Roland Traunmüller (Ed.)

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Preface

The EGOV conference series intends to assess the state of the art in e-Government and to provide guidance for research and development in this fast-moving field. Thus EGOV 2004 in Zaragoza built on the achievements of the previous EGOV conferences in Aix-en-Provence and Prague. This year the interest increased once more; thus the EGOV conference series has become a reunion for professionals from all over the globe.

EGOV 2004 brought some changes in the outline and structure of the conference: i.e., centralizing the reviewing process through the support of an ensemble of Area Chairs, and incorporating a workshop aimed at regional developments. Defining areas has extended the coverage of topics: examples are strategies and policies, public-private partnerships, change management, interoperability and semantic standards, G2G cooperation, public information, teaching and empowering staff, and voting. Several issues already well covered in last year's conference have preserved their topicality: governance and democracy, research methods, services and processes, knowledge management, security and identity management, legal issues. An annual conference bears a message as well: *"e-Government: the Challenges Ahead"*. This issue is treated as an introduction statement by the editor.

Rich was the set of themes covered in several streams. The following list of issues covered by the 3rd EGOV Conference gives an illustration:

- Frameworks and guidelines for e-Government and e-Governance
- e-Government policies, strategies and implementation
- Methods and tools for e-Government research
- e-Democracy and e-Voting
- One-stop government, electronic service delivery, mobile services
- International and regional projects, case studies and best practice
- Sustaining administrative processes, G2G cooperation
- Identity management and security: provisions and instruments, citizen cards, digital signatures
- Knowledge management, public information, GIS (geographical information systems)
- Interoperability and standards, semantic standardization
- Change management and new organizational arrangements: public-private partnerships, virtual teams
- Legal, societal and cultural aspects of e-Government
- International dimensions: cooperation, comparisons, networks
- Teaching e-Government

Networking is crucial, and thus to EGOV 2004 additional events were adjoined and in some way interlinked: the annual conference of "LEFIS" (Legal Framework for the Information Society), a workshop "Observatory on Interoperable e-Government Services", and a workshop "Metadata for Accessibility".

Several persons worked to form the conference and to prepare the program and the proceedings. The significance of the work of the Area Chairs is to be acknowledged; special recognition has to go to them as well as to the members of the Program Committee and some additional referees. The work of Gabriela Wagner, the scientific event manager in charge of the DEXA organization, deserves acknowledgment. In particular I thank Vera Himmelbauer, the coordinator for the program and of the proceedings of EGOV 2004; the editor expresses high appreciation for her extraordinary engagement.

Linz, August 2004 Roland Traunmüller

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Table of Contents

Introduction

e-Democracy

Interoperability

Process Management

Technical Issues

e-Voting

Services, Processes, General Assistance

Empowering the Regions

Methods and Tools

G2G Collaboration

Change and Risk Management

e-Governance

ID-Management and Security

Policies and Strategies

Geographical Information Systems (GIS)

Legal Aspects

Teaching and Empowering

Designing Web Services

Public Information

Workshop: Regional Developments in Global Connection

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e-Government: The Challenges Ahead

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Drastic Change and High Expectations

Change has become ubiquitous with globalisation and competition as dominant drivers. A common "quest for growth" exists paired with economic imbalances, finan-cial instabilities, societal and political unrest. Affluences and deprivation occur as well as an increased stratification of societies. Technology has become pervasive with no pause of evolution in sight. Economic necessity and lifestyle promote mobility and a round the clock economy. With a broad advancement in embedded computing, open systems interconnection and ambient intelligence technology reach all areas.

Likewise, expectations on government have grown. Living under good governance is a common goal calling for democratisation, coherence, accountability, efficiency, transparency and effectiveness. Such ideals have to be mirrored in the way government is working. The idea of good governance embodies four key marks:

- citizen-centric in attitude,
- cooperative in nature,
- seamless and joined up seen from the clients,
- multilevel and polycentric in composition.

Concepts have changed on the subject of government and IT. First awareness emerged three decades ago - e.g. in the German speaking countries starting in 1974 with the foundation of the discipline of governmental informatics (Verwaltungsinformatik). Later labels oscillated between administrative and technological focal points: for the former, New Public Management is an example; for the later, "information systems in public administration" has become the key. Now, e-government is forerunner with e-governance tightly following. Some focus on the "e" in e-government and want to replace it with "m" (mobile) or "k" (knowledge), others - in a radical view - tend to drop it. Let us take this merry-go-round of names as a sign of vitality with the implication of high expectations, and not as a dogmatic question.

Where Are We Standing

The state-of-affairs study of the European Commission's eGovernment 2003 Award represents a good point of departure. In the competition, 29 Countries participated with 357 cases of good practice submitted. The report was presented at Como in July 2003 demonstrating both, statistics and analyses of good practice, and a programmatic part. For more detailed information see EIPA website http://www.eipa.nl and www.e-europeawards.org. The programmatic part drew conclusions from the study and can be regarded quasi as a Vademecum providing powerful guiding visions for moderni-

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sation. So, it gives in many ways concrete advice for strategies, implementation and managing change. There is an unequivocal message from the study and prime insights can be outlined as follows (cf. [1]):

- e-government is the key to good governance in the information society.
- e-government is impossible without having a vision.
- e-government is not just about technology but a change in culture.
- e-government is not just about service delivery but a way of life.

Thus, e-government surpasses the administrative reform policies inspired by New Public Management (NPM, see e.g. [3]) and goes further than earlier approaches to modernisation. It aims at fundamentally transforming the production processes of public services (not only managing them as in NPM). Thereby it transforms the entire range of relationships towards public bodies. *Thus e-government is both, a vision and the construction site we live in.*

Building e-Government Is No Easy Task

Another outcome from the Como study [1] results in the reflection that building e-government is a challenging and strenuous task which has to overcome many hindrances. For example, leadership and commitment at the political level have to be convincing. This is particularly important where one has "to sell" the investment in infrastructures and qualification of staff. The problems may result from several inherent obstacles that will not vanish [2]: the goal structure of government has an extraordinary complexity; public agencies are not spurred by competition and there is a heavy dominance of legal norms. Just to mention the consequence for the latter: norms may restrict the possibility of process re-engineering by protecting the rights of citizens or safeguarding legal validity. A heavy obstacle is the high fragmentation of the public sector, where several actors get involved (in contrary to the private sector). Also administrative culture and historically grown structures may impede change. Finally, inertial forces are reinforced by bureaucratic attitudes.

Mixed Signs and Challenges Ahead

Various obstacles have become apparent, yet encouraging marks can be found. First to cite a growing awareness in politics and media. Governments have intensified co-operation at the international level; e-government legislation and master plans have become common. Examples are the eEurope 2005[1] strategy, the UK e-envoy initiative[2] or the "E-Government Act 2002" of the USA[3]. Not to forget the many projects on the national and international level leading to a number of best practice examples. Last but not least, e-government has evolved into a mature scientific discipline with a series of competitions and awards, conferences, networks, transfer events, delegations and learning journeys.

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[1] See http://europa.eu.int/information_society/eeurope/news_library/documents/eeurope2005/eeurope2005_en.pdf

[2] See http://e-government.cabinetoffice.gov.uk/

[3] See http://www.whitehouse.gov/omb/egov/

Accompanied by auspicious and warning signs likewise, we face the challenges ahead, which are briefly discussed in the following sections:

- Service Portal Creation
- Usability and Empowerment
- Process Improvement and Back-Office Integration
- Interoperability and Standards
- Security and Identity Management
- Collaboration via Multi Media
- Knowledge Enhancement
- Change Management.

Challenge 1: Portals for Service Provision

Without doubt, services are in focus. Many applications run – yet the picture is equivocal as there is a low take-up of electronic public services. Generally, citizens are not aware of economic and individual benefits. Also the level of service integration is not convincing. Access and usability are a prime concern with various requests. A main demand is a single-window access for all services regardless of government level and agency and the establishment of a high level of service integration. Other demands include a multi-channel access mix with a diversity of contact points: home and mobile as main choice, in addition kiosk, citizen office as well as multifunctional service shops. Also customisation and personalisation is on the agenda. Design for such service portals has to consider the entire interaction process accompanying any service delivery.

Challenge 2: Usability and Empowerment

According to challenge 1, usability is a major concern. Usability is the result of good design which means a holistic approach (see e.g. [4]) and meeting high standards of quality. There are prime criteria for usability: functionality, self-description of software, a conformity of the system to user expectations and the robustness of handling. Other demands call for more intelligent modules that provide customized help functions. One has to be aware that improving usability is only one side of the coin; the other one is empowerment. Training of staff by qualification activities and raising the general level of computer literacy are urgent objectives.

In any case, digital inclusion is searched after. It starts with possibility of access: some initiatives install free internet access in public buildings. Examples of good practice are post offices in France, parish churches in Portugal and tobacco shops in Austria. Policies have to address two directions, counterbalancing deficiencies and starting promotions for special groups concentrating on individual groups of addressees such as rural areas, traditionally under-served communities, the young in disadvantaged districts, ethnic minorities, persons with special needs.

Challenge 3: Improving Processes and Back Office Integration

Most applications cut across different government levels – local, regional or national – and different types of agencies. Cooperation joining up different branches and levels is needed to enable close and pertinent contact among all actors involved. The need is enforced by a general trend towards outsourcing and devolution with decision-making shifted to the lower administrative levels. Further on public administrations work via a complex tissue of cooperation involving quite many acting entities.

To say it in a bold way: administration means cooperation. The solution is back office integration and the first step is redefining of processes. It starts with understanding the nature of administrative work, rethinking the processes and then suggesting changes. Reengineering processes means to integrate diverse demands from citizens, businesses and public authorities (holistic and service-oriented view, see [4]). In addition, a restructuring of the business processes calls for a broad perspective including vertical and horizontal cooperation between public bodies as well as with external partners. As mentioned before, BPR has some strong limitations, as in the public sector, several boundaries are defined on purpose bearing a particular meaning.

Challenge 4: Interoperability and Standards

Interconnectivity is a huge task and has to be seen in a wider sense. Taking the conceptual level first: progress starts establishing a common understanding of administrative concepts and processes. It is followed by ensuring interoperable platforms on the technical level and by defining formats for data interchange. Interoperability and back-office integration are closely connected. It is interopera-bility that will bring tangible increases in effectiveness. The necessary condition for EDI (electronic data interchange) in the broad is the establishment of semantic standards. Currently, strong focus is put on this issue (e.g. the EC launched the Interchange of Data between Administrations (IDA) programme[4].

Legal and administrative semantics of data need to be represented carefully, to allow global use of local data. Otherwise the correctness of procedures cannot be granted. Further, it must be recognised that the EU cross border data interchange becomes the rule; so problems of semantic standards have to be solved. This is not easy and some examples may illustrate it: finding adequate meaning of terms (taking licenses, certificates and academic degrees); different connotations of terms may occur (such as boundaries of professions as in the case of lawyer and barrister); non-existence of counterparts may occur: public honours, awards, and titles and different categories.

Challenge 5: Identity Management and Security

Running administrative systems implies high demands on security. Especially for online service provision, a unique and trustful e-identity is needed in most transactions. Currently, many activities are going in this direction. To name a few examples:

[4] http://europa.eu.int/ISPO/ida/jsps/index.jsp

research projects in the 6th framework programme of the EC[5]. Several countries have successfully implemented the citizen cards and digital signature cards such as Austria, Belgium, Estonia, Finland.

As a broad deployment of digital signatures will take time, provisional solutions are important as well. They are promising as a strategy to break a common deadlock: few applications exist because there are only few citizen cards available; vs. deployment of such cards is weak, because too few applications are running. It is important to come out from this vicious circle. A possible way is an identification of users done in service points such as the nearest citizen office or multifunctional service centres. There is an additional advantage as local officials or bank staff might also provide assistance in case of emerging problems of ICT illiterates using online services. From the side of banks it is an interesting public-private partnership that may help building the image in showing care for their clientele. Furthermore, banks may be considered trustworthy to their clients and so, synergies could be exploited.

Challenge 6: Collaboration via Multimedia

Today, a pronounced attention is put on operational systems such as workflow. At the same time, multimedia collaboration is underrated. At higher ranks, the type of work is mainly collaborative and of knowledge-rich style. Multimedia collaboration may be used for negotiation, consensus finding, planning and policy formulation. Examples are plentiful such as meeting via video techniques, scenarios of policy implementation, discussion with remote experts. Also the level of service provision comprises collaborative steps such as giving advice or settling claims. In a future scenario, mediators and experts may be accessed via multi media links.

Challenge 7: Knowledge Enhancement

Government has to keep up with the knowledge society and needs self-reflection as intelligence organisation. There are many facets to make government a whole becomes more knowledge enhanced. The scope of managing knowledge is broad. Favouring democratic deliberation, sustaining political decisions, and drafting legislation is only part; others are building repositories, learning lessons, and enhancing processes. Especially, knowledge enhanced processes is a chance. So attention gradually shifts from structures and processes towards issues of content thereby reaching the very heart of administrative work: making decisions.

One example may be the creation of repositories for process knowledge for novices in work; another example is matching automatically an incoming demand with internal administrative structures. A big issue in service provision is often translating from legal and administrative jargon into real world language and vice versa. Technically, multiple means are possible: conventional databases, more advanced forms of repositories using knowledge ontology, software agents, semantic net technology or establishing a knowledge cartography. Also expert knowledge and its access is part of it, such as multimedia access to remote persons and building learning communities (see section before).

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[5] http://europa.eu.int/information_society/programmes/egov_rd/fp6/fp6_projects/index_en.htm

Challenge 8: Change Management Is Crucial

The factors influencing success are numerous. At higher level, a favourable environment has to be created: the commitment of the management for strategic planning and master plans, adequate funding and public-private partnerships, an adequate legal and regulatory frame. Involving staff is important. For staff members that means getting more responsibility and taking part in a qualification initiative. Steering change of administrative culture is key and various activities have to be spurred. An exchange of experiences, spotting good practice and an openness for lessons learnt are crucial.

To conclude: addressing these eight challenges is next action to take to reach the goals and vision of e-government. The EGOV 2004 proceedings shall give insights and clues of how to address these challenges by some means or other in an effective way.

References

1. Leitner, Christine (Ed.). eGovernment in Europe: The State of Affairs. Report of the European Commission presented at the eGovernment 2003 Conference in Como (Italy), European Institute of Public Administration, Maastricht, 2003
2. Lenk, K. and Roland Traunmüller. Perspectives on Electronic Government. In Galindo, F. and Quirchmayr, G. (Eds.). *Advances in Electronic Government.* Proceedings of the Working Conference of the IFIP WG 8.5 in Zaragoza, 2000, pp. 11-26
3. Schedler, K. and Pröller, I. New Public Management. UTB, Stuttgart, 2000
4. Wimmer, M. Integrated service modeling for online one-stop Government. EM – Electronic Markets, special issue on e-government, 12:3, 2002. pp. 1-8

Electronic Democracy and Power

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Abstract. The paper discusses, mainly on a principal and general level, answers to the question: To what questions about democracy is Information Technology (IT) the answer? Parliamentary-centred democratic procedures, in a newsmedia-saturated society, generate less and less enthusiasm among citizens. There's no evidence that people are turning anti-democratic, but opinion polls in both western Europe and North America show that in practically all countries, citizens feel gradually more detached from the established political process. Political reality seems to be moving further and further away from the ideals of democracy as described in political science textbooks. Although IT could be designed to support democratic procedures by which citizens could regain the political power they obviously feel they have lost, this is not happening. Electronic Democracy is very little about electronics, and very much about democratic reform – about power.

Introduction

Current, parliamentory-centred democratic procedures generate less and less enthusiasm among citizens. This is well documented and in most western countries, politicans as well as political scientists have laboured with the problem for 20 years or more. Noumerous "fixes" for the malfunctioning parliamentory democracy have been tried and they have virtually all failed.

But now there's the Internet. Although "only" a technical platform for communication it has also become the platform for a wave of new efforts to strengthen democracy. Having wrestled with these issues for about a year, in a report to a swedish, government-appointed committé on democracy, I conclude:

IT is the answer to quite a few of our troubled questions about democracy, at least if so called strong – or participatory – democracy is what we are hoping for. The possibilities to support "wired" citizens as co-actors in decisionmaking processes seem apparent. The major obstacle to political reform in this direction is that the institutions & interests dominating the political scene won't like it. As allways in the history of mankind, powerful groups are likely to oppose any societal reform that may undermine their influence. The most important challenge is not technical. It's social.

Framing the Questions

In 1993, president Clinton and his even more enthusiastic vicepresident Gore announced that the United States would race into the future on Information Superhighways. (1) The following year, the European Union declared that it was

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transforming into an "Information Society" (2) and ever since, an endless row of politicians, scientists, journalists and cyber-gurus have argued about the consequenses for democracy. By now, the amount of books and articles on the subject "Information Technology and Democracy" is overwhelming.

After having worked with these issues – as author and scientist – for six years I conclude that, of the people who actually try to answer the question – Is IT a good thing for democracy? – practically all can be put in one of two categories:

- Either they answer that, YES, Information Technology can be used to strengthen democracy in many different ways (3), or
- they answer NO, there are no signs of healthier democracies as all those millions of citizens are getting on-line (4).

Please note that these answers are not contradictory. Even though many participants in this debate seem either wildly utopian or despairingly dystopian, when they are categorized this way in YES and NO – they actually both make sense. YES, Information Technology can be used to strengthen democracy, and NO – so far, it hasn't been used that way.

Let me state early on that in arguing that "stronger" democracy can be realized by use of IT-applications, I'm not talking about instant, push-button democracy. There are no indications supporting the idea that frequent referendums on the Internet – as the major component in democratic reform – would solve current problems.

My focus is on political reform that would empower citizens to order effective investigations into matters were there's an obvious need for more or better facts, and to allow them to make crucial policy-decisions in key areas. Not instant, direct democracy, but an empowered citizenry.

The heart of the problem is obviously not technical. It's not about encryption-applications or agent-software that will do miracles for the citizen. No move by a computer scientist or programmer, however brilliant, will ever save democracy. The heart of the problem is power. Who controls what resources of information or finance? There's no technical answer to that question.

With the issue of power as the starting-point, I must embark on a detour in modern political theory & practice before I come back to the issue of Information Technology.

Democracy Today – Three Troubling Circumstances

As I indicated, traditional, western-style parliamentory democracy is in a state of decline. The trend is quite clear from opinion polls in both western Europe and North America. (4) In practically all countries, citizens feel gradually more detached from the established political process and view it with growing cynicism. Political reality seems to be moving further and further away from the ideals of democracy as described in political science textbooks. Citizens view the political system as more distorted than ever.

According to some critics, politics is turning into a powergame that citizens can watch but not in a meaningful way take part in. According to others this is not new – it's just that the realities of political life is becoming more evident to more people. As political scientists continously have showed (5), our democratic system has allways been more or less distorted or corrupt – and now people are seing it, they argue. In

1999, they pointed to the members of the European Commission, forced out of office on allegations of nepotism, greed and incompetence. In 2000, they likely refer to the revelations about former german Chanceller Helmuth Kohl and his party CDU.

There's no evidence that people are turning anti-democratic, but opinionpolls from virtually every country in the rich part of the world show that politicians are viewed with a growing sense of suspicion and distrust. The general notion seems to be that if You are not rich or well connected, it rarely matters what you say, know or do.

This is rather a dark view. I won't try to analyse exactly to what extent this gloomy picture of current parliamentory democracy is supported by facts. I'll just summarize what so many political scientists have found in recent years, namely that a number of factors actually do distort our democratic processes. Usually these factors are interconnected, although weighed differently by political analysts. Just to mention three factors, all very difficult to tackle:

Firstly, no one seriously denies that money talks, and most find that it talks loudly, in politics. Exactly in what ways and how effectively Big Business excercise politic influence may be subject to debate, but that political strength comes with financial strength is really not a controversial statement. (6)

Secondly, journalism has become far too dominating among the sources – for citizens – of politically relevant information. In many instances, it seems to be the only source. But journalism, and particularly news reporting, is much more about "selling" sensations and personalities than providing citizens with the kind of information they need to take part in their own governance. (7)

Thirdly, we have the process of globalization. It's forcing more and more politically important decisions to places/levels where there's no democratic control, no real possibilities for citizens to hold political, beaurocratic or financial elites accountable for their decisions. (9) Who can be made responsible for what the EU does, or NATO, the World Bank, the World Trade Organization, General Motors or a media-empire like Bertelsmann?

The Bad Circle

I should stress that I don't think there's any conspiracy among elites to deprive citizens of political influence. As I understand them, most politicians and civil servants are democrats at heart. If they could detect a clear, well-informed public opinion on the issues at hand, they would in most cases – maybe not all – respect it. But they don't see any competent citizenry manifesting its will, and therefore they see no other way of "doing politics" than the one at hand.

One might ask if this is so bad? Shouldn't we accept that in our extremely complicated society, a lot of power must be handed over to experts?

Well, I won't go deeply into the choice between "thin" democracy and "strong" democracy – between a democracy where people basically just vote and a democracy where well informed citizens actively take part in and influence all important political decisions. (10) I'll just conclude that "thin" democracy is what we are getting more and more of.

In fact, "thin" democracy these days seem to force political life into a bad circle. The less influence citizens can have in the daily political process, the less they will bother to learn about and deliberate on political issues. And the less they learn and deliberate – the less suited they will be to excercize influence. Which means that the

influence they do have should be minimized. Ignorance can't rule, can it? We know how dangerous that can be.

"Thin" democracy seems, at least these days, to equal a less and less trusted democracy. This trend is obvious in many countries, not least in Sweden. Noumerous studies by swedish political scientists show that voter distrust of parties and politicians have increased steadily over the years. Just to to pick one piece of statistic evidence:

- From 1968 to 1991, the part of the electorate that agreed with the statement, "decision makers in parliament do not care much what ordinary people think" went upp from 46 to 70 percent. (11)

Although many countries would be quite satisfied with 79% voter turnout in a parliamentory election, this number for Sweden in 2002 was a significant drop. It was 8% down from 1994 and 2% down from 1998, in a country that for five straight elections (1973-85) had over 90%. In the 1995 elections for swedish delegates to the EU Parliament, the voter turnout was just above 40%, and then dropped to 38% in the 1999 elections.

Once huge – membershipwise – popular movements and political parties in Sweden have for a long time been loosing members. As in so many other countries, this has sparkled the political establishment – including quite a few political scientists – into debates about possible ways of renewing political procedures and institutions. Many solutions have been tried during the last 15 years. Several of these have been based on the idea that politics must be "modernized" to better suit the massmedia, primarily television. The tempo of parliamentory debating have been raised and hearings in parliamentory committées have been broadcast live. Sweden have had "campaigns for democracy" in the schools and in 1998 prime minister Göran Persson started appointing a "minister for democracy" as a member of his cabinet.

Two relevant issues though, has allmost entirely been kept off the political agenda. Firstly, the alternative to move, even if only a few cautious steps, towards more direct empowering of citizens has not been seriously considered.

Secondly, IT-applications has not been a substantial issue in the debate on renewal of democratic processes. Communications technology has by most influential people – leading politicians, leading political scientists – been dealt with as a societal force in its own right, as something that is "coming" and "changing" the lives of everyone. It's doing something to us, we are not doing something with it.

This is remarkable, not least if one considers that Sweden in most aspects have been quick to adapt to new technologies and very much part of the Internet-boom. A couple of years ago the electronic journal NetPulse reported that Sweden is actually No 1:

"Sweden now tops the U.S. as the world's leading IT and Internet nation, according to the 2000 IDC/World Times Information Society Index released by International Data Corp. Sweden received 5.06 index points, compared to the United States' 5.04 points. Third was Finland with 4.58 points." (12)

Swedes seem able to do a lot of things using the net, but modernizing democratic processes is so far not one of them.

The Cost and Value of Democracy

If we take for granted the current prerequisites for democracy, we seem to be stuck with precisely the all-representative system that citizens trust less and less. But what if we change the prerequisites? If citizens were allowed the time & resources necessary to learn and deliberate, and guaranteed some influence on the political process and the decisions?

Is this possible, from a practical point of view?

One might argue that even if a lot of decision-making-support for citizens – high-quality information, frameworks for deliberation – can be provided with IT, it would cost too much.

It would certainly cost something to develop the software to support citizens in their capacity to make political decisions, and it would cost a lot more to guarantee all citizens both access to the Net and the training to use it. And that's not all. The deliberative part of such new democratic procedures would most likely – if successful – include discussions in thousands of groups with hundreds or thousands of participants each, which would require extensive, professional moderation, costing more money. And because time is money it would also cost a lot to have citizens take time from their ordinary work – which might prove necessary – to do what might be called "democratic work".

Democracy isn't free.

Neither is any other system of governance, though. When the citizen's distrust of the current democratic institutions gets deep enough, when they no longer see decisions made by parliaments and authorities as really legitimate – societal conditions usually develop that are not only unpleasent for most people to live with but also very costly. We would, most likely, see a reduced acceptance of societal obligations, like paying taxes and generally abiding by the law. When citizens start looking for alternative ways of protecting themselfes or making sure that justice is done, ways that have no connection to democratic institutions, society is in trouble.

I'm not predicting that this will happen, large-scale, in the near future. But the longtime trend is obviously that citizens loose trust in the political system. It could be that the general frustration among citizens with a growing sense of powerlessness will create, in a not too distant future, a political climate that is very unpleasent – for all.

Engagement

But citizen's aren't really interested, are they? How do we know that they will engage in learning, deliberating and decision-making the day they are provided the possibility?

All citizens certainly won't. Obviously, we won't know how many until we have done some serious practical experimenting. However, there are at least a couple of reasons for optimism. One is already mentioned: that the costs for a bad-functioning, all-representative democracy will be paid by the vast majority of citizens. The incentive to do "democratic work" is there for everyone who wants to live in a decent society, where the sources of power are generally concieved as legitimate.

Another reason for optimism is the findings by political scientists when experimenting with alternative democratic processes.

James Fishkin, american professor of Political Science, and creator of the so called Deliberative Poll is probably the most famous of these scientists. He has shown quite convincingly in both Britain and the US that when citizen's are placed in a situation where they 1) are provided the relevant information, 2) can seriously deliberate with others, and 3) have reason to believe that they will be listened to – they function very well as responsible decisionmakers/voters. (13) This capacity of ordinary citizen's is also demonstrated in several other experiments with alternative democratic procedures – labelled Televote, Citizen's Jury and the german Plannungszelle to name a few. (Of course, the swiss tradition of direct democracy also prove that citizens can handle decisionmaking authority without messing up.) (14)

If we, as most democrats would have to, accept the idea that ordinary citizens under favorable conditions can take responsability for their own society, the crucial question is: can we establish those conditions for everyone? Here's where Information Technology offers a whole new set of possibilities.

The Technological Challenge

Today, enormous sums are invested in R&D in the broad field of decision-making support. In business and in the public sector, as well as in academic environments, new software is developed to help people reach better decisions quicker. Executives of every variety, lawyers, stock brokers, salesmen, journalists, geologists, medical experts, etc etc – they are for each year provided better and better tools to gather and analyze exactly the information they need to do a more qualified job.

Virtually nothing, though, is invested in developing this kind of knowledge-management-systems to support citizens. Here's one of several crucial challenges for those who set out to restore faith in democracy. Training in the retrieval and management of politically relevant information must be compulsary at all levels of the educational system and available to all grown-up citizens.

The quantity, quality and accessibility of this kind of information is crucial. It must be presented in the most comprehensible way possible. By "information" I mean facts, different enterpretations of facts and the varying explanations of how these enterpretations relate to fundamental values and to society as a whole.

Citizens also need access to experts, in a wide sense of this term. If the issue is, say, poverty, the beggar and the bag-lady are experts in there own right, as well as the social worker, the policeman and the professor of sociology. Using the new, interactive technologies, new possibilities for communication between citizens and experts must be explored. Depending on the subject, the situation and number of citizens involved we could be talking about unmoderated, moderated or heavily moderated exchanges of questions and answers, of proposals and reactions to them.

These and other ways of supporting citizens about to take more responsability for their own governance are all technically feasible today. Although technology certainly will become more powerful and sofisticated in the future, the real bottleneck in developing new resources for education and deliberation is in the human mind. Citizens as well as political elites must not only understand the opportunities inherent in new technologies, they must also dare think of radically different ways of creating dialogue and reaching decisions.

The Political Challenge

IT neither saves nor destroys political democracy. It's a tool, a formiddably forceful and flexible one, but as every other tool the effects of it are up to the users. Several experts of political science have pointed out that, in the words of famous american scientist Robert Dahl: *"the democracy of our successors will not and cannot be the democracy of our predecessors. Nor should it be."* (15)

Former prime minister of Sweden, Ingvar Carlsson, put it simply (in translation):

"No one would dream of putting clothes made for a three-year-old on a thirteen-year-old and ask why they don't fit as they did ten years ago. A living democracy, that grows and matures, must also get new clothes, that fit." (16)

Our future society will to a great extent be based on functions of IT. This society is not "coming". We are building it. Democracy is not "happening". If we want democratic procedures to be an integrated part of our society, we must design them too.

References

1. Information Infrastructure Task Force, IITF. (USA) "Agenda for Action", 1993.
2. Bangeman Group. "Europe and the Global Information Society, Recommendations to the European Council". 1994.
3. Grossman, Lawrence K. "The Electronic Republic. Reshaping Democracy in the Information Age". Viking Penguin, 1995,
4. Arterton, Christopher F. "Teledemocracy: Can Technology Protect Democracy?". Sage, 1987
5. From the Swedish parliamentory comittée on democracy: SOU 1999:151 Citizen Participation in European Politics
6. Ferguson, Thomas. "Golden Rule. The Investment Theory of Party Competition and the Logic of Money-Driven Political Systems". University of Chicago Press, 1995.
7. Fallows, James. "Breaking the News. How the Media Undermine American Democracy". Pantheon Books, 1996.
8. Rosen, Jay. "Getting the Connections Right. Public Journalism and the Troubles in the Press". The Twentieth Century Fund Press, 1996.
9. Dahl, Robert A. "On Democracy". Yale University Press, 1998.
10. Barber, Benjamin R. "Strong Democracy. Participatory Politics for a New Age. University of California Press, 1984.
11. Åsard, Erik/Bennet, W. Lance. Democracy and the Marketplace of Ideas. Communication and Government in Sweden and the United States. Cambridge University Press, 1997.
12. N e t P u 1 s e – the e-journal of politicking on the Internet. Volume 4, Number 9, May 2, 2000. (Distributed via e-mail.)
13. Fishkin, James. "The Voice of the People. Public Opinion & Democracy". Yale University Press, 1995, 1997. See also Iyengar, Shanto / Luskin, Robert C./ Fishkin, James: Facilitating Informed Public Opinion: Evidence from Face-to-face and Online Deliberative Polls. http://cdd.stanford.edu/research/
14. Linder, Wolf. "Swiss Democracy. Possible Solutions to Conflict in Multicultural Societies". MacMillan Press/St Martin's Press, 1998.
15. Dahl, Robert A. "Democracy and its Critics". Yale University Press 1989.
16. Elmbrant, Björn. "Dom där uppe – dom där nere. Om demokratin i Sverige." Atlas 1997. (In Swedish only.)

17. Kubicek, Herbert/Dutton, William H./Williams, Robin (edts). The Social Shaping of Information Superhighways. European and American Roads to the Information Society". Campus Verlag/St. Martin's Press, 1997.
18. Morris, Dick. "Vote.Com: How Big-Money Lobbyists and the Media Are Losing Their Influence, and the Internet is Giving Power to the People", Renaissance Books, 1999.
19. Barnett, Steven. "New Media, Old Problems". European Journal of Communications. Vol 12, No 2/1997.

Young People and e-Democracy: Creating a Culture of Participation

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Abstract. Research originally suggested that new technologies, particularly the Internet, provided a useful mechanism for engaging young people - an otherwise largely disenfranchised group. Subsequent to the evaluation of a number of pioneering projects in this field it has become apparent that merely providing online tools is not sufficient to engage young people democratically. In order to begin to resolve some of the underlying issues a number of interviews with youth consultation coordinators in Scotland have been conducted and youth consultation best practice documents have been researched. This has resulted in the development of four high-level stages, which situate online youth dialogues in a much broader, supporting scheme. Evaluation research is planned through the development and field-testing of further youth consultations. Our work will continue to research ways of developing online youth consultation tools that are both used and useful. At present, as this paper details, it appears that the only way this will occur is if 'traditional' offline techniques are implemented to help alter a cultural view of young people in opposition to what it means to be a citizen.

1 Introduction

This paper is based on research regarding young people's online engagement in policy-making in Scotland conducted over the past four years. This research had suggested that new technologies, particularly the Internet, provide a useful situation for engaging an otherwise largely disenfranchised group [1]. Subsequent to the evaluation of a number of pioneering projects in this field it has become apparent that merely providing online tools is not sufficient to engage young people democratically. New research, however, suggests that by re-focusing on offline methods of consultation, and using this as a foundation from which to build useful online consultation tools for young people, some success in this area might be gained. Following this introduction, the first section of this paper examines the need to consult young people. The reasons behind online youth consultation and the problems that underlie this are then examined. A third section details a number of stages and principles that, through our research, have become apparent for successful youth consultation. Finally our future research and evaluation of the precepts detailed here are outlined. Throughout this paper a practical example of an online youth consultation mechanism, Young Scot's Ur'Say will be used for clarification. Young Scot is an information, rights and dis-

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counts organisation for young people in Scotland[1]. Young Scot has been keen to use its portal to facilitate young people's involvement in decision-making. Therefore, the 'Ur'Say' discussion forum was added to the site, where a variety of debates have been held. The Ur'Say pages provide background information for young people to read, including 'expert witness' statements to encourage informed debate [1].

2 Background to Youth Participation

The drive to consult and increase citizen participation, or to 'reinvigorate democracy', in the UK has been an ongoing issue for a number of years now. One of the reasons for this concern is the increasingly low level of voter turnout. In the 2001 UK general election the official turnout was 59.4%, which is the lowest since 1918 and the lowest ever under the full democratic franchise. Young people are amongst the least likely to participate, with only an estimated 39% of 18–24 year olds having voted [2]. More recent research amongst young people in Scotland shows that; 'fewer than one in five young people (17% of 11-16 year olds and 16% of 17-25 year olds) believe voting in elections is important in making someone a good citizen and less than half (41% and 48%) agree that it is important to vote' [3]. Clearly this does not bode well for the future of British democracy. The Electoral Commission voices the concern that: 'Unless this generation of young people becomes more civic-minded as they age, the nature of British democracy is likely to become increasingly passive' [2]. Recent legislation requires some levels of government to talk to young people on issues that have significant impact on their lives in accordance with Article 12 of the UN Convention on the Rights of the Child. This recognition that young people are citizens too and thus entitled to be heard is compiled with a host of factors that indicate the benefits of involving citizens in decision-making. For instance, the realisation that this can lead to greater trust in government through visibility and transparency and that there can be more effective implementation of policy through informing and involving citizens [4].

The above outlines the main reasons for involving young people in decision-making, yet do they wish to be involved? Studies of young peoples' attitudes to political practice have shown widespread disregard for conventional politics, but also widespread dissatisfaction with their lack of involvement [4,5,6]. Thus, current investment in consulting and involving young people stems from the view that their rejection of politics reflects feelings of exclusion and disenfranchisement from the public sphere. Therefore, by giving them the opportunity to participate and have their say on issues that affect them, young people may feel listened to and thus become engaged and responsible citizens [4],

3 Young People and Technology: Opportunities and Challenges

Increasingly, information and communication technologies (ICT's) are seen as one way in which citizens may be engaged in the democratic process. It is believed that innovative use of ICT's might enable young people to engage with political issues, the processes of public decision-making and wider civil society. ICT's are pervasive

[1] www.youngscot.org

in many young peoples lives in a way that other mainstream mechanisms simply are not. Statistics show that 81% of households in the UK have access to a personal or laptop computer in the home and that nearly all young people aged 5-18 (98%) use computers at home, at school or elsewhere [7]. Further, it has been argued that whilst young people wish to be engaged, they cannot relate to the traditional means political institutions use to communicate with the electorate [8]. In this case, ICT's, particularly the Internet, provide a modern means of communication, and arguably one that young people resonate with. Perhaps the most important opportunity provided by the Internet is the ability to *practice* democracy and this is a key factor in engaging young people:

> As parties have declined, and young people in particular have tended to resist joining them, there are few obvious places to go and learn how to 'be political', or 'act democratically'. Creating online spaces, such as discussion forums, in which young and old can experience communities of democratic practice, is likely to be of more use then many hours of citizenship teaching in the classroom. Young people need opportunities to practice democracy, not simply watch or read about it as outsiders [9].

The Internet offers an opportunity for young people to get information, debate issues of public policy with each other and with decision-makers, to have these views considered and any outcomes fed back to them. In other words, people and situations that young people would not normally have access to could become within easy reach and there is the potential to have an influence [6].

Despite the potential for active involvement through the Internet, participation by young people in online consultation projects that the authors have undertaken has proved to be disappointing. It is clear that merely providing online mechanisms is not enough to encourage active citizenship. It has thus become necessary to examine the notion of online youth consultation and a number of basic assumptions have become apparent. These assumptions and the issues they expose need to be considered in order to move forward and produce useful techniques for involving young people in decision-making.

The most immediate stereotype that should be addressed is that young people are somehow inherently good at and at home with technology. As Neil Selwyn has described:

> The portrayal of children and ICT has proved an enduring and multifaceted aspect of the social construction of the 'information age' over the past two decades. [...] Given such pervasiveness, it is unsurprising that many people concur with the over-riding idea that younger generations are inherently more skilled and adept at using IT [10].

The fact is that the present generation of young people have had a great deal of involvement with ICT's in their early years, yet they still learn how to operate technology just like everyone else, and just like everyone else some of them will be adept at it and others will not. Despite pressures to become 'techno-savvy', many young people choose not to participate and remain 'technophobic' [11]. Research conducted by the Hansard Society revealed similarly that the common view of young people being effortlessly at home with ICT's is unfounded, when many, in fact, find even simple navigation and communication problematic [9]. This is the first stumbling block to focusing entirely on ICT's for youth engagement, and like a weak foundation it cannot support what is built upon it: the view that young people will suddenly want to be involved with politics and decision-making because the Internet makes it 'trendy'.

> Even when transmitted by the most sophisticated and cutting-edge multi-media technologies, dull political messages are still dull political messages and grey politicians are still just as miserably grey [12].

A further aspect of such assumptions regarding young people and technology is the erroneous view that they are a homogenous group. Many texts on youth consultation mention this in a token-like way, but fail to give this important point any real weight. Young people are gendered, classed and ethnic subjects and this will influence their perspective on life in general, and on technology in particular. To see them in any other way results in a 'one-size fits all' product, which may detract from efforts made for their full involvement [13].

Another reason for the lack of success in involving young people in consultations, both on and offline is the lack of tangible outcomes from such initiatives [6,14]. If outcomes are not fed back to young people, or if there are no impacts, then their involvement will merely seem tokenistic and will not contribute to creating a culture of participation. These lack of outcomes point to a deeper, underlying issue that needs to be addressed in order for us to come to some productive conclusions about how to consult and involve young people and to make full use of the opportunities offered through ICT's. It is generally accepted that the category 'child' or 'young person', just like that of 'adult', is socially constructed. This is evident from the changing societal attitude towards childhood and what it means to be a young person over the centuries, and in different cultures [e.g. 15,16,17,18] David Buckingham argues that in most 'Western' countries children are seen to be 'pre-social individuals' (i.e. they are not fully part of society) and young people are in somewhat of a liminal phase. He states that this notion of pre-sociality effectively excludes young people from being citizens [19]. In fact, he believes that young people are effectively defined as all things opposite to the traditional definition of a citizen.

> Citizenship is predominantly perceived to be a function of rationality: it requires a fundamental distinction between public and private, a free flow of undistorted communication and a dutiful subjection to the public good. In these respects, enfranchisement, political rights and citizenship are defined in opposition to all the things that children and young people are traditionally seen to represent [19].

If this is the case then a whole cultural attitude about young people must be altered before any real change can take place. This means that merely providing online consultation mechanisms is not enough, and, as we and others [20] have discovered, will not work alone.

4 A Possible Way Forward

In order to begin to resolve some of these underlying issues a number of interviews with youth consultation coordinators in Scotland have been conducted and youth consultation best practice documents have been researched [e.g. 21,22,23,24,25]. What has become apparent is that there is not a quick fix to elicit any lasting shift in attitudes towards and by young people regarding active citizenship; a habit of participation needs be built. ICT's could provide very useful tools to aid this process, but they need to be seen as just that, tools; not as the solution itself. The OECD has concluded similarly that technology can be an enabler, but interest in technology is not

sufficient in itself to address the democratic deficit [26]. Our research has thus led us to develop four high-level stages, which situate online youth dialogues in this broader, supporting scheme.

Offline Principles are the first stage in a youth consultation. For any person, including young people, a desire and ability to engage in informed debate is a necessary prerequisite to actively taking part. In the current climate of disengagement from the political sphere, encouragement may be required for participation in each consultation. Likewise, ongoing education in the skills and issues necessary for online engagement may be necessary to make such a tool effective. Without the various prerequisites pertinent to this stage, young people will be without the impetus and grounding that the conditions of personal interaction provide.

Online Engagement has a number of potential key advantages in youth participation already outlined above. Importantly, they provide a potential option for active participation, which can transcend a number of limitations (e.g. time and location).

Analysis and Evaluation are necessary following (and perhaps during) any on and offline initiatives. Firstly, there are the results of consultations to be analysed; secondly, there must be an evaluation of the ways the consultation was carried out and its relative success. Finally, results from consultations need to be presented to those with the decision-making power.

Feedback and Ongoing Involvement is the final stage, as outcomes from consultations, i.e. the effect they had on policy, need to be fed back to those young people who took the time to participate. Young people must be kept in the loop and indeed be part of any ongoing evaluation themselves.

In recognition of the need for a supporting base for their online consultations, Young Scot's Ur'Say is being re-developed. This involves a shift of focus, both from online consultation to holistic dialogue, and from national consultations to local ones. Ur'Say will reflect and support the new 'Dialogue Youth (DY) Units'; part of the local government youth consultation system in Scotland. Each local authority has set up a DY unit in partnership with Young Scot and they are responsible for engaging young people in decision-making. The new 'Ur'Say toolkit' being developed is intended to provide DY units with a range of options for developing on and offline consultation mechanisms, which will support and feed onto each other. For instance, there are online options to advertise and sign up to offline events. Whilst online tools will be used as an addendum to any offline conferences etc. It is felt that DY Units could provide the necessary means of grounding any online discussions in 'traditional' youth consultation techniques, and fulfilling each of the four high-level stages. In addition to this, another advantage of this localised forum, as Edwards [27] notes, is that young people tend to engage with issues that are 'close to home'. She therefore notes that local authorities are in a unique position to engage young people in decision-making processes by facilitating their involvement in issues that they may see as immediately relevant.

The current development and future success of Ur'Say is thus hinged on building a deeper system of participation by utilising all mechanisms of youth consultation and by focusing on local and more 'relevant' issues. However, a third important facet of the re-design has been the diversification of the online tools provided. Having a range of online tools recognises the need for a diverse choice of participatory mechanisms

in order to ensure inclusion. This also allows DY Units the option of which tools to use depending on the particular consultation, the desired outcomes and practical issues such as staff time and skills. Finally, it is important to find new and fun ways of engaging young people in order to maintain their interest. These online tools are currently under development, but the following are anticipated:

Discussion Boards are an area for debate on specific topics allowing for the expression of deliberative comments. The main advantages are that they support interaction, thought, deliberation, debate and allow for a full discussion. They are, therefore, potentially useful for the development of active citizenship skills. However, since they do potentially allow for such a broad and deep debate, staff time and skills are required to moderate, support and facilitate such discussion, as well as the skills to analyse contributions to produce reports.

Group to Group Chat utilises the same format as discussion boards, but is time-specific and limited. Young people could be given the opportunity to chat to those with decision-making power at pre-arranged times. This would be a fun element, yet also increase transparency in decision-making as questions and opinions can be directly corresponded. Some of the challenges of live chat are that it could be somewhat difficult to arrange; timing things to suit all concerned, and ensuring that young people are aware of the opportunity. It would also, again, require a moderator, necessitating staff time and skills.

e-Petitioning can be used as a 'bottom-up' tool for young people to lobby opinion. Links through to discussion boards would also allow them to expand on their view.

Surveys can be utilised to canvass the views of young people by using a variety of different question-types to collect fairly broad ranging data. Advantages of surveys are that they collect quantifiable data that is easy to analyse and understand, they require a minimum of staff time and skills, and they are also a good option for some young people with specific computer literacy issues. On the other hand, being partially closed questions, they do not allow young people to fully express or expand upon their views; young people might not feel able to have their true say, nor can they see each other's views, detracting from deliberation. Aside from concerns over the representativeness of statistical information, direct and active involvement is limited, and citizenship skills not fully built on.

e-Voting is a fun element, easy to use and gives instant gratification, as current results could be instantly viewable. Again, this requires minimum staff time and skills, and provides simple statistical information. Yet, equally they limit involvement as well as the development of deliberative thought and understanding around a topic.

5 Evaluation and Future Research

The development of the above high level stages of instigating a 'culture of participation' which involves both on and offline youth dialogue mechanisms is the result of research to date. Further evaluation research is planned through the development and field-testing of tangible mechanisms such as Dialogue Youth consultations. It is expected that this evaluation will dictate the best course for further research. Evaluation will involve the application of ethnographic techniques to discuss with young people

how such new mechanisms effect them, and how they would like to see these mechanisms take shape. This work will continue to research ways of developing online youth consultation tools that are both used and useful. At present, as this paper has detailed, it appears that the only way this will occur is if 'traditional' offline techniques are implemented to help alter a cultural view of young people in opposition to what it means to be a citizen.

References

1. Macintosh, A., Robson, E. & Smith, E. et al. (2003) 'Electronic Democracy and Young People'. In *Social Science Computer Review, vol. 21, no. 1/ Spring 2003.* London: Sage Publications.
2. The Electoral Commission (2002) *Voter Engagement and Young People.* Available at: http://www.electoralcommission.org.uk, 6/11/2003.
3. Machin, D. (2003) *Being Young in Scotland in 2003: YouthLink Scotland's Research Findings.* Edinburgh: YouthLink Scotland.
4. Willow, C. (1997) Hear! Hear!: Promoting Children and Young People's Democratic Participation in Local Government. Local Government Information Unit, London.
5. Bentley, T. & Oakley, K. (1999) *The Real Deal: What young people really think about government, politics and social exclusion.* London: Demos.
6. Howland, L. (2002) *Logged Off? How ICT can connect young people and politics.* Demos, p.32.
7. Hayward, B., Alty, C., Pearson, S. & Martin, C. *Young People and ICT 2002: Findings from a survey conducted in Autumn 2002.* DfES, p.1-2.
8. Children and Young People's Unit (2001) *Young People and Politics: A report on the Yvote/Ynot? Project by the Children and Young People's Unit,* p. 18.
9. Coleman, S. (2002) *Digital Jury – The final verdict.* London: Hansard Society, p.33,35.
10. Selwyn, N. (2003) 'Doing IT for the Kids: Re-Examining Children, Computers and the Information Society' *Media, Culture & Society, 25,* p.365.
11. Valentine, G. Holloway, S. (2001) 'Technophobia': Parent's and children's fears about information and communication technologies and the transformation of culture and society'. In I. Hutchby & J. Ellis (ed.) *Children, Technology, and Culture: the impacts of technologies in children's everyday lives.* London: Routledge/Falmer.
12. Coleman, S. (2003) *A Tale of Two Houses: The House of Commons, the Big Brother House and the people at home.* London: Hansard Society, p.33.
13. Alloway, N. & Gilbert, P. (1998) 'Video Game Culture: Playing with masculinity, violence and pleasure'. In S. Howard (ed.) *Wired-Up: Young people and the electronic media.* London: UCL Press.
14. Kirby, P. with Bryson, S. (2002) *Measuring the Magic? Evaluating and researching young people's participation in public decision making.* London: Carnegie Young People Initiative. Available at: http://www.carnegie-youth.org.uk, 20/11/2003.
15. James, A. & Prout, A. (1997) *Constructing and Reconstructing Childhood: contemporary issues in the sociological study of childhood.* London: Falmer.
16. Amit-Talai V. & Wulff, H. (1995) 'Introducing Youth Culture in its Own Right: The state of the art and new possibilities'. In V. Amit-Talai & H. Wulff (ed.) *Youth Cultures: A cross-cultural perspective.* London: Routledge.
17. Caputo, V. (1995) 'Anthropology's silent 'others': A consideration of some conceptual and methodological issues for the study of youth and children's cultures'. In V. Amit-Talai & H. Wulff (ed.) *Youth Cultures: A cross-cultural perspective.* London: Routledge.
18. Griffin, C. (1993) *Representation of Youth: The study of youth and adolescence in Britain and America.* Oxford: Polity Press.

19. Buckingham, D. (2000) *After the Death of Childhood: Growing up in the age of electronic media.* Oxford: Polity Press, p. 15, 188.
20. Hutchby, I. & Moran-Ellis, J. (2001) 'Introduction: Relating Children, Technology and Culture'. In I. Hutchby & J. Ellis (ed.) *Children, Technology, and Culture: the impacts of technologies in children's everyday lives.* London: Routledge/Falmer, p.4.
21. Aspinwall, T. & Larkins, C. (2002) *Breathing Fire into Participation, the Funky Dragon Guide: good practice guidelines on supporting groups of children and young people to participate.* Funky Dragon/The Children and Young People's Assembly for Wales. Available at: http://www.funkydragon.org, 06/10/2003.
22. Connexions (2003) *Good Practice Guide on Involving Young People in the Governance of Connexions as Decision-makers.* Learning and Skills Council. Available at: http://www.connexions.gov.uk, 06/10/2003.
23. Learning and Skills Council (2002) *Guide to Engaging with Young People: Putting learners in the driver's seat.* Leicester: National Youth Agency. Available at: http://www.lsc.gov.uk, 03/10/2003.
24. Madden, S. (2001) *Re:action Consultation Toolkit: A practical toolkit for consulting with children and young people on policy issues.* Save the Children.
25. Youth Council for Northern Ireland (2001) *Seen and Heard? Consulting and involving young people within the public sector.* Belfast: Youth Council for Northern Ireland.
26. OECD (2004) *Promises and Problems of E-Democracy: Challenges of online citizen engagement.* Paris: OECD.
27. Edwards, L. (2001) *Politics not Parties: Young people and political engagement.* London: IPPR, p.7.

The Support for Different Democracy Models by the Use of a Web-Based Discussion Board

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Abstract. Different initiatives are initiated to utilize ICT to maintain and develop democracy. Democracy models are developed to explain differences between different democracies. This paper reports from a case study where a web-based discussion board is developed and implemented. The findings indicate that politicians and citizens add support to different democracy models by their contributions to the web-based discussion board. Contributions from the citizens add stronger support for the neo-republican model where as politicians mainly support the demo-elitist model. These differences might become obstacles to the utilization of the technology. Identifying potential differences early on in a project may increase the opportunity to develop services capable of handling requests from different stakeholders.

1 Introduction

The importance of changes in democracy towards more focus on citizens arose in western democracies at the end of the 1980's [1]. ICT became seen as an opportunity to renew democracy in the face of decreased voter participation and falling interest in political issues. There is a challenge for democracies to engage people in important community issues and to try to involve citizens in political and democratic processes [2]. New technology has changed the conditions for communication and coordination between individuals and businesses [3]. This has led to an increased interest in how to utilize new technology to increase participation and involvement in democratic processes.

Increased focus on E-Democracy projects implies a need for a better understanding of how IT can relate to different democracy models [3]. Different ICT-artefacts may support different democracy models, but the relationships need to be investigated [4].

Bellamy [5] presents four different democracy models; consumer-, demo-elitist-, neo-republican- and Cyber-Democracy. The models have different characteristics related to democratic value, role of the citizens, form of political participation, political intermediary, objectives for the use of ICT and dominant political issues. The models are summarized in table 1 and will be used to investigate the fit between different democracy models and the use of a web-based discussion forum.

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Table 1. Emerging models of democracy for the information age [4].

Characteristics	Consumer	Demo-Elitist	Neo-republican	Cyber Democracy
Dominant democratic value	Freedom of choice	Effectiveness	Deliberation and participation	Communi-tarian/radical democratic
Citizen's role	Choose their electives, less active between elections	Choose their electives, less active between elections	Active citizen, also between elections.	Active citizens are decision makers
Central form of political participation	Choice of public services	Consensus, creation, lobbying	Public debate, associations	Virtual debate, virtual and real actions
Political nexus	Producer/consumer relation	Expert discourse	Public sphere, media	Electronic discussion (Internet)
Main political intermediary	Service declarations, consumption data	Negotiation and campaign institutions	Public debate, associations	Electronic networks and communities
Typical ICT application	Voter compasses, websites, citizen cards, databases	Websites, mail, information systems, voter compasses	Geographically located and moderated discussion groups	Self-organised discussion groups
Main objec-tives for the use of ICT	High quality on the information to the citizens	Support relations, transparency	Quality on discussion and bi-directional information	Strengthen the essential network
Dominant political issues	Data security, privacy, service delivery	Relegitimating and reorientation of governance.	Increasing participation, improving the quality of discussions	Increasing political reflexivity, competences and autonomy

2 Case Results and Discussion

The project was initiated by one city and two regional municipalities in southern Norway early spring 2003. The motivation was to increase the availability to information, increase openness and contact between citizens and politicians and the citizen's involvement in political processes by using ICT and web-technology. The forthcoming local election was an important milestone in the project.

The target groups of the project were citizens, especially young people, and politicians. None of these groups were represented in the development of the discussion board. The goals were determined without any investigation of the requests from these stakeholders.

The discussion board was pre-organized with different sub-categories. The debates focusing on local and specific themes were most popular, followed by debates on how web-technology can add value to democracy.

Discussions focusing on the use of technology and the influence on the democracy have been investigated to illuminate what kind of democracy the use of the discussion board supports. The contributions are evaluated by the use of content analysis which is a much applied method for textual investigation [6]. The contributions are categorized (based on the democracy models) and counted.

Classifications into the categories are not possible without some self-judgement made by the researchers. The data-material is available for everyone at the discussion board (www.Demokratitorget.no) and the conclusions made in this paper can be evaluated towards the discussions made by the end of January 2004.

In table 2 the contributions are sorted based on Bellamy's [5] models of democracy. Out of the 70 contributions, we were able to categorize 66 by democracy models. The remaining four were rejected due to their unserious character.

Table 2. Contributions at the discussion board classified by models of democracy.

Democracy models → Characteristics ↓	Consumer		Demo-Elitist		Neo-republican		Cyber-Democracy	
P= Politicians, C= Citizens	P	C	P	C	P	C	P	C
Dominant democratic value								
Citizen's role			1	2				
Form political participation			2	2		1		
Political nexus						3		
Main political intermediary	1		4		1	1		
Typical ICT application	3	2						
Main objectives use of ICT			4	1	3	8		
Dominant political issues					3	22		2
Sum contributions	**4**	**2**	**11**	**5**	**7**	**35**	**0**	**2**

The support for a Demo-Elitist democracy is strongest among the politicians. The model emphasizes the growth of influence by experts and networks. The model also considers citizens to be less active and focused on their need for service. In light of this, it is interesting to see that the politicians add stronger support to this model than the citizens. The specialists (politicians) support a democracy which implies a strengthening of their power.

Neo-Republican democracies aim to change the public spheres where the experts, bureaucrats and politicians, loose power in advantage of the citizens. The citizens should be active, interested and share social consciousness [5]. New technology can reactivate the citizens. This model has strong support in the contributions from citizens.

Consumer Democracy, which implies that more or less passive citizens consume services by the public, is not strongly supported. Participation on a discussion board requires some kind of engagement which is not the main objective in the consumer democracy model.

The use of this discussion board did not support the model of Cyber-Democracy. The contributions do not focus on a radical shift in the power balance and shape of democracy. Cyber-Democracy may be seen as the last step in an alteration and consecutive steps following minor changes in the past [5]. Further investigations may reveal to what extent the use of discussion boards may result in a stronger support for Cyber-Democracy when the users increase their experiences and the services become more mature.

3 Conclusion and Future Research

The use of the discussion board show stronger support to some models of democracy than others. There are dissimilarities in which democracy models the citizens versus

the politicians contributes to. These two groups have different expectations to the influence participation in the discussions may cause. The project did not investigate in advance different stakeholder's interest in the project.

The results indicate a connection between the choice of ICT-artefact and different support to the models of democracy. By investigating the overall objective in an initial phase of the projects, the choice of technology can be founded on the objectives. The possibility to achieve the objectives by using ICT-artefact will increase if the artefacts are chosen for their ability to support the objectives.

The results are collected from one case study using one ICT-artefact. The indicated connection between models of democracy and choice of technology raises several questions for future research. What are the connections between other ICT-artefacts and different democracy models? To what degree does the design and implementation of technology influence the support for different democracy models? Does the pre-organizing of the discussion-threads act as an enabler or inhibitor to the discussions going on? An investigation should be conducted concerning what the major arguments for the choice of technology really are.

References

1. Macintosh A., Davenport E., Malina A., Whyte A.: Technology to Support Participatory Democracy. In Grönlund, Å. Electronic Government, Design, Applications and Management. Idea group publishing (2001)
2. Hague, H., Loader, L. B.: Digital democracy, and introduction. In Hague, H., Loader, L. B. (editors): Digital Democracy, discourse and decision making in the information age. Routledge, London (1999)
3. Van Dijk, J.: Models of democracy and concepts of communication. In Hacker, K.L., Van Dijk, J., (editors): Digital Democracy, Issues of theory and practice. Sage Publications, London (2000)
4. Tops, P, Horbocks, I., Hoff, J.: New technology and democratic renewal: the evidence assessed. In Hacker, K.L., Van Dijk, J., (editors): Digital Democracy, Issues of theory and practice. Sage Publications, London (2000)
5. Bellamy, C.: Modelling electronic democracy, Towards democratic discourses for an information age. In Hoff, J., Horrocks, I., Tops, P., (editors): Democratic governance and new technology, technologically mediated innovations in political practice in Western Europe. Routledge, London (2000)
6. Silverman D.: Interpreting Qualitative Data (second edition). Sage publication, London (2001)
7. Moore R., K. Democracy and cyberspace. In Hague, H., Loader, L. B. (editors): Digital Democracy, discourse and decision making in the information age. Routledge, London, (1999)

The Framework of e-Democracy Development

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Abstract. This paper addresses the framework of e-Democracy, which is presented in the generic sustainable e-Democracy form, such as management and stakeholder, business driver, technology driver and development methodology. The related contents of creating e-Democracy applications are also discussed. Furthermore, this paper presents the model of Thai e-Democracy. The survey of Thai citizens' opinion about government services through electronic media by the National Statistical Office is illustrated. Some examples of e-Democracy in Thailand are also discussed. To promote the efficiency of Thai e-Democracy, the broadcast of cabinet meeting via television is commenced.

1 Introduction

The era of globalization or digital world has created a new kind of information society and knowledge-based economy, which change our human behavior. This has effects on many aspects such as politics, economic, and society. Information and Communication Technology (ICT) is claimed as the powerful tool which plays an important role on those changes. It provides an alternative channel for government and citizens' communication of new services, e.g. providing information source, collaboration between stakeholders. Such e-Services could lead to transparency of government administration in democracy world. It is true that country development must be managed by citizens, and for citizens which is the major principle for serving real citizens' needs. Furthermore, citizens have their right to receive sufficient information as well as to give their opinions to government. The citizens' opinions are claimed to be a valuable asset for country development. The employment of ICT for e-Democracy applications is to provide an alternative channel for citizens to more easily participate their local government processes for better services. It also gives a better collaboration for public monitoring and evaluating in any government project.

2 The e-Democracy Development

The pattern of e-Democracy development must combine ICT with the process of democratization. The citizens can involve in the process of democratization easily by embedding the transparency and openness concepts into e-Government. Furthermore, the e-Democracy should be identified by both technical and non-technical aspects. Hence, e-Democracy is a form of democracy that combines ICT tools with the process of democratization. e-Democracy can be viewed as building an open communica-

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tion system among stakeholders such as government and citizens, government and public sectors, government and NGOs, and inter-agencies. Those stakeholders should receive useful information and services required from the government at anytime in a more efficient way. The experiences of e-Democracy development in some countries, such as the Minnesota e-Democracy in United States [1], the e-democracy.gov.uk site in United Kingdom [2] and the e-Democracy pattern in Japan [3] address a similar goal for improving citizens' participation in democracies and communities. This can be achieved by employing the power of ICT and competitive strategies in the forms of e-Forum or e-Participation.

3 The e-Democracy Framework

The e-Democracy framework consists of the generic sustainable e-Democracy and e-Democracy applications. Such a generic sustainable e-Democracy composes of 4 external components as shown in figure 1.

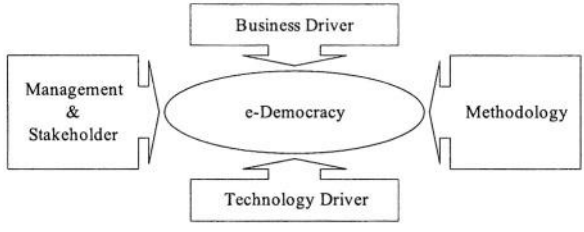

Fig. 1. A Generic Sustainable e-Democracy.

1) *Management and stakeholder.* This aspect contains:
   - e-Citizen: e-Citizen is the person that acquire self services from the government website which are 24 hours a day, 7 days a week.
   - e-Government: e-Government provides extensive access to government information and interacts electronically with citizens and political parties.
   - Political party: political party is the organizations that seek to gain political power for the purpose of country development.
   - Private sector: private sector means institutions that support small and medium sized enterprises.
   - NGO: Nongovernmental Organization (NGO) is an organization that is not a part of the local or state or federal government.
2) *Business Driver.* Business Driver is the part of trend or expectation. The business drivers of e-Democracy are to a) raise the value of citizen lives, b) reduce the gap between government and citizens, c) increase the efficiency of parliaments, d) reduce the difference of citizens, and e) support the development of making Thailand equivalent to other developed countries.
3) *Methodology.* The efficiency of e-Democracy must establish citizens' participation to take part of government policy making. The methodology is one of the key factors that identify activities for citizens' participation. The e-Democracy development cycle, which contains 5 stages, is given in figure 2.

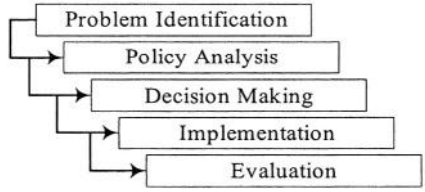

Fig. 2. The e-Democracy Development Cycle.

- Problem Identification. The government identifies the true problem or questions from citizens through electronic media in the form of e-Petitions or e-Referenda.
- Policy Analysis. The Prime Minister (PM) or cabinet analyses the problem and extracts useful ideas from citizens via electronic media in order to build the requirements.
- Decision Making. The government discusses the problem with related citizens such as discussion forum, or e-Referenda.
- Implementation. The government publishes the policy through the electronic media such as e-mail distribution, or discussion forums.
- Evaluation. The government monitors the feedback from citizens using electronic media such as online feedback, or online discussion.

At the present, the Thai government creates a bill of citizens' opinion. The objective is to support the transparency and to create the participation from citizens' [4]. This would promote the efficient e-Democracy development in Thailand.

4) *Technology Driver.* Technology driver is to increase the efficiency of providing online information and communication from each government sector. They can use the electronic media such as e-mail, video conferencing, private discussion rooms, online polling and survey, online chat, and SMS messaging.

Some e-Democracy applications are a) e-Voting for electing member of parliament through electronic media, b) e-Information as a provision of information or forms through website, e-mail or short message, c) e-Forum for the problems discussion related to politics through electronic media, d) e-Services as a provision of governmental services through electronic media, and e) e-Complaint for filing complaint through electronic media.

4 The Model of Thai e-Democracy

The policies of Thai government at present states every governmental unit must have its own web site that can provide information to the public and submission of citizens' opinion. This helps to support the transparency and openness concepts and to create an e-Democracy environment. The report of the Thai National Statistical Office surveying the use of computer and internet in Bangkok by 1,560 populations shows that most citizens want to contact the government via online service or e-Service. For example, they want to pay tax and public utilities directly through the Internet. The citizens suggest that using ICT should do the increase of public relations and information and knowledge exchange. For example, a discussion on "the culture of students'

participation in educational institution" is to promote the democracy at the school level. The objective of this discussion shows an awareness of schools on building a suitable environment for students' participatory process in decision-making. The main point of this seminar is based on the culture of participation, which should be begun at the schools. Hence, this trial project promotes the participatory democratic mechanisms and values at school-level. Another example is the Thai government broadcasts the cabinet meeting through television. The objective is to let citizens know the government administration and the way of Member of Parliament administrates the country development. The survey of the Thai National Statistical Office concerning 5,800 citizens' awareness on the meeting shows that only 44.4% of the respondents are aware of the meeting broadcast. The main reasons of those agree on this broadcast method are the acknowledgement of government work progress and their up-to-date political aspect. In Addition, citizens want to partly participate on national policy decision. Consequently, the government should support the citizens by building the efficient online democracy or e-Democracy in order to employ as a tool to provide useful information to the citizens in an easy way. The experiences from the above examples show that the citizens and government can get benefits from e-Democracy development as follows. First, e-Democracy can reduce the gap between citizens and government, and the rich and the poor. Second, citizens realized that they get involve to the democratic process. Finally, politicians have a chance to listen to what people think and to know what the people want.

5 Conclusions and Further Work

The Thai e-Democracy has employed the ICT as a tool to support democracy, e-Democracy is considered as a medium to gain the competitive advantage among the government, citizens, and private sectors for political matter. The contemporary communication among stakeholders on government information is by using Internet or e-mail. The e-Democracy and e-Service should be developed to provide as an alternative approach for citizens to participate the politics and country development. The framework of e-Democracy development consisting of management and stakeholder, business driver, technology driver, and methodology is described. The examples of promoting the Thai e-Democracy are also discussed.

References

1. Minnesota E-Democracy, About Minnesota E-Democracy [Online], Available at http://www.e-democracy.org/about.html [Feb 2004]
2. Cabinet Office, e-Democracy Home Page [Online], Available at http://www.edemocracy. gov.uk/ [Feb 2004]
3. Ichiro Shinkai, New ICT and Democracy: E-democracy in Japan, NTT Data, November, (2003) 1-10
4. Office of the Council of State, Office of the Council of State [Online], Available at http://www.krisdika.go.th/comment_x_01.jsp?head=5&item=1&billCode=3 [Feb 2004]

Networked ICT to Foster e-Democracy?

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Abstract. Democracy is an evolving normative project with lots of facets. Using and shaping networked ICT to enhance democracy is a challenging task. It needs action research as well as theoretical considerations. It needs societal pull and technological push. It needs research funding and self-organised grass-root activities. It needs both an administration oriented approach of development and an autonomous citizen-oriented approach. This has to be balanced.

1 e-Government Does Not Automatically Include e-Democracy

There are different visions of e-democracy: The utopian vision promises that ICT solutions will reinstall Athenian conditions of direct democracy. The dystopian vision announces for the digital future a new information autocracy, a widening digital gap between have and have-nots, the exclusion of large amount of citizens, surveillance, and manipulation. Beside of these theoretical discussions empirical experiments take place, funded by national governments and the EC for example. Under the topic of eGovernment NGO's, R&D - institutes, private companies and universities experiment with networked ICT. Technology driven field trials try to find new ways of public discourse, voting, deliberation, and participation. New networked media offer chances of being shaped according to assist the democratisation of societal and political processes. And they offer the chance of a new stratification of societal elites, societal transparency and control. In Germany current approaches of eGovernment and eDemocracy are technology driven and not guided by democratic values first. The introduction of ICT and reorganization of institutions and processes aim at efficiency and effectiveness within the public administration, towards business and finally citizens (information, communication, transaction). This will establish a technological regime of use and relations where citizens are objects of the public administration. In my opinion eDemocracy should be a societal driven normative approach to assist the citizens autonomously. Today this is regarded as a minor often negligible aspect of eGovernment approaches. Networked ICT should be a key opener of new forms of knowledge spaces, deliberation, and public participation for and by citizens.

2 New Networked ICT for e-Democracy: Take Existing Experiences into Account

The experiences made in the domain computers and work and especially in the field of Computer Supported Cooperative Work over the last thirty years give us several

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hints for the application and use of networked ICT for societal and political purposes. Very much in general one can state that:

1. A techno centric perspective only applying new technology does not solve problems: application first then technology;
2. The idea of one best way, one best practice, the idea of "one size fits all" is a myth, considering the local political cultures and practices;
3. Contexts and situations determine the usefulness of technology;
4. Invest in learning and education: the introduction of new socio-informatic infrastructures for eDemocracy has to go together with political education;
5. Technology is not neutral, it establishes a regime of practice which imposes ways to act;
6. Technological innovations and their applications are often unprecedented.

In exploring and shaping new networked media for democratisation we should take these experiences into account. If one reviews the long list of literature it becomes clear that the impact of new networked media on democratisation is judged ambivalently. The re-invention of politics and polity through new networked media in a Knowledge or Information Society was a popular topic in the USA [Gr95; Fi95; Ra97] and still is: "Instead of the government watching people, people could be watching their government" [Ca01:115]. The socio-romantic societal visions of Howard Rheingold [Rh95] of networked communities are now replaced by more analytical visions of Community Networks. Networked groups of shared interests are to be seen as a new, translocal and transnational societal form of organisation for civic engagement within a civil society [Ca01:155]. Civic engagement and civil society came into interest of parliaments as a solution to shift the (financial) burdens from a protective regulating government to more self-responsibility and self-governance of civil groups and citizens [En02].

The discussion about concepts, tools and applications of networked media to support direct democracy was full of hype about the reach, usefulness and practicability: Scientists and activists promised the advent of a Cyber Democracy. In Germany this led to a critique especially from scientists analysing the relation between mass communication and political behaviour and those being active in the field of political education. From their point of view the assumptions concerning man as a homo politicus are way to naïve and to positive: The discourse oriented citizen unlimited open for electronic deliberation and participation is a fiction and far away from the existing political reality [Sa98]. Some critical scientists go even farther. They do not only state the unwillingness to participate of most of the citizens in political affairs. They fear that the new socio-technical applications (discourse systems, deliberation systems, opinion polling systems etc.) will even widen the gap between the possibilities to influence political processes and decisions by the citizens and their capacity of understanding the problems and solutions. Their participatory claims are not corresponding to their political understanding (education) [Sa98]. These critical positions which are status-quo oriented and inhibit exploration and innovation are often shared by those active for years in the empirical research about mass communication (TV, the press, Radio). But one should question if the results of their findings are transferable to networked new media. How can one transfer experiences made with one-way communication and fixed roles (journalists – the public) with a network based structure of communication where social roles are not prescribed but are flexible? In his PhD Thesis Bonchek analysed the new flow of political information in the Internet [Bo97].

Extrapolations and equations do not take the social adoption, learning and re-development (shaping) of technologies into account and neglect the unpredictability of the results of enculturation processes. 1895 there had been 15 telephones in the German Reichstag for all; today technical communication applications are an extension of each person there.

3 More Direct Democracy?

Modern political theory in Germany sees the representative system as the basic structure of nations in Europe [Lu97]: Because of the complexity of the political problems elites govern which follow the principles of division of labour and specialisation. These elites correspond to the citizen by an interrelationship which is established by general elections and mass media. New technical applications which assist direct democracy are in conflict with these basic principles. This can explain why e-voting is supported by all governments in contrary to other applications e.g. discourse systems, virtual parliaments, polling systems etc. which often only play symbolic roles in niches projects of the political system.

Beyond the pragmatic approach of "just doing it" one must admit that new socio-technical approaches to foster direct democracy raise new questions towards the procedural and organisational principles of democratic legitimate representation and delegation: Persons in favour of participatory approaches of electronic democracy view networked ICT as a medium of discourse to develop or detect the common good under the assumptions of equal participation for all and horizontal communication. The Internet serves as means to strengthen common sense, to develop shared interests and social capital. Persons in favour of a more elitist perception of democracy consider the Internet as a market place of competing ideas where the articulation and aggregation of interests take place. Both directions claim more direct participation of citizens in governmental and administrative affairs and more transparency of procedures and decisions. Those claims and new approaches of socio-technical applications will challenge the responsiveness and adaptivity of the political and administrative system.

4 Slow Moves: Different Goals, Disappointing Results of Action Research, and the Persistent Political Culture Are Hindering

The development and application of new digital assisted ways to improve democracy remained a minor aspect within the informatisation of the political system itself. Since the 70s parliaments and political parties use more and more heavily new media for pushing efficiency and effectiveness of their administration and for pursuing their strategic political goals. Especially national parliaments play a leading role [MVW91; CTD97]. Most of these applications are designed to consider the citizen as the object, the recipient of services and not as an active part in the interplay between public administration and government. E-Democracy in Germany is a sub part of the e-Government activities on state, federal and municipal level. The main goal is to reduce costs and deliver better services to citizen. The research and development projects of the European Commission are comparable to this [EC03]. In Germany on

municipal and state level there is not much interest in fostering experiments to enhance direct democracy. There are several reasons for this: The first reason is the shortage of resources: service delivery with fewer personnel is the main goal of introducing and experimenting with networked ICT in the public administration and not democratisation. The second reason to be so reluctant is the partially frustrating experiences of the experiments made in this sector in Germany, which contradicts the euphoric visions [Te02]. Experiences made in government funded projects like Media@ kom show, that the number of participants who were interested in exploring these new technologies is very small. Citizen and politicians do at present time not widely accept new socio-technical applications to foster democracy (chat with politicians; online-discussions, networked mediation, virtual party conferences etc.). Well known political procedures, rites and means to persuade persist. These new networked media require a new political culture, new norms and conventions to be successful. The third reason is founded in the experiences made in the Third Reich, when the radio was used by Nazis for fraud and propaganda reasons. But there is not only the threat of being manipulated and misinformed but also the threat caused by the tendency to visualize and easily explain complex problems (Mickey-Mousation of information).

5 Outlook

There are different perspectives of the role networked ICT will play for the political systems in our societies: a) it will assist direct and representative democracy b) it will lead to a replication of existing power structures and a petrifaction of the systems c) it will enhance the existing power structures and lead to a deeper divide between dominant and marginalised groups in society. I believe, that democracy is a normative dynamically evolving project and has to be shaped for and by citizens. Based on existing knowledge about the use of ICT in organisations action research as well as theoretical discourses could fuel the innovation of socio-technical infrastructures. They could provide interactive platforms for e.g. large-scale discussions and polling to give citizens a voice between elections.

References

1. Bonchek, M.S.: From Broadcast to Netcast: The Internet and the Flow of Political Information. PhD-Thesis, Cambridge MA Harvard University 1997.
2. Castells, M. The Internet Galaxy. Reflections on the Internet, Business, and Society. Oxford University Press Oxford New York 2001.
3. Coleman, S.; Taylor, J.; Donk, W.v. (eds.): Parliament in the Age of the Internet. Oxford University Press New York 1997.
4. Der Rat für Forschung, Technologie und Innovation: Informationsgesellschaft: Chancen, Innovationen und Herausforderungen. Bonn 1995. Bundesministerium für Bildung, Wissenschaft und Forschung.
5. European Commission: Systems and Services for the Citizen. Synopsis of Research Projects. Brussels 2003 – http://europa.eu.int
6. Enquete Kommission des Deutschen Bundestages zum Bürgerschaftlichen Engagement in der Zivilgesellschaft. Berlin 2002.

7. Ewert, B.; Fazlic, N.; Kollbeck, J.: E-Demokratie. Stand, Chancen und Risiken. In: Schulzki-Haddouti, C. (Hrsg.): Bürgerrechte im Netz. Bpb Bonn 2003, 227-260.
8. Fuchs, G.; Kastenholz, H.: E-Democracy: Erwartungen der Bürger und erste Realisierungen. Ein Werkstattbericht. In: Technikfolgenabschätzung – Theorie und Praxis: E-Government zwischen Vision und Wirklichkeit Nr. 3 und 4, Jg. 11, November 2002, 82-91.
9. Fishkin, J.S.: The Voice of the People. Public Opinion and Democracy. Yale University Press New Haven/London 1995.
10. Grossmann, L.K.: The Electronic Republic. Reshaping Democracy in the Information Age. Viking Penguin New York NY 1995.
11. Leib, V.: Bürger mit Netzanschluß. Über Partizipation, Internet und „elektronische Demokratie". In: Martinsen, R.; Simonis, G. (Hrsg.): Demokratie und Technik (k)eine Wahlverwandschaft. Leske und Budrich 2000, 363-386.
12. Luthardt, W.: Probleme und Perspektiven direkter Demokratie in Deutschland. In: Aus Politik und Zeitgeschichte B 14, 13-22.
13. Mambrey, P.; Vorwerk, E.; Wurch, G.: Computer im Deutschen Bundestag. Zur Informatisierung des politisch-administrativen Systems. Leske und Budrich Opladen 1991.
14. Rash, W.: Politics on the Nets. Wiring the Political Process. Freeman New York NY 1997.
15. Sarcinelli, U.: Politikvermittlung und Demokratie: Zum Wandel der politischen Kommunikationskultur. In: Sarcinelli, U. (Hrsg.): Politikvermittlung und Demokratie in der Mediengesellschaft. Bercker Bonn 1998, 11-23.
16. Technikfolgenabschätzung – Theorie und Praxis: E-Government zwischen Vision und Wirklichkeit Nr. 3 und 4, Jg. 11, November 2002.

Analysis of the Interoperability Frameworks in e-Government Initiatives

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Abstract. Interoperability has been identified as a major issue to be addressed by all e-government agencies. In the first stage of this awareness, interoperability deals with applications and semantics concepts, which will enable the seamless information flow between organizations. However, it will not be enough for enabling the sort of interoperability required for a true seamless service delivery to citizens and business, which is the vision of the e-government strategies. A second stage in interoperability shows up which deals with the building of an enterprise architecture. In the article the main initiatives in interoperability are presented and the degree of fulfillment of the above two-stage roadmap is evaluated.

Introduction

During late 90s, most Administrations in OECD countries released their e-government strategies. Each e-government strategy is supported by its own framework policies. One of such policies is the interoperability framework (CEC, 2002a, 10; OECD, 2003, 62 & 99).

The interoperability framework aims at providing the basic standards that all the agencies which are relevant for the e-government strategy implementation should adopt. This interoperability framework will allow, at least, the interoperability between information systems from different agencies in order to provide services to citizens and businesses in an integrated way.

In the paper the main initiatives in interoperability frameworks development are presented. A methodology for discussion is then provided and applied to the analysis of the above frameworks. Finally, the main conclusions of the conducted analysis are pointed out.

This work follows up previous work conducted by the author within the E-Forum Association[1]. From January until September 2003, the Shared Infrastructures Working Group carried out an study of the interoperability issues of the shared infrastructures that support the delivery of e-government services.

There have been attempts to build analysis frameworks similar to the one presented in this article. One of the attempts was the IDEAS network (Interoperability Devel-

[1] Visit http://www.eu-forum.org

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opment for Enterprise Application and Software), which is a FP5 project (IST 2001-37368). It aimed to deliver a roadmap for achieving the interoperability of e-business applications, which would eventually assist the design of large scale actions for the FP6. The IDEAS project has produced an Interoperability Framework to structure, scope and rationale the consortium work.

We have chosen five of the main initiatives being carried out by e-government agencies in the interoperability arena, which have produced corresponding interoperability frameworks. The Office of the e-Envoy in the UK has based its technical guidance in the e-Government Interoperability Framework (e-GIF), which was issued in 2000, and updated to its version 6 for public consultation in March 2004 (e-Envoy, 2004). The French ADAE ("Agence pour le Développement de 1'Administration Électronique"), formerly known as ATICA, published the second version (2.1) of "Le Cadre Commun d'Intéroperabilité" (CCI) in September 2003. The German Ministry of Interior published the version 1.1 of the Standards and Architectures for e-Government Applications (SAGA) in February 2003 (BSI, 2003). The European Commission Enterprise DG, through the Interchange of Data between Administration (IDA) Program, issued its Architecture Guidelines (version 6.1) in June 2002 (CEC, 2002b). Finally, the Federal Chief Information Officers (CIO) Council, in the USA, issued the Federal Enterprise Architecture Framework (FEAF) in September 1999, and published its second version of the E-Gov Enterprise Architecture Guidance (CIOC EAG) in July 2002 (CIOC, 2002).

Application and Semantics Interoperability

The interoperability in e-government has been identified as a major issue to be addressed by all e-government agencies. In the first stage of this awareness, the interoperability concept is defined according to the software discipline, that is, interoperability is agreed to be understood as the "ability to exchange functionality and interpretable data between to software entities" (Mowbray, 1995). Issues covered by this concept are usually grouped in two fields:

- **Application interoperability,** which includes the communications issues, both at the telecommunications network access level and at the network interconnection level; and the distributed applications issues, regarding the remote procedure call/ method invocation mechanisms and the public interface exportation/binding.
- **Semantics interoperability,** which includes both the data interpretation, by means of XML schemas, and the knowledge representation and exploitation, by means of ontologies and agents

Each one of the five e-government agencies agrees on mandating a full set of standards, which address the areas that are relevant to the interoperability, according to the above definition. Such areas are, for instance, interconnection, data integration, content management metadata, telecommunication network access, workflow management, group working, security, document archiving, and so on.

The five interoperability frameworks show a common feature: Internet and WWW technologies build their core. However, two different approaches can be identified in the enumeration of standards: e-GIF and CCI follow an OSI-centric approach, which

organises the standards in a layer-like manner; SAGA, IDA AG and CIOC EAG follow a POSIX-centric approach, which organises the standards around services.

Enterprise Architecture Role in Interoperability

The consensus around the standard profile in each Administration is essential for e-government implementation success, since it will enable the seamless information flow between institutions. However, it will not be enough for enabling the sort of interoperability required for a true seamless service delivery to citizens and business, which is the vision of the e-government strategies. Some initiatives have shown a need, then, for a second stage in interoperability which deals with the building of an enterprise architecture. Enterprise architecture refers to a comprehensive description of all the key elements and relationships that make up an organization. It aims to align the business processes and goals of an enterprise and the applications and systems that build up its technical infrastructure. There are many different approaches to describing the elements of an enterprise architecture. One approach that has grown in popularity in the past few years is based on a framework developed by John Zachman (1987).

Not all the agencies under study have addressed this second stage, and when having done it, their achievement degree is not homogeneous. Some agencies have only identified that business requirement are an issue to address, whereas others have already succeed in providing the models and tools for the description of the enterprise, and in founding the technical architecture in this description.

e-Envoy has included e-GIF in the e-Services Development Framework (e-SDF). The e-SDF is a framework for guiding and supporting the development process of e-services in e-government. Requirements, design and implementation are the three phases of the development process, and the e-SDF provides sets of reusable elements (patterns, components, and resources) for improving the consistency and reducing costs in the development at the different phases, and a High Level Architecture, which provides a single set of top-level specifications and standards to be used for developing government e-Services. The High Level Architecture is composed of the Common Information Model, the Data Standards Catalogue, the Message Reference Model, and the e-GIF. The High Level Architecture is actually an enterprise architecture framework.

Both CCI and SAGA are still focused on the specification of sets of standards for guiding the implementation of interoperable applications for the provision of e-gov services, but they have not provided yet a framework for enterprise architecture description.

As regards the work of the European Commission, IDA has shown efforts in progressing towards the provision of a enterprise architecture. Apart from issuing sets of relevant standards for each service profile, IDA AG regards two dimensions for guiding the implementation of interoperable e-services: the business requirements, involving the definition of a suitable implementation approach, and the security management, involving a security policy that meets the security requirements and a set of security mechanisms that enforce the policy on the trans-European network.

Following a different approach from the other initiatives, the CIO Council mandates one target enterprise architecture for Presidential E-Gov initiatives, but selects the applicable standards only for consideration in those initiatives. The CIO Council

adopts the FEAF 4-layer structure as the framework for E-Gov initiatives, which includes (CIOC, 1999) a business architecture, a data architecture, an application architecture, and a technology architecture. Within each one of the four layers in the FEAG, the CIO Council has defined one or more models which will guide the development of e-government solutions.

In our opinion, this approach has reached the most in the path towards a true interoperability.

Conclusions

Based on the research of the interoperability-related initiatives undergone by the agencies in charge of the e-government agenda in the most advanced countries, we have conceptualised a two-phase interoperability roadmap. A first phase, which consists of enabling the interoperability, that is, providing the basic technical standards and policies for allowing the seamless flow of information between different Administrations in the delivery of e-services. And a second phase, which consists of leveraging this enabled interoperability to align the processes between the Administrations.

References

1. BSI. Bundesamt für Sicherheit in der Informationstechnik (2003), Standards and Architectures for e-Govemment Applications, version 1.1.
2. CEC. Enterprise DG (2002a), Architecture Guidelines for trans-European Telematics Networks for Administrations, version 6.1, Brussels.
3. CEC. Commission of the European Communities (2002b), eEurope 2005: An information society for all. An Action Plan to be presented in view of the Sevilla European Council, 21/22 June 2002, COM (2002) 263 final.
4. CIOC. Federal Chief Information Officer Council (1999), Federal Enterprise Architecture Framework, version 1.1.
5. CIOC. Federal Chief Information Officer Council (2002), E-Gov Enterprise Architecture Guidance, draft–version 2.0.
6. e-Envoy. Office of the e-Envoy (2004), e-Government Interoperability Framework, version 6 draft for public consultation.
7. Mowbray, T. J. & Zahavi, R. (1995), The essential CORBA, John Wiley & Sons.
8. OECD (2003), The e-Government Imperative, OECD e-Government Studies, France.
9. Zachman, J. (1987), A framework for information systems architecture, IBM Systems Journal, vol. 26, no. 3.

An Overview of DC-Based e-Government Metadata Standards and Initiatives

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Abstract. Metadata are "data about data" or "information about information". In the public sector, metadata may be used amongst others for the discovery and retrieval of governmental information. An increasing number of governments worldwide recognize the role of establishing a metadata standard as an integral ingredient of their interoperability framework towards realizing their eGovernment strategy. This paper presents an overview and comparison of eGovernment metadata initiatives throughout the world. Most metadata initiatives worldwide are currently based on Dublin Core (DC) thus in this study only standards based on Dublin Core are considered. We start by reviewing Dublin Core and the work within the Dublin Core - Government Working Group. We thereafter review national metadata standards and compare them with Dublin Core. We finally present a metadata element set that has been proposed by the European Committee for Standardization (CEN).

1 Introduction

Metadata are most commonly defined as "data about data" or "information about information". The use of metadata is common in areas, such as libraries, where the discovery and retrieval of resources is essential. In the case of libraries, metadata provide information such as title, author, publisher etc. that facilitate readers in locating the required items. One of the most influencing, domain-independent initiatives in the area of metadata is the Dublin Core Metadata Initiative [1]. Dublin Core (DC) has been used as a basis from a number of diverse communities in their efforts to establish a suitable metadata standard for their needs.

More recently, governments all over the world realize that "within the exercise of its public tasks, the public sector collects, processes and disseminates huge quantities of information" [2]. In Europe it has been recognized that "public bodies are by far the largest producers of information" [3]. The European Commission has recently presented a Directive of the European Parliament and the Council on the re-use and commercial exploitation of public documents [2].

An increasing number of governments are now concerned with establishing Metadata Frameworks for standardizing and promoting the use of metadata in the public sector. These frameworks are usually based on DC and are integral parts of Interoperability Frameworks, which in turn are essential parts of implementing the national eGovernment Strategies. We anticipate that in the years to come the use of metadata by governments will continue to expand.

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At the next level, initiatives have already emerged trying to formulate and promote a European or even universal standard on the use of metadata in eGovernment. Examples include the Dublin Core Government (DC-Gov) initiative[4], the IST eGOV project[5], the IDA MIReG project and the project "A Dublin Core eGovernment profile and model" by the MMI-DC Workshop [6] within the European Committee for Standardization (CEN)[7].

The main objective of this paper is to review national and international initiatives and standards that are based on DC. This will allow decision makers, policy makers, domain experts but also researchers, analysts and technicians to appreciate the efforts that are taking place simultaneously in different countries as well as the standardization efforts that are taking place at the European and international level.

2 Definitions

In this study, the following definitions have been used:

Element: An Element is a property of a resource. Furthermore, "properties" are attributes of resources, i.e. characteristics that a resource may "have", such as a Title, Publisher, or Subject.

Element Refinements: An Element Refinement is a property of a resource that shares the meaning of a particular Element but with narrower semantics. In DC practice, an Element Refinement refines just one parent DC property.

Application Profile (AP): An Application Profile is a declaration of which metadata terms an organization, information resource, application, or user community uses in its metadata [8].

3 Dublin Core

The Dublin Core Metadata Initiative has proposed a set of 16 elements as shown in the following table.

Element	***Definition***
Title	A name given to the resource
Creator	An entity primarily responsible for making the content of the resource
Subject	The topic of the content of the resource
Description	An account of the content of the resource
Publisher	An entity responsible for making the resource available
Contributor	An entity responsible for making contributions to the content of the resource
Date	A date associated with an event in the life cycle of the resource
Type	The nature or genre of the content of the resource
Format	The physical or digital manifestation of the resource
Identifier	An unambiguous reference to the resource within a given context
Source	A Reference to a resource from which the present resource is derived
Language	A language of the intellectual content of the resource
Relation	A reference to a related resource
Coverage	The extent or scope of the content of the resource
Rights	Information about rights held in and over the resource
Audience	A class of entity for whom the resource is intended or useful

4 National Metadata Standards

This study revealed the following DC-based national standards:

- UK e-Government Metadata Standard ver. 2.0, April 2003. From http://www.e-envoy.gov.uk/Resources/Guidelines/fs/en
- Irish Public Service Metadata Standard. ver. 1.0, August 2001. From http://www.gov.ie/webstandards/metastandards/index.html
- The Danish Government Metadata Standard (data derived from a study conducted by the MIReG project)
- The Finnish Government Metadata Standard (data derived from a study conducted by the MIReG project and the Web site http://www.intermin.fi/juhta/suositukset/jhs143.htm)
- The Iceland Government Metadata Standard (data derived from a study conducted by the MIReG project)
- The Australian Government Locater Service (AGLS). From http://www.naa.gov.au/recordkeeping/gov_online/agls/summary.html
- The New Zealand Government Locater Service (NZGLS). From http://www.e-government.govt.nz/nzgls/index.asp
- The Canadian Government On-Line Metadata Standard. From http://www.cio-dpi.gc.ca/im-gi/meta/clf-nsi-meta/clf-nsi-meta_e.asp

The additional metadata elements that are used in the investigated national standards and are not included in DC are summarized in the following table.

Element	***National Standard***
Accessibility	UK
Disposal	UK
Location	UK
Preservation	UK
Status	UK
Addressee	UK
Aggregation	UK
Digital signature	UK
Mandate	UK
Receiver	DK,FI
Process	DK
DocumentType	FI
Publicity	FI
Version	FI, IC
Environment	FI
Mandator	FI
Availability	FI, AU, NZ
Metadata	IC
Function	AU, NZ

It should be noted that two elements of the Icelandic standard (namely Quality and Standards) are not included in this table. This is due to the fact that the Icelandic stan-

dard was mainly focused on educational purposes and the relevance of these elements to eGovernment is not adequately documented. Despite this fact, there are still nineteen elements in use by various governments that are not included in DC.

5 Towards a Universal e-Government Metadata Standard

This study revealed the following DC-based international initiatives and projects:

- DC-Government (DC-Gov) Working Group. From http://dublincore.org/groups/government/profile-200202.shtml
- MIReG project funded by the IDA initiative. From http://dublincore.org/groups/government/mireg-metadata-20010828.shtml
- IST eGOV RTD project co-funded by the European Commission. From http://www.egov-project.org
- CEN MMI-DC Workshop project entitled "A Dublin Core eGovernment profile and model". From http://www.cenorm.be/sh/mmi-dc

The first two projects are ongoing and have not yet finalized their work. The third project presented an eGovernment Metadata Application Profile for the purposes of a research project aiming to develop an one-stop government platform. As a result, the project's aim was narrower than proposing a viable universal standard. Thus, in the rest of this section we concentrate on the last project.

The last project was conducted within the MultiMedia Information – Dublin Core (MMI-DC) Workshop of the European Committee of Standardization (CEN). The project started on September 2002, ended on September 2003, and resulted in two CEN Working Agreements (CWA), namely CWA 14860 "Dublin Core eGovernment Application Profiles" [9] and CWA 14859 "Guidance on the Use of Metadata in eGovernment" [10].

This section only presents the work relevant to the establishment of a DC-based eGovernment Application Profile by harmonizing existing national initiatives, mainly in Member States.

It should be noted that a follow up project is currently running by CEN MMI-DC Workshop. The project started on January 2004, will finish on January 2005 and is entitled "Further development, guidance and promotion related to the EU eGovernment Metadata Framework". This project will culminate in two more CWA, namely "EU eGovernment Metadata Framework" and "Guidance for the deployment of the EU eGovernment Metadata Framework".

5.1 General Rules

The establishment and maintenance of a metadata Application Profile (AP) for eGovernment should be based on a set of rule. The proposed rules are [9]:

1. General Rules
   1.1. The application profile will be based on Dublin Core.
   1.2. Additions to Dublin Core will be only considered if they
      - have clear purpose
      - provide clear value and
      - do not significantly overlap with existing terms

1.3. The application profile should allow harmonisation by allowing Member States to use their own labels for metadata terms (i.e. elements and refinements) but always using the centrally agreed name
1.4. All metadata terms in the application profile are considered as optional thus allowing Member States to determine the obligation of each metadata term according to their needs.

2. First version and Updates
2.1. The first version of the eGovernment Application Profile will be based on the metadata standards in Member States that are based on Dublin Core (i.e. UK, Denmark, Finland, Iceland and Ireland) while other relevant standards and initiatives will be also taken into account.
2.2. All official changes of Dublin Core should be adopted immediately
2.3. For considering a new term, suitable documentation should be provided to indicate its purpose and value. For example, the documentation could be provided in the form proposed by the methodology reported in CWA "Guidance on the Use of Metadata in eGovernment".

5.2 CEN Application Profile v.1.0

The following namespaces are assumed:

- *dc*: this contains version 1.1 of the Dublin Core Element Set
- *uk*: this contains version 2.0 of the e-GMS (http://www.govtalk.gov.uk/terms/)
- *dk:* this contains the Danish metadata standard
- *fi:* this contains the Finnish metadata standard
- *ic:* this contains the Icelandic metadata standard
- *cen:* this contains new terms of version 1.0 (http://www.cenorm.be/metadata/egov/terms)

The proposed CEN eGovernment metadata AP consists of the following terms (besides those element refinements already in DC and national standards):

Element	***Element Refinement(s)***
dc: Title	
dc: Creator	
dc: Subject	
dc: Description	
dc: Publisher	
dc: Contributor	
dc: Date	
dc: Type	*CEN:* Aggregation, DocumentType
dc: Format	
dc: Identifier	
dc: Source	
dc: Language	
dc: Relation	
dc: Coverage	
dc: Rights	*CEN:* Publicity
dc: Audience	*CEN:* Receiver

UK: Accessibility	
UK: Disposal	
UK: Location	
UK: Preservation	
UK: Status	*CEN:* Version
UK: Mandate	*CEN:* Mandator
CEN: MetaMetadata	*CEN:* Creator, dateCreated, dateModified

Compared to DC, this AP includes only seven new elements: Accessibility, Disposal, Location, Preservation, Status, Mandate and MetaMetadata.

Is summary, from the initial 19 extra elements in use in national standards, 2 are currently eliminated, 7 are retained as elements while the remaining 10 are either included as refinements or mapped to those elements retained.

It should be noted that no new metadata term has been included in this AP. The work included only reviewing national metadata standards and harmonizing them towards a common metadata standard.

5.3 Mapping to Existing Standards

The following table presents the mapping of existing standards to the proposed CEN eGovernment Application Profile (AP) version 1.0. The standards considered are those of UK, Denmark, Finland, Iceland, Ireland, Canada, Australia, New Zealand and the one proposed by the IDA MIREG project. This table only contains elements that do not map obviously i.e. elements with a name and definition that is not identical to the name and definition in the CEN eGovernment AP version 1.0.

Standard	***Metadata Term***	***CEN Metadata Term***
UK	Addressee	Audience.Receiver
UK	Aggregation	Type.Aggregation
UK	Digital Signature	-
DK,FI	Receiver	Audience.Receiver
DK	Process	Status
FI	DocumentType	Type.DocumentType
FI	Publicity	Rights.Publicity
FI	Publicity.securityClass	Rights.RightsSecurityClass
FI,IC, MIReG	Version	Status. Version
FI	Environment	Preservation.Environment
FI	Mandator	Mandate.Mandator
FI, AU, NZ	Availability	Rights.Publicity, Rights.Price
IC	Metadata	MetaMetadata
AU,NZ	Function	-
MIReG	Circulation List	Audience.Receiver
MIReG	Electronic Signature Certificate	-

There are two issues to be noted. Firstly, although nine different standards were included in this mapping exercise, only 16 elements needed to be mapped. This suggests that although the proposed CEN eGovernment AP is relatively small (only the

standard DC terms plus seven new) it still includes the vast majority of terms in the national standards.

Secondly, for the 12 out of 16 elements the mapping is one to one thus, at least from a technological point of view, "bridges" between national and the proposed standards could be implemented to enable cross-border interoperability. From the remaining 4 elements, the 3 are not mapped while 1 is mapped into two refinements. It is noted that 2 out of the 3 elements that were not mapped are referring to Digital Signatures; an indication that these should be examined in a next version of the AP. The remaining element, namely "Function", refers to the "business function of the agency to which the resource or service relates". This seems a valuable element in the content of public sector resources. Indeed citizens are often concerned on the authority that owns the resource they access since this is related to their trust and confidence on the use of that resource. Thus, this element could be also considered in a next version of the proposed AP.

6 Conclusions and Future Work

Metadata may be used amongst others for the discovery and retrieval of governmental resources. As a result, an increasing number of governments worldwide establishes and promotes the use of metadata standards as an essential part of their eGovernment strategies. Many of these standards are based on Dublin Core (DC) metadata initiative.

This paper presented a number of metadata standards worldwide that are based on Dublin Core. The survey revealed that usually governments adopt DC and further extent it according to their needs and requirements. As the needs and requirements across these governments are similar, it comes as no surprise that these standards are similar. Despite the similarities however, there are still differences between standards that in the future may harm cross-border interoperability. For this purpose, a number of initiatives and project are working towards establishing and promoting a universal metadata standard. In this paper, we briefly presented the work conducted within one such project initiated by the European Center for Standardization. Although this work seems promising there is still a long way to be walked before a universal metadata standard is agreed and used by all governments worldwide.

Acknowledgments

The work presented in this paper was conducted within the project "A Metadata eGovernment Application Profile and Model" and was updated within the EU-Publi.com project. The project "A Metadata eGovernment Application Profile and Model" was conducted within the MultiMedia Information – Dublin Core (MMI-DC) workshop of the European Committee for Standardization (CEN). The EU-Publi.com project (IST-2001-35217) is partially funded by the European Commission under the IST programme.

References

1. Dublin Core, http://dublincore.org/
2. European Commission, Proposal for a Directive of the European Parliament and of the Council on the re-use and commercial exploitation of public sector documents, COM(2002) 207 final
3. eContent, Commercial exploitation of Europe's public sector information, 2000,
4. Dublin Core Government (DC-Gov), http://dublincore.org/groups/government/profile-200202.shtml
5. eGov project, http://www.egov-project.org
6. CEN Workshop on Dublin Core Metadata, http://www.cenorm.be/sh/mmi-dc
7. European Committee for Standardization, http://www.cenorm.be/
8. Thomas Baker, DCMI Usage Board Review of Application Profiles, http://dublincore.org/usage/ documents/2003/02/11/profiles/
9. CEN, CWA 14860 "Dublin Core eGovernment Application Profiles", http://www.cenorm.be/sh/mmi-dc
10. CEN, CWA 14859 "Guidance on the Use of Metadata in eGovernment", http://www.cenorm.be/sh/mmi-dc

Enterprise Architecture for e-Government

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Abstract. We discuss the role of Enterprise Architecture as a prerequisite to e-Government implementation, and underscore how simply taking an IT perspective is a serious mistake. We discuss the influence of the Federal Enterprise Architecture Framework (FEAF) guidance on E-Government and the holistic perspectives respectively to better assess their viability. We argue that those who take an IT-centric narrow view confuse the new Office of Management and Budget (OMB) mandated Federal Enterprise Architecture (FEA) Reference Models as providing a methodology for satisfying government legislation and as a replacement for the FEAF. This confusion is often the result of agencies' zeal to satisfy whatever OMB issues as guidance and their over reliance on external contractors who are charged with building their EA and in so doing emphasize selling their products. With such an emphasis they cannot demonstrate the business value of the EA they deliver and instead are primarily product focused.

United States e-Government Mandates

Since the late 90s E-Government has been a priority at the federal, state and local levels across the United States. In July 2002 Congress passed the E-Government Act of 2002 (H.R. 2458) that provides for a comprehensive framework for information security standards and programs, and uniform safeguards to protect the confidentiality of information provided by the public for statistical purposes, and to expand the use of the Internet and computer resources in order to deliver Government services for a citizen-centered, results-oriented, and market-based Government. Those responsible for implementing E-Government are split according to their interpretation of how to accomplish this mandate. There are those who take a narrow view that EA is primarily an IT matter that involves optimizing an agency's IT assets and deciding upon what applications and technologies to purchase in order to implement E-Government and other agency specific initiatives. Others recognize E-Government entails enterprise and cross-agency perspectives, and in doing so take a long view or holistic perspective. They argue that to only treat E-Government as an IT matter inevitably leads to continuance of IT centric practice and inefficient and less than effective programs. What is required is a thorough understanding of the business of an organization, the processes and activities involved, the types of information flows (internal and interaction with the public) that each entails and the applications and technologies that support them. With this understanding the objectives for implementing E-Government can be clearly defined to fully support the business process and activity changes entailed in making the transition. In addition having a well defined scope will consequentially lower the cost and risks of such an eGovernment business reengineering effort.

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In this paper we discuss the role and significance of Enterprise Architecture as a prerequisite to E-Government implementation, and underscore how simply taking an IT perspective is a serious mistake. We discuss the lasting influence of the Federal Enterprise Architecture Framework (FEAF) guidance on E-Government and how the holistic perspective leads to viable projects. We argue that those who take a narrow view confuse the new Federal Enterprise Architecture (FEA) Reference Models as providing a methodology for satisfying government legislation and even as a replacement for the FEAF. We maintain that this confusion is often the result of agencies' zeal to satisfy whatever OMB issues as guidance and their over reliance on external contractors (mostly IT integrators) who are charged with building their EA and in so doing emphasize selling their products. With such an emphasis they are unable to demonstrate the business value of the EA they deliver and instead are primarily end result and product focused.

e-Government and Enterprise Architecture

Enterprise architectures are 'blueprints' for systematically defining an organization's current (baseline) and/or desired (target) environment. Enterprise architectures are essential for evolving information systems and developing new systems that optimize their mission value. This is accomplished in logical or business terms (e.g., mission, business functions, information flows, and systems environments) and technical terms (e.g., software, hardware, communications), and includes a sequencing plan for transitioning from the baseline environment to the targeted e-government environment. In the United States, enterprise architecture is mandated by Congress for all federal agencies, including the Department of Defense, through the 1996 Clinger-Cohen Act. The Clinger-Cohen Act requires all federal agencies to establish an architecture program that integrates a process to select, control, and evaluate their IT investments. It calls for "an integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the agency's strategic goals and information resources management goals" (Clinger/Cohen Act – 1996). Furthermore, the United States Office of Management and Budget (OMB) budget process requires that agencies indicate the compliance of IT initiatives with their agency architecture on Exhibit 300B, budget request form. Recently, the OMB has clarified its position by requiring Enterprise rather than IT architectures from all Agencies as a mandate to receive their appropriations. In support of this the CIO Council's Practical Guide to Enterprise Architecture (2001) defines EA as an "agency-wide roadmap to achieve an agency's mission through optimal performance of its core business processes within an efficient information technology (IT) environment". Those advocating the short view IT architecture-centric perspective literally interpret the language of Clinger-Cohen calling for a "...sound and integrated information technology architecture" and ignore what this implies for high level business processes. They interpret the Office of Management and Budget (OMB) requirement that agencies indicate "...the compliance of IT initiatives with an agency architecture" on the yearly budget request form (Exhibit 300B) as a reporting task rather than an opportunity to fully develop a to-be business and IT strategy that in addition to optimizing technology takes into account the possible optimization of business activities and work processes of government. The quality of architectures are solely evaluated in terms of IT projects without direct reference to how those projects

support current and re-engineered business activity for E-Government. Many of those who take such an IT centric perspective advocate a change in terminology for those doing architecture from enterprise architect to solutions architect. This seems to be just another name for point to point technical solutions and Enterprise Application Integration (EAI) solutions.

This past year the Office of Management and Budget published a new architecture construct called the Federal Enterprise Architecture (FEA), consisting of five reference models. OMB requires alignment of all Departments and cross agency architectures with the FEA Reference Models. The expressed purpose of the FEA reference models is to enable analysis across the Federal Government Departments to locate duplicative investments, gaps, and opportunities within and across agencies. The FEA models are constructed specifically for the submittal of Exhibit 300 budget requests to the OMB in the spring of each year. This has led to confusion as the OMB has redirected the CIO Council's efforts away from modifying and improving the FEAF, and greatly publicized the reference models in its publications and discussions. As a result a number of people have mistakenly assumed that the FEAF is no longer viable and has been replaced by the FEA models.

The Zachman Framework and the Development of the FEAF

Almost every major architectural framework draws from John Zachman's original formulation (1987), which defined a five-level hierarchy based on design factors. An earlier collaborator of Zachman, John Sowa (2000) describes the upper three levels as epistemological and the bottom two as heuristic or implementative. The top level is the scope or what Melissa Cook (1999) calls the "ball park" view lists the relevant components in the architecture without specific attention to their systemic structure. It is the planner's view of the enterprise, essentially "an executive summary characterizing the purpose of the system, its scope, its cost and what it would do" (Sowa, p. 189). The second level is the enterprise model; it addresses the system user's view without reference to how the systems are represented on the computer. This is the operational perspective, the view of those involved in the day-to-day functioning of the business, and it entails people, resources, products and tasks. The third level is the system model. Although it is implementation-independent, it is the domain for the systems analyst who works on the border between the computer and the outside world. This level covers the information system designed by the systems analyst who determines the data elements and functions representing business entities and processes. It entails the data structures representing physical entities at the enterprise level. This level basically integrates the top two levels with the bottom two (technical) levels. The fourth level addresses the technology used to implement information elements of the systems model. It is the province of programmers who map the system analyst's view to programming languages, I/O devices and other components of computer systems. The bottom or fifth level is the component model. It entails detailed specifications of programmers who code modules without concern for the global context and purpose of the enterprise.

Zachman provides a grid of columns across each of the five rows of his framework based on the Aristotelian questions "what, how, where, who, when and why." Each column addresses pairs of concepts that are differentially relevant for each of the rows. The "what" involves an entity/relationship or data perspective and lists the entity types at each level. Each entity is in a relationship to others and their sum con-

stitutes the total data of the entire working system. The "how" is a function/argument relationship that lists the functions the system performs. Each function has one or more entity types as arguments, and the totality is the overall system function. The "where" involves location/link listing significant locations from physical rooms, buildings to cities and logical sites internally in a computer. The sum of locations defines the network. The "who" is an agent/work relationship listing all agents that have some role in the system. These include both human and computerized agents with their respective associated activities, tasks, processes, and work. The sum of all agents and their work constitutes the "organization" of the enterprise. The "when" is the time/cycle listing when significant events occur and their location within a cycle or irregular mode of occurrence. The sum of all times and cycles is the "schedule" of the enterprise. The "why" entails ends and means. It is a list of the ends or purposes for each entity, function, location, agency or time. Each end has a means whereby it is accomplished, and the totality of all ends and means at each level constitutes the enterprise strategy. At the very bottom of the Zachman framework is the working system layer, with answers to the what, how, where, who, when and why respectively as data, function, network, organization, schedule and strategy.

In 1999, the Federal CIO Council developed the FEAF to provide architecture guidance for federal cross-agency or "segment" architectures. The assumption is that full federal enterprise architecture is so complex that it must be built of segment architectures, where segments represent government business areas needed by multiple agencies coordinate activities or share resources. This thinking probably gave rise to the Quicksilver initiatives by OMB to root out duplication of effort for what became eGovernment programs. The FEAF is based on the Zachman framework but addresses only the first three columns of Zachman (using slightly different column names) and focuses on the top three rows. There is no work products specified in the FEAF. However, there was a major initiative organized by the MITRE Institute, a Federally Funded Research Development Center (FFRDC), to develop such products based on the Department of Defense Architecture Framework (DoDAF), which has specified products for each of its three views – operational, systems and technical. However, the initiative was never completed as the emphasis shifted towards the development of the FEA reference models for the OMB. By default the FEAF focused more on introducing EA concepts and references Steve Spewak's Enterprise Architecture planning methodology. The FEAF guidance document was planned to undergo revision to provide guidance on architecture work products, EA governance, Technical Reference Model and standards, use by small agencies, criteria for selecting EA tools and repositories, and security aspects to be included. The updated FEAF was expected to expand its scope to all six columns of Zachman and contain more guidance oriented toward agencies in addition to its current focus on segments. This effort was placed on hiatus when the emphasis shifted to developing a set of reference models with the pragmatic motive of helping agencies comply with Exhibit 300 budget request form requirements.

Federal Enterprise Architecture (FEA) Reference Models

The Office of Management and Budget (OMB) established a Federal Enterprise Architecture Program Management Office (FEA-PMO) to define how to implement architecture concepts for the public sector to be in compliance with Clinger-Cohen,

and it established the FEA or Federal Enterprise Architecture as "a business-based framework for cross-agency, government-wide improvement." However rather than being a framework the OMB reference models are sets of categories that comprise models for defining business, performance, data, service component, and technical reference.

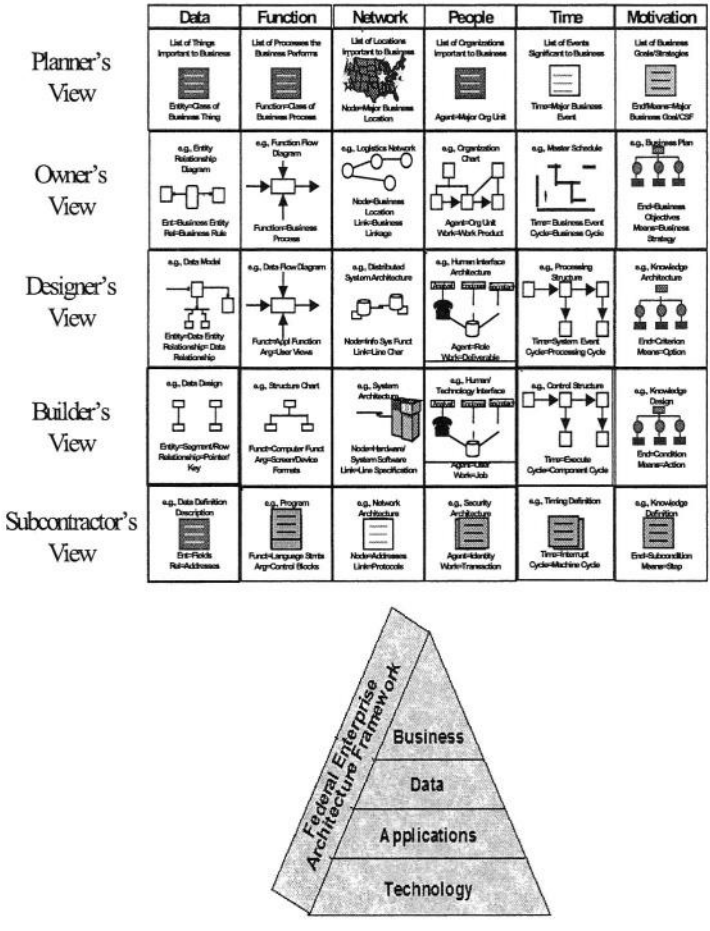
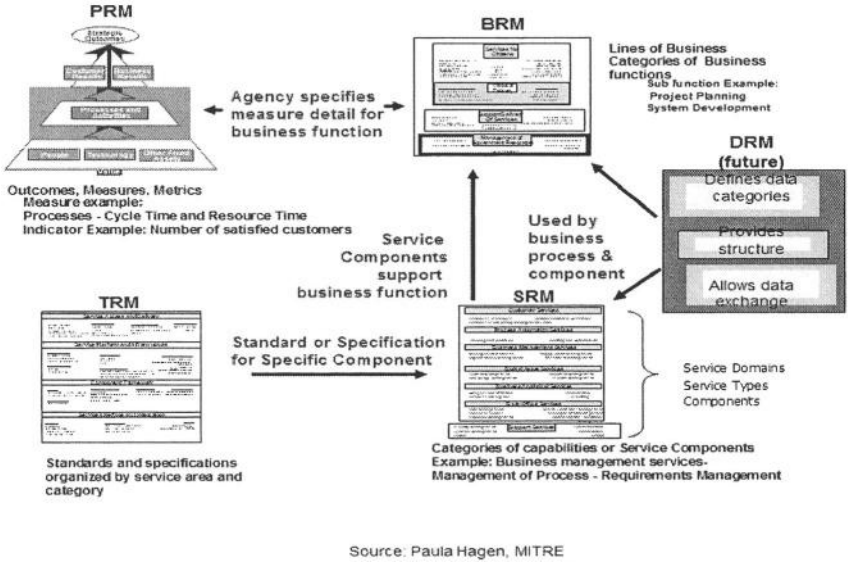


Fig. 1. Zachman Framework Federal Enterprise Architecture Framework.

The *Business_Reference Model* (BRM) describes a standard set of Federal Lines of Business to which all federal Agencies are to map their business missions. The model sets standard business functions that allow agencies to facilitate their own process of achieving program goals and objectives, and that identify potential opportunities for cross-agency collaboration. What is lacking in the BRM is any specification regarding the modeling of business activities and processes, and how these are linked to each of the other reference models. The *Performance_Reference Model* (PRM) provides scorecard measures for gauging how well these lines of business function. A low performance score would be interpreted from each of the other reference model per-



Source: Paula Hagen, MITRE

spectives. The *Data and Information Reference Model* (DRM) defines aggregate data and information categories to support business line operations. It advocates a common data model to facilitate information exchange processes within government and external stakeholders. The data model differentiates types and their interrelationships. As information and data are often poorly organized or classified within an enterprise there are often conflicts regarding stewardship. Consequently, the specification of data and information reference models very often entails a reengineering of information systems but itself does not provide clear links to the business to facilitate this. The *Service Component Reference Model* (SRM) classifies horizontal and vertical IT service components supporting federal agencies, recommends service capabilities supporting the re-use of business components and services across government. This involves the integration and coordination of capabilities to ensure consistent operations with respect to agency business objectives. The SCRM necessitates viable business process models along with information and integration infrastructures for information exchange and resource utilization management. However there is no requirement for such process models within the BRM. Lastly, the *Technical_Reference Model* (TRM) describes how technology supports the delivery of service components. The TRM classifies technologies, components, and functions supporting the re-use of business services; defines existing products that can be leveraged outside of agency boundaries; and aligns existing guidance and architecture recommendations. The TRM identifies information services used across an enterprise to promote interoperability and includes standards and principles that support them. These include applications, data/message interchange, hardware, management, network, operating systems, programming and security. The FEA purpose is to primarily deal with extracting financial decision support information for the highest levels of Government cross agencies and eGov projects. This is the mechanism for the US OMB to determine duplications and overlaps in project spending and take action during the appropriations process in streamlining certain operations.

Department of Defense Architecture Framework (DODAF)

The Department of Defense developed its own unique architecture framework initially called the Department of Defense Architecture Framework (DODAF). The DODAF defines three views of any given architecture: the operational, the systems, and the technical. The operational view visually presents and describes tasks and activities, operational elements, and information flows required to accomplish or support an operation. The systems view describes systems and interconnections that support the activities of interest. And the technical view is the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or elements. To be consistent and integrated, the architecture must provide explicit linkages among its views. Such linkages provide a cohesive audit trail from integrated mission operational requirements and measures of effectiveness to the supporting systems and their characteristics, and to the specific technical criteria governing the acquisition/development of the supporting systems. The following figure illustrates the interrelationships among the three views in terms of interoperability:

As shown in the figure, the operational view describes information exchanges in detail sufficient to determine the degree of information-exchange interoperability required. The systems view identifies which systems support the requirement, translate the required degree of interoperability into a set of system capabilities needed, and compare current/postulated implementations with the needed capabilities. The technical view articulates the rules and criteria that govern the compliant implementation of each required system capability. A High-Level Process is provided for using the framework in building the architecture. This is a six-step process intended as general guidance and is designed for tailoring to the needs of each architecture development project. While the DODAF was not intentionally based on Zachman, its descriptive products are mapped to the cells of the Zachman Framework and the FEAF, which link all parts of the enterprise together making all components address and be responsive to the business or operational views.

Meeting e-Government Objectives

When the OMB focused on the FEA over FEAF there was a general confusion in many agencies about what they wanted out of enterprise architectures. This was exas-

perated by their not updating the FEAF while the Department of Defense continued to develop the DODAF. Additionally the eGovernment projects were not required directly to do an EA first before anything else. Concomitantly, many agencies outsource major portions of their EA to external contractors who promote the selling of IT products and, consequently, concentrate on the 4th and 5th Zachman rows to the exclusion of others. This IT-centric perspective led some to conclude that the FEA is a replacement for the FEAF. However, to the contrary the FEA is not a framework or a methodology. It is only set of reference models comprised of categories that, although relevant to constructing an EA so that OMB can exercise its management function, is intended specifically to support the annual budget process of the Executive branch of Government. It neither maps against the Zachman Framework nor provides a mechanism for integrating the enterprise. Without taking a holistic, integrated EA perspective the implementation of E-Government becomes overwhelmed by technical possibilities without understanding how different alternatives respectively impact business activities. As a consequence, often after a great deal of money is spent building the IT-centric architecture, its business value cannot be demonstrated.

This was the case with the USDA's US Forest Service (FS) when it undertook its first pass at constructing an EA in support of its E-Government initiatives. They outsourced to one of the large contractors that also is a major technology vendor. The immediate focus was on developing logical and physical models of its technical and application architectures. There was no attention paid to business activities and processes, except for noting that there are different lines of business within the service. This recognition of lines of business could be interpreted as satisfying requirements for a BRM in filling out the Exhibit 300 for the OMB budget process, but it did little to provide for an integrated view of the enterprise. Much of the effort was placed on categorizing technology and applications. This was done by organizing large focus groups, bringing to Washington IT staff from the different FS regions around the country. These meetings were chaired by the contractors, where they asked those attending to fill out elaborate spreadsheets regarding the technologies and applications they utilized. When the final architecture data was assembled and placed into a model, the FS chief architect asked the contractor to now demonstrate the architecture's business value. The FS architect presented several business use cases and asked how the architecture would address the problems they posed. Not only was the contractor unable to show how the architecture addressed these business case examples, in the review it was evident that the building block data they elicited was unreliable. When the data was collected many in the focus group became upset by the monotonous procedure of filling out forms and often filled them in without any quality control just to complete the process. Their behavior was not only the result of the methodology of having groups fill out long forms, but also from a lack of demonstrating to those attending that this work was related to improving business processes and satisfying E-Government objectives. As a result the FS EA project began anew. They brought in a new team of consultants who seriously took an integrated, holistic view in building their EA. This produced a viable EA that is today exemplary for other agencies. Another example of a major project in the DoD to build a financial and administrative architecture in support of E-Government without concern for integrating with and linking to business processes and activities involved has had even more serious consequences. Although the DoDAF requires both architectural and operational views that visualize DoD business processes, the financial DoDAF focused was so IT centric that these processes were disconnected from the final deliverables. Over 100 mil-

lion dollars have been spent resulting in a barely usable data architecture centric system. These examples support the requirement for taking the long view or holistic perspective. The guidance offered by the FEAF involves understanding the business and not just the technology and applications layers of an agency's architecture. It is important, nevertheless, for the United States CIO Council to continue developing the FEAF to provide continual guidance and framework components. Only in this way can government fully meet the goals of E-Government to deliver Government services for a citizen-centered, results-oriented, and market-based Government.

References

1. CIO Council, A Practical Guide to Federal Enterprise Architecture, Version 1.0, February 2001
2. CIO Council, Federal Enterprise Architecture Framework Version 1.1, September 1999
3. Cook, Melissa. (1996) Building Enterprise Information Architecture: Reengineering Information Systems Prentice Hall
4. Department of Defense Architecture Framework, http://aitc.aitcnet.org/dodfw/
5. FEAC Institute faculty lectures – courses 1-5 of its EA Certification Program
6. Federal Enterprise Architecture Program Management Office, FEA Reference Models
7. MITRE, Federal Enterprise Architecture Product Guide 2001
8. Sowa, John F. (2000) Knowledge Representation: Logical, Philosophical and Computational Foundations; Brooks/Cole
9. Spewak, Stephen Enterprise Architecture Planning: Developing a Blueprint for Data, Applications, and Technology John Wiley/QED, New York 1993
10. Zachman, John (1987) "A Framework for information systems architecture" in IBM Systems Journal, 26:3, 276-292

Information Integration or Process Integration? How to Achieve Interoperability in Administration

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Abstract. IT managers in administration must decide how to contribute to cross-organisational integration and what strategy and means to choose for achieving interoperability. Comparing the frameworks and guidelines provided by central European and U.S. governmental units, we find information integration and process integration as prominent concepts to guide interoperability efforts, but they seem to point to different directions. This paper aims at contrasting the different characteristics of both approaches and concludes with recommendations according to the intended organisational scope of integration. To be successful in these efforts it is important to understand that (a) interoperability requires a guiding vision of integration, (b) each type of integration points to a different set of interrelated ideas, assumptions and technical means, and (c) integration implies a strategic commitment to explicit forms of cross-organisational cooperation and their implementation.

1 Introduction

To fulfil the many promises of e-government, organisational and technical performances of different administrative units need to be interrelated. This requires *cooperation,* pointing to a common cross-organisational strategy and its implementation, as well as *interoperability,* pointing to the technical means which enable IT systems to exchange messages in order to realise machine performance across system borders. Given these two enablers, *integration* is the result of both cooperation and interoperability between administrations and their partners. Within this article, integration denotes a state of readiness (or the effort to reach this state) to provide services (information, transactions, production etc.) which are only possible through successful incorporation of informational or functional elements which had been isolated before.

Within the e-government discussion, integration is related to several concepts – each of these meant to put in the foreground the main objective of integration. One of these is the concept of life-event, i.e. an integrated way of dealing with concerns related to a certain situation in the life of a citizen (e.g. marriage, moving home) or a business (e.g. start up). This vision of integration has sparked many projects and research on how to realise e-government websites based on "life-events" or "one-stop-government" (cf. [17]). But it soon became clear that prospects for this kind of integration are very limited unless the different providers contributing to the overall performance are able to achieve a higher level of integration than is given today (cf. [24]). Another stream of discussion (e.g [16]) highlights administrative efficiency and

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effectiveness, concluding that improvements in these areas are only possible through an increased integration of performance by administrative units and their IT devices.

Given these drivers for integration, IT managers on all levels of administration now have to decide how to contribute to cross-organisational integration and what strategy and means to choose for achieving interoperability. To guide this effort, two prominent concepts seem to point to different directions:

- *information integration* aims at facilitating information flow, i.e. providing access to structured informational resources across technical and organisational borders in order to enable new services based on a virtually shared information environment
- *process integration* centres around interrelating steps and stages of process performance across technical and organisational borders in order to enable new services based on an overarching monitoring and control of process flow.

In practice, these two integration approaches seem to largely overlap or supplement each other without providing a clear understanding of the implications of following or prioritising one of them. Does one approach depend on the other or are they separate paths to follow? Do they require different or similar activities and instruments?

This paper examines information integration and process integration more closely by analysing the underlying assumptions and perceptions of "things" to be integrated. The aim is (a) to point out the interdependencies between the concepts, their underpinnings, technical means and consequences for any interoperability strategy, and (b) thereby to contrast the different characteristics of information and process integration and to foster a better understanding of the potentials and limitations of each approach.

This contribution is organised as follows: Section 2 points to the differences between the interoperability guidelines provided by central European and U.S. governmental units with respect to information and process integration. In section 3, information and process integration are contrasted within three dimensions: administrative cooperation, conceptual deconstruction and modelling, and systems development. In section 4, the two approaches are contrasted by certain characteristics in order to sum up the findings and to provide some guidance also for practitioners.

2 e-Government Interoperability Frameworks and Architectures

During the last few years, facing increasing demands on interoperability and integration, central governments around the world have started initiatives to provide comprehensive frameworks in order to provide guidance to activities on the local and regional level and to prevent from investments which do not contribute to interoperability. In consequence, local actors now find themselves surrounded by an increasing variety of artefacts such as e-government guidelines, frameworks, architectures, standards, components and tools – all of these introduced with the threat of causing major disadvantages (e.g. additional cost, interoperability gaps, insufficient service performance) if not being used.

Comparing the guidelines provided by the European Commission (EC) with those issued by the U.S. federal government reveals that the visions to guide interoperability efforts refer differently to information and process integration. The EC has issued several documents centred around e-Government interoperability, namely the European Interoperability Framework [7], the Architecture Guidelines [8] for administra-

tive networks and a position paper ("Linking up Europe", [9]) on the importance of interoperability for e-government services. The scope of this endeavour is to supplement the national efforts in this field and to support the provision of user-centred e-government services on the European level. In these documents the EC clearly highlights process integration and service interoperability as the guiding vision:

- The Architecture Guidelines are designed to fulfil generic business requirements: "Trans-European networks are established to support business processes that involve independent partner organisations. Business types and requirements are wide ranging, yet common business requirements can be identified and classified based on the substantive commonality of the underlying processes." ([8], p. 7)
- The EC [7, 9] distinguishes between three main areas: organisational, semantic and technical interoperability. For the organisational level it recommends a demand driven approach and the connection of business processes through "business interoperability interfaces", supported by distinct service level agreements. Aspects of information and data integration are then covered within subordinate levels.

The Federal Enterprise Architecture (FEA) [10], issued stepwise by the FEA Program Management Office (a U.S. federal agency established for that purpose), also incorporates a layered approach. The collection of interrelated reference models (Performance, Business, Service Component, Data & Information, Technical) is designed to implement a "business and performance-driven approach" which is supposed to "transform the Federal Government to one that is citizen-centred, results-oriented, and market-based" (ibid.). Compared to the EC approach, the FEA focuses on results rather than on the processes producing those outputs. For example, the FEA incorporates

- a distinct reference model (or framework) to measure the performance of major IT investments and their contribution to program performance;
- the Business Reference Model as a function-driven framework for describing the business operations, while the next subordinate reference model classifies service components with respect to how they support business and/or performance objectives. Only one out of those six service classes deals with process automation, and one more with supporting cross-organisational business management.

In comparison, the EC approach clearly emphasizes the intermediation of cross-organisational processes and citizen-centred services, while the FEA focuses on the products of functions and services within and across agencies, all of which are to be integrated on the informational level. In their analysis of e-government architectural frameworks, Pardo et al. use the term "interorganisational information integration" [21] to denote the intergovernmental integration effort currently underway in the U.S., claiming that governmental leaders increasingly recognize its critical importance.

All in all, the two approaches introduced above follow different priorities and guiding visions, respectively. But they had made their choice without providing the reader (e.g. IT managers in administration) with any rationale on benefits and drawbacks. Therefore, the following section draws on the literature to contrast information and process integration as to approaches to achieve interoperability each of which interrelating distinct perspectives on administrative cooperation, conceptual deconstruction and modelling, and systems development.

3 Information Integration Versus Process Integration

As definitions of information and process integration may vary, this contribution builds on notions taking into account both the organizational and IT perspective. Information integration centres around facilitating the flow of information, i.e. providing access to structured informational resources across technical and organisational borders, in order to enable new services based on a virtually shared information environment. Jhingran et al. [12] describe information integration one of the forms of integration, "wherein complementary data are either physically (through warehousing tools) or logically brought together, makes it possible for applications to be written to and make use of all the relevant data in the enterprise, even if the data are not directly under their control" (p. 555). While integration is considered to be the driving force of this decade of IT spending, the task of information integration has become even more complex due to the heterogeneity and distribution of relevant data as well as the demand for increased speed of information processing (e.g. for business intelligence). The above authors as well as many others distinguish information integration from other forms such as portal, business process and application integration. However, these perspectives are distinct because of their optimisation focus while the same data is relevant for all forms of integration. As Roth et al. [22] point out, "enterprise applications require a new information integration platform that combines the advances in enterprise data management over the past 30 years into a single unified interface" (p. 565).

Process integration aims at interrelating steps and stages of process performance across technical and/or organisational borders. On a general level process may be described as an "organizational form, that encapsulates the interdependence of tasks, roles, people, departments, and functions required to provide a customer with a product or service" ([5], p. 13). These interdependencies come into focus through analysis, modelling and design of flows (of material or data) interconnecting the above elements. However, it is important to note that "integration is concerned with the process itself, not with its output" ([3], p. 2). Areas of discussion relevant for e-government are business process integration, (cross-organizational) workflow management and Web services. Focusing on the value for the process client (e.g. a citizen using an e-government service) process integration comes into focus from the corner of service integration. Service providers seek for an overarching monitoring and control of process flow in order to enable new services (e.g. for life event management).

Both integration strategies are related to assumptions and perceptions of "things" to be possibly integrated. In the e-government literature we find research focusing on management/integration of information exchange (e.g. [6, 11, 13, 14, 21]) as well as on processes management/integration (e.g. [1, 2, 4, 15, 20, 23, 25]). Most of these contributions focus on conceptual aspects and/or practical challenges in relation to specifics of public administration; they are based on interrelated perspectives of the cooperation of actors (individual or institutional), conceptual deconstruction and/or modelling and systems development (although technical aspects are treated only marginally). As the authors explicitly draw on related concepts and theories (mainly from business computing) or implicitly make assumptions to support their arguments, these contributions quite consistently comply with the following distinctions between information and process integration (see also table 1 for overview):

Table 1. Different concepts and challenges in information and process integration.

Concepts & challenges	Information Integration	Process Integration
Cooperation in administration	• cooperation as exchange of information as shared resource • client receives/supplies information (data) • unresolved: access, ownership	• cooperation as coordination of contribution to overarching process • client involved in process • unresolved: control, ownership
Conceptual deconstruction & modelling	• guiding vision: interorganisational IS & information flow • critical aspects: data definition, information models & classifications, quality of information	• guiding vision: interorganisational workflow & process management • critical aspects: process control, modelling of performance entities, work items & processes
Systems development	• interoperability of any IS components • use of XML, RDF/S, OWL, metadata	• interoperability of functional components • use of XML, SOAP, WSDL, UDDI, WSI

Cooperation Between Administrations

Striving for information integration, information primarily appears as a shared resource which, at the workplace, is to be obtained/retrieved, processed, delivered and archived. The client is someone who supplies and receives information (or data; mostly there is no clear distinction). Cooperation among actors is based on exchange of information within a virtually shared information system. Among the major obstacles for cooperation are unresolved issues concerning security, access and ownership of information.

Striving for process integration, workplace activities are regarded as contributions to overarching process in which the client is also involved. Cooperation means to coordinate activities and/or performance among the actors involved. Among the major obstacles for cooperation are unresolved issues concerning ownership and control of the overall processes.

Conceptual Deconstruction and Modelling

Within information integration, the guiding vision is to achieve an interorganisational information flow between information producers and consumers (which may be organisations, humans or machines). Critical aspects of analysis and modelling include

- data definitions and information models (which may include process related data),
- classification of administrative information (e.g. through thesaurus or ontologies),
- quality of information (reliability, access rights etc.).

Within process integration, the guiding vision is to achieve an interorganisational workflow between process participants (which may be organisations, humans or machines). Critical aspects of analysis and modelling include

- identification and classification of performing entities according to role, function or service within their organisational structure (e.g. front office versus back office),
- description and representation of items to be processes and shared,

- indicators for process control (e.g. conditions, events, service levels),
- process models (business processes, workflows, with reference to informational resources) and process reference models (e.g. classification/types of administrative processes).

Systems Development
The interoperability requirements deriving from information integration call (in principle) for the exchange of informational resources (according to given information models) between any given distributed information systems components. To achieve this, it is recommended to build IT architectures and infrastructure standardisation on the application of XML, RDF/S, OWL (cf. www.w3c.org) and the use of standardised metadata.

The interoperability requirements deriving from process integration call (in principle) for the linkage of functional components (according to given process models) across systems borders. To achieve this, it is recommended to build IT architectures and infrastructure standardisation on the application of XML, SOAP, WSDL, UDDI, WSI (cf. www.w3c.org).

4 How to Choose Interoperability Strategies

To sum up, the difference between information integration and process integration may be characterised as follows:

- *Information integration* relates to the vision of interorganisational information systems. The main task to be accomplished is information resource design. Abstractions shared among partners mainly describe syntax and semantics of data as well as access control (location, naming, access rights etc.) and quality of information. The scope of partnership is mostly multilateral with the potential to engage in relations with new partners any time, even on a global scale.
- *Process integration* relates to the vision of interorganisational process networks. The main task to be accomplished is business process (re-)engineering. Abstractions shared among partners mainly describe performance entities, work items, processes and process control. The scope of partnership is mostly limited to peer-to-peer relations within a group of known business partners.

All in all (see also table 2), process integration (compared to information integration) needs more planning operations, therefore it requires a higher intensity of cooperation and financial investment. For the same reason, the potential for integration is higher and the state of readiness for new services may be more advanced and rewarding.

In practice, IT managers in public administration make their choice of interoperability strategy according to a number of factors such as a given e-government strategy, service demands and requirements, investment frame, legacy systems and infrastructure, available know-how etc. As the interoperability frameworks suggest (see section 2), information *and* process integration both should be taken into account somehow – but how to set the priorities? Should we prefer rather the European or the U.S. approach? Having analysed the characteristics of both, some advice can be derived according to the intended *organisational scope of integration.* From that angle, three types of scope require different strategies:

Table 2. Different concepts and challenges in information and process integration.

Information Integration	*Characteristic*	Process Integration
interorg. information systems	*vision of integration*	interorg. process networks
information resource design	*basic strategy*	business process reengineering
multilateral, global	*scope of partnership*	Peer-to-peer, limited members
syntax & semantics of data, access control, information quality	*shared abstractions*	performance entities, work items, processes & process control
lower	*integration potential*	higher
lower	*intensity of cooperation*	higher
lower	*investment*	higher

1. *Within a single organisation:* information and process integration may both be followed together under the auspices of enterprise application integration (EAI); the main idea is to achieve unrestricted sharing of data and business processes throughout the networked applications or data sources in an organisation through establishing an adequate middleware infrastructure [18]. This applies mainly to large communes or large administrative units on the federal or transnational level.
2. *Among a stable group of partners:* a rather small network with stable relationships is the most rewarding setting for the integration of processes which are an essential part of the cross-organisational cooperation. Typical e-government settings are larger cities and their neighbouring communes (horizontal cooperation) or high-frequency processes involving local governments and federal agencies (vertical cooperation). Within these settings, the exchange of information is embedded in the process management.
3. *Open to global partnerships:* if cooperation is mainly based on encounters, without stable partner relations, the investment for process integration usually does not pay off and instead information integration is the most important guiding vision for interoperability. Given the large number of more or less independent administrative units within each country and throughout the world, the successful exchange of information between any administrations (with different IT systems and infrastructures) will be the most important interoperability scenario for the coming years. Within this setting, cross-organisational process management must be transformed into an information integration task (e.g. through establishing open process interfaces and applying global standards for process description).

With the specification and standardisation of web services and semantic web concepts, there are now new technical options for achieving interoperability. Some authors (e.g. [19]) already foresee the next generation of application integration without being limited to single organisations or small networks.

Of course, these options are relevant also for e-government: in the future, information and process integration both will lead to application integration on a large scale and provision of integrated services for citizens and others will be achieved on the basis of service-oriented architectures spanning across the whole domain of e-government. However, in comparison to the business sector, public administration is

only just beginning to achieve internet-based interoperability, and everyone involved has to learn step by step. To be successful in these efforts it is important to understand that (a) interoperability requires a guiding vision of integration, (b) each type of integration points to a different set of ideas, assumptions and technical means, and (c) integration implies a strategic commitment to explicit forms of cross-organisational cooperation and their implementation.

References

1. Andersen, K.V. Public Sector Process Rebuilding Using Information Systems. In: R. Traunmüller, K. Lenk (Eds.): Proceedings EGOV 2002, pp. 37-44
2. Andersen, K.V. Six Actions to Initiate PPR. In: Proceedings EGOV 2003, pp. 207-212
3. Aubert, B., B. Vandenbosch, M. Mignerat. Towards the Measurement of Process Integration. CIRANO Working Papers #2003s-04, University of Montréal, 2003.
4. Becker, J., L. Algermissen, and B. Niehave. Processes in e-Government Focus: A Procedure Model for Process Oriented Reorganisation in Public Administrations on the Local Level. In: R. Traunmüller (Ed.): Proceedings EGOV 2003, pp. 147-150
5. Earl, M. J. The New and Old of Business Process Redesign. Journal of Strategic Information Systems, 3 (1), 1994, pp. 5-22.
6. Eschenfelder, K.R. The Importance of Articulation Work to Agency Content Management: Balancing Publication and Control. Proceedings HICSS-36, IEEE, 2003
7. European Commission. European Interoperability Framework for pan-European eGovernment Services. IDA working document, version 2.4, Brussels, January 2004
8. European Commission. Architecture Guidelines for Trans-European Telematics Networks for Administration. Brussels, June 2002
9. European Commission. Linking up Europe: the Importance of Interoperability for eGovernment Services. Commission Staff Working Paper, Brussels, 2003
10. Federal Enterprise Architecture Program Management Office. Federal Enterprise Architecture. Washington, D.C., 2003; http://feapmo.gov/fea.asp
11. Homburg, V., and V. Bekkers. The Back-Office of E-Government. Proceedings HICSS-35, IEEE, 2002
12. Jhingran, A.D., N. Mattos, and H. Pirahesh. Information integration: A research agenda. IBM Systems Journal 41(4), 2002, pp. 555-562
13. Klischewski, R. Towards an Ontology for e-Document Management in Public Administration– the Case of Schleswig-Holstein. Proceedings HICSS-36, IEEE, 2003
14. Klischewski, R. Semantic Web for e-Government. In: R. Traunmüller (Ed.): Proceedings EGOV 2003, pp. 288-295
15. Klischewski, R., and K. Lenk. Understanding and Modelling Flexibility in Administrative Processes. In: R. Traunmüller, K. Lenk (Eds.): Proceedings EGOV 2002, pp. 129-136
16. Kubicek, H., J. Millard, and H. Westholm. Methodology for Analysing the Relationship Between the Reorganisation of the Back Office and Better Electronic Public Services. In: R. Traunmüller (Ed.): Proceedings EGOV 2003, pp. 199-206
17. Leben, A., and M. Vintar. Life-Event Approach: Comparison between Countries. In: R. Traunmüller (Ed.): Proceedings EGOV 2003, pp. 434-437
18. Linthicum, D.S. Enterprise Application Integration. Addison-Wesley, Boston, 1999
19. Linthicum, D.S. Next Generation Application Integration: From Simple Information to Web Services. Addison-Wesley, Boston, 2003
20. Palkovits, S., and M.A. Wimmer. Processes in e-Government – A Holistic Framework for Modelling Electronic Public Services. In: Proceedings EGOV 2003, pp. 213-219
21. Pardo, T., A. Cresswell, S. Dawes, and G. Burke. Modeling the Social & Technical Processes of Interorganizational Information Integration. Proceedings HICSS-37, IEEE, 2004

22. Roth, M.A., D.C. Wolfson, J.C. Kleewein, and C.J. Nelin. Information integration: A new generation of information technology. IBM Systems Journal 41(4), 2002, pp. 563-577
23. Scholl, H.J. E-government: A Special Case of ICT-enabled Business Process Change. Proceedings HICSS-36, IEEE, 2003
24. Wimmer, M., and R. Traunmüller. Integration – The Next Challenge in e-Government. In: Proceedings EurAsia-ICT 2002. Austrian Computer Society, Vienna, pp. 213-218
25. Wimmer, M., R. Traunmüller, K. Lenk. Electronic Business Invading the Public Sector: Considerations on Change and Design. Proceedings HICSS-34, IEEE, 2001

Security Requirements Engineering for e-Government Applications: Analysis of Current Frameworks

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Abstract. The need for keeping information secure is increasingly important in modern e-business, e-commerce, and e-government environments. This holds because personally identifiable information can be electronically transmitted and disseminated over insecure open networks and the Internet. Security and privacy constitute the basic foundations of a trust framework, which composes a *sine qua non* condition for Information Societies. Requirements engineering (RE) is the principled application of proven methods and tools, which can design this trust framework effectively, in all aspects of modern e-Government applications considering the directives described in the e-Europe Initiative. This paper describes a number of well-known RE frameworks developed for eliciting and managing security requirements (SR). It also presents a comparative analysis of existing frameworks from a number of complementary viewpoints. Based on the results of this analysis it identifies a number of unresolved issues that need to be addressed by research in the SR field.

1 Introduction

Europe's public sector is today at a crossroad, facing challenging economic and social conditions, as well as institutional change. Within the public sector, public administrations are facing the challenge of improving the efficiency, productivity and quality of their services. *eGovemment* refers to the combination of information and communication technologies (ICT) with organizational change and new skills in order to improve public services, democratic processes and public policies.

Undoubtedly, a crucial sector in ICT is security. In eGovernment applications, the transmission and dissemination of personally identifiable information must be as secure as possible. To achieve this, security requirements of a system should be defined correctly early during the design face of eGovernment systems. Under this scope a number of requirements engineering (RE) methods have been proposed, which focus on security requirements and this is the subject matter of this paper. In particular, section 2 presents a number of well-known methodologies for eliciting and managing security requirements. Section 3 provides a comparative analysis of existing methodologies from a number of complementary viewpoints and identifies further issues that need to be addressed in the field of security requirements engineering. Finally, in section 4 concluding remarks and future work are mentioned.

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2 SR Frameworks

A number of well-known methodologies for eliciting and managing security requirements have been proposed. Most of these methodologies can be considered as general RE frameworks aiming to support the elicitation and management of different functional and non-functional system requirements during the early phases of software development. However, unlike other RE frameworks they also incorporate suitable modeling constructs for the specific representation of security requirements and their translation onto the security policies of the system under consideration.

Specifically, the NFR framework [4,5], *i** [6] and Tropos [6,7,9,10] are three frameworks sharing the same rationale. All three treat security requirements as *soft goals* that must be accomplished. Goal accomplishment is seen as a means-ends analysis process, leading to a network of goals describing the 'causal transformation' of general goals into one or more subgoals that constitute the means of achieving desired ends. In particular, the NFR framework treats security goals as overall business requirements, whilst *i** and Tropos consider security goals in the context of the organizational (human or system) actors that aim to achieve them.

KAOS [11] is a goal-oriented framework, which focuses on system rather than organisational goals. In particular, the term goal is used to describe the operational objective(s) that the composite system should meet. Security goals are further classified into *integrity, confidentiality, authentication, availability* etc. Security goals are once again decomposed into subgoals by AND-refinement and OR-refinement links. This elaboration process is assisted by the re-use of existing goal hierarchies. *Obstacles* prevent security goals from being met. KAOS uses a refinement procedure for eliminating these obstacles.

The Moffett – Nuseibeh framework (M-N) [11, 13] provides a goal-oriented metamodel in the spirit of the KAOS conceptual model. In contrast to the previous methods, which emphasize SR specification issues, this framework focus on the elicitation of security goals. Specifically, it applies security risk analysis and management techniques in order to identify and evaluate the risk to a system. Security goals are derived from the threats defined using the above techniques.

The Goal-Based Requirements Analysis Method (GBRAM) described in [14, 15] also puts emphasis on the process of identifying, elaborating, and refining the security goals. It suggests a number of techniques including *scenario analysis, identification of goal obstacles and constraints* and *goal operationalization.*

In contrast to the aforementioned frameworks, which use the concept of goal in order to define security requirements, the RBAC method described in [16] uses the concept of *role* derived from business processes. In particular, it seeks to model privacy requirements as the contexts and obligations of actor roles and their relationships.

3 Analysis of SR Methodologies

3.1 The Analysis Framework

Section 2 presented a number of methodologies for eliciting and managing security requirements. In this section a comparative analysis is presented. The analysis frame-

work adopted from [2] is based on the four worlds framework originally proposed on system engineering.

In more detail, the *usage* view describes, *"What these methods achieve"*. Most methods consider the RE process in terms of three tasks [3]: *requirements elicitation, requirements specification* and *requirements validation.* Requirements specification and validation are grouped under the *"Manage Security Requirements"* scope. An additional concern though in security is the generation of the system security policies based on the derived requirements. Some methodologies take this step but others stop at the organizational (business) requirements level. The tasks mentioned above plus the generation of system policies consist the 3 aspects of the usage view.

The *subject* view describes, *"What type of security issues these methods address"*. Most methodologies focus on organizational security requirements derived from business goals, whilst few use these requirements to generate system policies. Thus, we can differentiate between *business security issues* and *system policies.*

The *representation* view describes, *"How are the security issues expressed"*. *Graphical notations* and *formal languages* are the two techniques most commonly used by SR methodologies.

Finally, the *development* view describes, *"How are the security issues developed and used"*. This view considers the existence of appropriate *modeling tools* for representing security requirements and their relationships, as well as the provision of methodological support for guiding the modeling process *(guidance).*

Comparative analysis of the SR methodologies described in section 2 based on the usage, subject, representation and development dimensions, follows. A summary of this analysis is shown in table 1.

3.2 Analysis

Regarding the usage perspective, the majority of the compared methodologies focus on managing security requirements, i.e. they consider the specification and validation of security requirements. However, few provide a specific method for eliciting those requirements from various sources (e.g., stakeholders, business documents, legacy systems, etc.). In a similar manner, few methods address the issue of translating these requirements into system policies. In particular, *i** and the M-N framework support the elicitation and management of security requirements but they don't propose a method for deriving security policies from these requirements. The GBRAM method concentrates on managing security requirements but also suggests elicitation methods for identifying security goals. In addition, GBRAM deals with security policies. The RBAC method clearly focuses on the identification of security policies, but the elicitation and management phases are not considered.

Regarding the subject view, almost all methods, with the exception of GBRAM and RBAC, focus solely on business security requirements. GBRAM further models security policies issues whilst RBAC addresses security policies without paying attention on business security requirements. However, role identification in RBAC, emanates from business processes.

Regarding the representation view, most of the methods considered, use a graphical notation for representing their models. NFR, *i**, Tropos and KAOS use decomposition techniques for representing the relationships among goals and their subgoals. Beside the graphical notation these methods also use a formal language for formally

Table 1. Security Requirements Engineering Frameworks Comparison.

Framework Components		NFR	*i**	Tropos	KAOS	M-N Framework	GBRAM	RBAC
Usage	Elicit Security Requirements		✓			✓	✓	
	Manage Security Requirements	✓	✓	✓	✓	✓	✓	
	Generate System Policies						✓	✓
Subject	Business Security Requirements	✓	✓	✓	✓	✓	✓	
	System Policies						✓	✓
Representation	Graphical Notation	✓	✓	✓	✓			
	Formal Language	✓	✓	✓	✓			
Development	Guidance Process					✓	✓	✓
	Modeling Tools	✓	✓	✓	✓			

representing their models. NFR and *i** use the Telos language. Tropos uses the *Formal* Tropos specification language, which defines a textual notation for expressing Tropos models and allows the description of dynamic constraints among the different elements of the specification in a first order linear-time temporal logic [10]. In KAOS security goals are formalized according to the pattern of behaviour they require, using temporal logic. The M-N framework and GBRAM do not use a formal language or a graphical notation for representing their models. The M-N framework uses an informal textual approach for expressing its models. GBRAM defines tables where each goal is assigned with specific obstacles identified and scenarios for solving those obstacles. RBAC does not use any graphical notation or formal language. Boolean expressions are used only for modeling the conditions specified in a privacy policy.

Finally, regarding the development perspective, most methods use modeling tools for helping the developer to impress the models generated or to manually make changes. In particular, the *NFR Assistant,* the *i** *Organizational Modeling Environment,* the *graphical Tropos* and the KAOS *Observier* are four modeling tools provided by the corresponding methods. Whilst these tool assist developers to build a correct representation of the SR model they offer limited guidance, i.e., they do not provide any suggestion on how to resolve impending problems during the modeling

process. On the other hand, the M-N framework, GBRAM and RBAC don't provide a modeling tool like Observier but they offer, to an adequate degree, guidance (rules and heuristics) through their models. This guidance helps the developer to resolve possible conflicts between security goals or change the output of the model.

4 Conclusions and Future Work

Based on the above analysis, one can conclude that security issues have not yet been fully encountered during the design of a system. Most of the methodologies presented in this paper do not reach the system policies level but they stay in the organizational requirements level, which cannot prove very helpful for the developer during the implementation face. Security issues must be treated in a more practical way so as to manage, detect and eliminate all threats and conflicts during the design and not in the implementation face. A productive solution might be the combination of these methods into a powerful one since each method covers specific aspects of the four worlds framework. The combination might lead not only to a strong method eliminating individual weaknesses but also to a successful method, which would cover all aspects of SR modeling from the elicitation of security goals until the determination of the security policies.

Today security issues are of great concern due to the development of the eGovernment applications. Hundreds of people every day use eGovernment as the gateway of communicating and transferring important information over insecure networks. The role of eGovernment is crucial and so must be the security issues. People must be sure that their account information or business confidential information are transmitted safely. That is the reason why designers must advance their methods in covering more the security issue field. eGovernment is growing rapidly and security requirements frameworks must accompany this growth in order to keep information safe and secure away from every intruder or hacker.

References

1. Commission of the European Communities: The Role of eGovernment for Europe's Future. Brussels, 26.9.2004, {SEC (2003) 1038}
2. Kavakli, E., Loucopoulos, P.: Goal Driven Requirements Engineering: Evaluation of Current Methods. The 8th CaiSE/IFIP8.1 International Workshop on Evaluation of Modeling Methods in System Analysis and Design (EMMSAD '03). Velden, Austria (2003)
3. Kavakli, E.: Goal Oriented Requirements Engineering: A Unifying Framework. Requirements Engineering Journal, Vol. 6. Springer-Verlag, London (1995) 237-251
4. Chung, L.: Dealing with Security Requirements during the development of Information Systems. CaiSE '93. The 5th Int. Conf of Advanced Info. Systems Engineering. Paris, France, (1993)
5. Mylopoulos, J., Chung L., Nixon, B.: Representing and Using Non-Functional Requirements A Process Oriented Approach. IEEE Trans. Soft Eng., vol. 18. (1992) 483-497
6. Liu, L., Yu, E., Mylopoulos, J.: Analyzing Security Requirements as Relationships among Strategic Actors. (SREIS'02), Raleigh, North Carolina, Oct 15-16, (2002)
7. Liu, L., Yu, E., Mylopoulos, J.: Security and Privacy Requirements Analysis within a social Setting. 11th IEEE International Requirements Engineering Conference (RE'03), Monterey Bay, California, USA, (2003)

8. Castro, J., Kolp, M., Mylopoulos J.: Towards requirements-driven information systems engineering: The Tropos Project. Information Systems, Vol. 27 Elsevier (2002) 365-389
9. Mouratidis, H., Giorgini, P., Manson, G.: Integrating Security and Systems Engineering: Towards the Modelling of Secure Information Systems. CAiSE '03, Springer-Verlag, Berlin Heidelberg LNCS 2681 (2003) 63-78
10. Mouratidis, H., Giorgini, P., Manson, G.: An Ontology for Modelling Security: The Tropos Project. Proceedings of the KES 2003 Invited Session Ontology and Multi-Agent Systems Design (OMASD'03), United Kingdom, University of Oxford, (2003)
11. van Lamsweerde, A., Letier, E.: Handling Obstacles in Goal-Oriented Requirements Engineering. IEEE Transactions on Software Engineering, vol. 26, (2000) 978-1005
12. Dardenne, A., van Lamsweerde, A., Fickas, S.: Goal-Directed Requirements Acquisition. Science of Computer Programming, vol. 20 (1993) 3-50
13. Moffett, D., J., Nuseibeh, A., B.: A Framework for Security Requirements Engineering. Report YCS 368, Department of Computer Science, University of York, (2003)
14. Antón, I., A.: Goal-Based Requirements Analysis. ICRE '96 IEEE Colorado Springs Colorado USA (1996) 136-144
15. Antón, I., A., Earp, B., J.: Strategies for Developing Policies and Requirements for Secure Electronic Commerce Systems. 1st ACM Workshop on Security and Privacy in E-Commerce (2000)
16. He, Q., Antón, I., A.: A Framework for modeling Privacy Requirements in Role Engineering. Int'l Workshop on Requirements Engineering for Software Quality (REFSQ) Austria Klagenfurt / Velden (2003)
17. Sindre, G., Firesmith, G., D., Opdahl, L., A.: A Reuse-Based Approach to Determining Security Requirements. In Proc. 9th International Workshop on Requirements Engineering: Foundation for Software Quality (REFSQ'03) Klagenfurt/Velden Austria (2003)
18. Devaubu, T., P., Stubblebine, S.: Software Engineering for Security: A Roadmap. Future of Software Engineering (FoSE) at ICSE'00 Limerick Ireland (2000)

Semantic Lexicons for Accessing Legal Information

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Abstract. In many countries public institutions, as the main producers and distributors of legal source information, have promoted projects aimed at improving the availability and the free access to information via the web as a significant component of the process of transparency in citizen/institution interaction. This paper describes the state of the art in terms of European projects created by public institutions for facilitating access to regulatory information and it focuses on the necessity of integrating structural documentary standards with semantic ones for the description of content. The Italian JurWordNet project is a source of semantic metadata aimed at supporting the semantic interoperability between sectors of Public Administration; the creation of a multilingual lexicon that extends the Italian model to five European languages (the aim of the Lois Project that has recently been approved by the EU) is also described.

Introduction: The Social and Ecomomic Value of Legal Information

Legal information has both a social and economic dimension and is one of the most important components of Public sector information (PSI) provision. In carrying out its tasks the public sector collects, collates, creates, stores and disseminates huge quantities of information: financial and business information, legal and administrative information, geographical, traffic, tourist information etc.

PSI is crucial for democratic and civil life and user-friendly and readily available information enhances citizens' participation in the democratic process. Moreover a better use of public sector information is also useful to citizens by the provision of added-value information products that the public sector itself cannot provide. Therefore, the public sector can be considered the most important source of raw material for the creation of value-added information content and services and the primary locus to which both citizens and businesses can come for access to online information. Clearly, public sector information has considerable economic potential[1].

Better conditions for the exploitation of public sector information would lead to both new opportunities for job creation and the production of value-added information

[1] In order to estimate the extent of the economic value of public sector information, the European Commission's Directorate General for the Information Society commissioned a study from PIRA International on the *Commercial Exploitation of Europe's Public Sector Information* PIRA International (2000) Commercial Exploitation of Europe's Public Sector Information. Final Report for the European Commission, Directorate General for the Information Society. http://www.cordis.lu/econtent/studies/studies.htm

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content and services vital to citizens and business. As part of the Action Plan for the Information Society, the European Commission has adopted a Directive on the exploitation of public sector information aimed at achieving a basic set of common rules in the European Community that at the same time do not or only minimally affect current public sector workloads and budgets[2].

In order to meet the Directive's goals and to expand the European market in this field the public sector should establish a legal and technical framework aimed at improving dissemination of PSI and services to citizens and business. This should be achieved by adopting a series of measures and strategies that include: a general right to re-use PSI; effective co-operation between the public and private sector; a transparent pricing structure; the adoption of standard licenses that prevent the granting of exclusive rights; the provision of easy access to data; the adoption of the digital format as the primary mode of information distribution; improving administrative procedures and adopting common procedures, standards and metadata.

The importance of standards and metadata is stressed by the universal awareness that the most important challenge that faces the Information Technology Society is the capacity of handling the exponential growth of the Internet and the crucial problems that this poses in generating, searching, extracting and updating information.

The same problems affect the specific field of legal information where practical/technical solutions for accessing information are also given a particular 'social' perspective by the need to enable citizens to access in an 'understandable' way legal, mainly regulatory, information.

In many countries, public institutions, as the main producers and distributors of this source of information, have promoted projects aimed at improving the availability and the free access to information via the web [5] as a significant component of the process of transparency in citizen/institution interaction. One of the main goals in this area is the achievement of a high level of *semantic interoperability* between sectors in order to:

- improve communication between areas and services of the Public Administration
- make it possible for the user to access information and to make that information available for further use by other sections of the Public Administration;
- easy-to-access tools in order to incorporate and organize the data that the users themselves are asked to supply.

This paper is structured in the following way: the state of the art in terms of European projects created by public institutions for facilitating access to regulatory information is outlined (section 1); their analysis then leads to the emergence of the necessity of integrating structural documentary standards with semantic ones for the description of content (section 2). In paragraph 3 semantic networks are put forward as a means to create interfaces that get over linguistic barriers and the Jur-WordNet project is outlined.

The creation of a multilingual lexicon that extends the Italian model to five European languages (the aim of the Lois Project that has recently been approved by the EU) is also described (section 4).

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[2] Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information, Official Journal L 345, 31/12/2003 P. 0090 – 0096. *http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_345/l_34520031231en00900096.pdf*

Standard for Legal Documents: State of the Art

At a national level many initiatives exist that are specifically concerned with the development of common standards across websites holding information on legal matters. In the UK, the Legal and Advice Sectors Metadata Scheme (LAMS)[3] was developed by the Lord Chancellor's Department as part of the Community Legal Service (CLS) launched in April 2000. It is a central part of the British Government's programme of legal reform that is designed to increase ordinary people's access to the law. The UK Metadata Framework (UKMF) describes all the resources within each government sector so that policy-makers have access to the resources on a particular policy issue regardless of the department to which those resources belong.

As part of its e-government Plan, the Italian government has invested 12 million Euro in projects aimed at making legal information more readily available: one of these is the Norme-in-rete Project[4] (NIR) in which all of Italy's major Institutions in this area participate (the Chamber of Deputies, the Senate, the Department of Justice). The project envisages the XML codification of all standards adopted in normative texts, including metadata descriptions.

In the Netherlands, the METALEX project[5] is an open XML standard for the mark up of legal sources. In France, an *Action Spécifique on Legal Ontologies du Droit et langage juridique* has recently been set up by Governmental Institutions with the aim of improving the LegiFrance public legal information system.

In Denmark, a similar Project (DAMIALex) has recently got under way. In other EU countries the LEXML initiative[6] is a coordinating point for Germany, Sweden, Austria, and Netherlands in the development of standardised structures, vocabularies and data exchange tools. The US Association on legal XML is called "LegalXML"[7].

Accessing Legal Contents

In the development of the NIR, the need of a semantic standard as a tool for describing content alongside structural standardisation has emerged.

One of the typical obstacles the citizen is faced with when accessing legal resources is "Legal jargon". The non-expert user has no precise idea of what he is looking for and will often use common language rather than specific legal terminology. Indeed several legal concepts may have different names in normal as compared to legal language. For instance, in Italian the common term "*affitto*" (*rental*), which any interested party will use to retrieve relevant legal documentation, is referred to in legal jargon as "*locazione di immobili*" *(lease).* Even professionals in the legal field might encounter difficulties in retrieving some kinds of legal document by using inappropriate keywords. This is a particularly pressing problem in the area of case law (judicial decisions) where the discursive style of argumentation is often affected by the semantic ambiguity of natural language. Identical legal concepts are often desig-

3 www.lcd.gov.uk/consult/meta/metafr.htm
4 http://www.normeinrete.it
5 www.metalex.nl
6 www.lexml.de
7 www.LegalXML.org.

nated by different terms, which are, however, synonyms from the legal point of view. Thus, there is a clear need to be semantically explicit so that searches are driven by a meta-description which holds to univocal references in the text.

Even more importantly, corporate users, citizens, but especially professional organizations will benefit from crosslanguage linkages in order to retrieve legal documents from different European countries. The possibility of doing this is becoming more and more vital as social and economic activities, which require legal documentation, are acquiring an ever-increasing European dimension. In the future we envisage that even non-specialized legal practises will need to consult legal documentation from countries other than their own. (see section 4)

JurWordNet

To date, it is difficult to put forward semantic standards shared by public information producers that go beyond the level that is offered by the standards that have already been universally adopted (e.g. Dublin Core). An intermediated solution could be to insert some interfaces between public data and users that resolve the problems associated with normal language. The Italian Jur WordNet project comes in here.

JurWordNet is a formal ontology-based extension to the legal area of the Italian part of the *EuroWordNet* initiative[8] [10] [14]. As is the case for other WordNets[9] this is relevant to the class of computational lexicons that aim at making word content machine-understandable via the highly structured semantic representation of concepts [7], [8], [2]. These are represented by *synsets,* a set of all the terms expressing the same conceptual area *(house, home, dwelling domicile...)* linked by a semantic relation of meaning equivalence. Semantic equivalences are limited (variants) in many terminology lexicons such as the legal one, which has a plethora of technical terms and where synonyms are rare. Conversely, it is important to create equivalence relations with normal language in order to make up for the imprecision of non-experts when searching for legal information, and to use common language terms instead of legal ones. Apart from having taxonomic vertical relations, the synsets of the law lexicon also have 17 associative horizontal relations based on the notions of meronymy, synonymy, and role.

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[8] Currently, the Italian language coverage offered by IWN amounts to 50,000 terms (www.ilc.cnr.it); specialised sectors dealing with specific areas, e.g. EcoWordNet for economic/financial language; Euroterm is an extension of Eurowordnet with Public Sector Terminology funded by EC in the E-content Program. (www.ceid.upatras.gr/en/index.htm.)

[9] Since its initial release by Princeton University, WordNet has always been regarded as one of the most important resources in the NLP community (about 400 papers have been published on the subject). This is the main reason. Why successively great efforts have been made to make WordNet related technologies as stable as possible. For instance just in terms of programmatic interfaces the community can rely on 21 access libraries in all major modern computer languages. Also Multilingual WordNet can be considered mature in every respect. The European commission recognized the importance of having linked WordNet for all European languages as early as 1996 by funding the EuroWordnet project (LE-2 4003 & LE-4 8328). The results and the methodologies developed within this project proved to be so sound that in September 2001 a new project was launched, namely Balkanet, with the goal of extending EuroWordNet to Balkan languages.

The Methodology

Consistent with all WordNet projects, the developing methodology favours the use and harmonization of already existing lexical resources. [12] Relevant concepts have been identified *bottom-up from* the queries of legal information systems. In particular the lists of the Italgiure/Find system, the largest Italian law information system, developed by the Supreme Court, produced:

- a Semantic database, 11,000 conceptually connected key words and headings;
- a list of terms in which common users include "AND", from which derives the *list of syntagms,* a group of about 13,000 two-word expressions.
- The list of words in which common users include "OR", this is the so-called *analogical chain.* Analogical chains are made up of synonyms, or terms that, at least in a certain amount of searches were declared to be interchangeable by the majority of users.

Starting with syntagms, taxonomy with the main terms was automatically created, as were the top levels of the trees derived from it, using, in a partially automatic mode, the dictionary glossaries. A consolidated corpus of about 2000 synsets will be automatically increased through the link with thesauri and key words for legal databases. We will also map the resource with the Multiwordnet database that contains 1800 synsets marked as 'legal'[10].

Connection Between Legal and Generic WordNet

JurWordNet is a domain lexicon; as in all technical fields, it is impossible to trace a borderline between common language and terminology: consequently, the legal lexicon should not be considered as a sub-class separated from the generic base. Overlapping occurs, both when the technical sense is stored in the Italian lexicon (ItalWordNet), and when the term is stored only in its common meaning. The connection between the two resources is made manually, adopting pragmatic criteria relevant to the application task. The first simplification was to limit the connection to nouns, as nouns make up almost the totality of this specific resource. A limited amount of adjectives is included, as these are polysemies compared to the nominalised use (private, public...); verbs appear rarely in syntagms and are connected to the noun that acts as the subject/object. There are two kinds of *Plug-in* functions between legal and generic resources:

- specific meaning that overlaps the generic meaning *(eq-lug-in)* occurs when the sense defined in common language matches with terminology. However, the definition (gloss) drawn from dictionaries or legal manuals is more precise. In this case, through simultaneous access, all the lower branches of the trees are specific, whereas the upper are in normal Italian.
- a specification of the legal meaning as opposed to the generic one *(hypo-plug-in),* which entails that the entire lower legal branch becomes a specific branch making up that of common Italian.

[10] http://tcc.itc.it/projects/multiwordnet/multiwordnet.php

Disambiguation of Polysemies: Linguistic and Ontological Levels

One of the most interesting functions of the wordnet methodology is the distinction of meanings in polysemic terms, both within the domain and in relation with common language[11] .Often, sense distinctions do not just concern language but also the differences in reality perception: for instance there is a need to separate within a concept the role played as opposed to the existence of a tangible physical entity. The entry *President of the Republic* indicates the physical person (referring to space and dimension), the constitutional body, and the holder of the state function. Another example, very common in law, is the distinction between the normative content and physical entity: the entry *contract* may be catalogued as a legal relation, as the physical entity of the paper, and as information content.

The criteria followed to organize the concepts requires, therefore, assumptions that are external to the language. These assumptions must be explicit so that the user is aware of the perspective according to which concepts are differentiated. This is the role of ontology: "It is possible that a lexicon with a semantic hierarchy might serve as the basis for a useful ontology, and an ontology may serve as a grounding for a lexicon. This may be so in technical domains, in which vocabulary and ontology are more closely tied than in more general domains" [6]. Because of this, we framed high-level concepts in basic legal categories, and we have inserted terms used in law manuals, which are usually too generic for the searching out legal data. For example, terms used in the search, such as *foundation, association, committee,* and so on, are grouped in the class *institution,* which is a legal science concept that does not appear in the lexical corpus.

Over and above the disambiguation of meaning within a linguistic and legal system things become even more complicated when, as in our case (see section. 4), the aim is to provide multicultural and multilingual communities with a shared knowledge for accessing legal material.

Thus, the categories that bring together the top level of JurWordNet's taxonomical trees are the basic legal entities which are held to be common to all the legal systems. We can give them a minimum set of properties shared by all the specific meanings of each system and/or language. They make up a *Core Ontology for law.* Having a nucleus of shared legal knowledge allows matching, integrating, and comprehension of elaborate legal concepts created by particular legal systems, and grants that the criteria used to organize the concept classes can be shared and are based on the law [4], [13].

[11] For instance, the Italian juridical term *canone,* means both the payment in money or in kind, against a contract; or, in canon law, a universal juridical norm. The Italian term *mora* is meant both as "unjustified lateness in discharging an obligation" and as "the amount of money due as a fine against the delay". The Italian term *alimento* substantially changes it's meaning if considered in its singular form as "food", or plural form as "alimony". The entry *alienation* in a juridical context is a juridical act; whereas in common Italian is has several meanings, all unconnected to the technical meaning of the term. Making explicit the difference in meaning, the user is allowed to build more precise questions for information searching.

Legal ontology is the subset of social object ontology[12], which, in turn, requires ontological assumptions with regard to the "real world" as well as the social and legal. Both imply, and thus depend on, foundational ontology. The foundational ontology upon which our core ontology is based *(Core Legal Ontology CLO)* is DOLCE + (Extension of DOLCE, "Descriptive Ontology for Linguistic and Cognitive Engineering", version 2.1 of D17 Deliverable Wonderweb[13].). DOLCE was developed by the Laboratory for Applied Ontology of the Institute of Cognitive Sciences and Technology of the National Research Center in Rome. It collaborated with the ITTIG for the development of a legal ontology [3].

Cross-Lingual Information Retrieval: The LOIS Project

This process also allows mapping terms between different languages. This is particularly effective in the legal field where corresponding terms are often absent in different languages but are present in concepts and legal systems. In the legislative domain it is more appropriate to speak about multi-language versions of law texts rather than translations. Shifting emphasis from the linguistic expression to content allows comparing concepts through properties and metaproperties, and to assess not only whether the concept itself occurs in different contexts, but also how the concept is processed in different regulatory structures [1].

Translation problems are due to: a) language, b) difficult comparisons between different legal systems.

With regard to the first case, jurists maintain that, *"the translation of a word into another is possible and legitimate to the extent to which the two words express the same concept"* [11], It is possible to encounter situations in which although literal translations of terms can be made, the translated equivalent acquires within a different linguistic context a completely different meaning: for example the Italian term *diritto civile* translated into English as *Civil Law* has a very different meaning to the apparently equivalent term employed in the Italian context.

Other kinds of problem at the linguistic level arise from the need to compare linguistic systems that are very diverse in terms of structure and cultural pattern dimension. For example French is characterised by an abundance of polisemic words and the frequent use of insidious rhetorical forms that can only with great difficulty be compared to the terms and structures of the more practical and pragmatic English language. The difficulty in finding equivalent terms is all too apparent (e.g. *agent, estoppel, executor*).

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[12] According to the language philosopher John Searle, creating social or political ontology means describing the nature, properties, and role of social entities. The 'objects' represented by nations, social classes, communities, associations, governments, banks, universities, but also rights, obligations, powers, money, copyrights, patents, have no real existence or physical identity, but fill social life and are the object of any conversation on politics, social behaviours, and justice. Language created them, their existence is based on international, historical, and social agreements, and their meaning changes according to the various social contexts, historical ages, and discourse levels. The role of ontology is to describe such objects making explicit the meaning assumptions in terms of minimal (meta) properties that may be universally shared. On stricter, and more technical terms, ontology defines concept meaning negotiations facilitating, especially on the Internet, communication interchange, net interactivity, use of existing lexical resources, harmonization of contents, and so on.

[13] http://wonderweb.semanticweb.org

The most common and most difficult problem, however, is due to a substantial divergence.

An example could be the term *negozio giuridico* which was introduced via German legal science and with great difficulty can be assigned an equivalent in French or English. It is a term that can be perfectly defined by both French and English jurists but which cannot be translated through the use of a specific term in these languages. This, of course, is a great limitation to the comparison and translation of texts. The Italian entry *capacità giuridica* has no equivalent in English, as there is no general theory on legal capacity within common law that may be compared to the body in Italian legislation.

In the last years the growing need to make comparisons with foreign documents has led research to tackle the issue of multilinguism by attempting to create tools to obviate the difficult problem of legal concept and data communication.

For example, the European Community, via *Eurodicautom,* predisposed a translation service of legal terminology taken from European laws, but because this tool is based on practical terminology it does not include terms used in legal science and it does not envisage a direct connection between the thesaurus developed by the Community.

Jurovoc, the legal thesaurus of the Swiss Federal Tribunal is another type of tool developed in this area. It is made up mostly of legal terms in German, French and Italian that are connected amongst themselves in pairs. Compared to semantic lexicons thesauri, and therefore also Jurivoc, do not include term definitions and so do not resolve the problem of polysemes. It is difficult to grasp the meaning to which the translated term refers. Over and above this, the list of terms are connected at a taxonomic level (Bt, Nt) as well as to a generic reference to equivalent terms. The type of semantic connection made between terms is therefore not defined. For example, the term *mora dei creditori* is connected to *penalità della mora.* The distinction between the sanction with respect to and the legal effects that can result from this are missing. The Wordnet methodology appears to offer solutions to the treatment of multilinguism that are able to go beyond the limitations of these approaches.

EuroWordNet has created an impressive quantity of documentation concerning *methods* for developing multilingual ontologies in the WordNet framework. All European local wordnets are linked to the ILI *(Inter-Lingual Index)* of English terms. ILI is an unstructured list of meanings, where each synset has a one-to-one reference *(equal-to)* to its source, without any language-specific relation [Vossen 1998]. Local synsets can be mapped from language to language according to the inter-link of ILI This 'shallow' methodological choice was due to the difficulties encountered in the Euro Wordnet project in harmonising different lexical resources and separate starting points. The homogeneity requirement was dealt with by top-down identification of the Base Concepts and by the shared interpretation of semantic relations.

The European Commission[14], in response to the need for a means of allowing the access to cross-language legal information, has recently financed within the e-Content

[14] Treaty on European Union (Consolidated version 1997), *Article 314 (ex Article 248):* "This Treaty, drawn up in a single original in the Dutch, French, German, and Italian languages, all four texts being equally authentic, shall be deposited in the archives of the Government of the Italian Republic, which shall transmit a certified copy to each of the Governments of the other signatory States. Pursuant to the Accession Treaties, the Danish, English, Finnish, Greek, Irish, Portuguese, Spanish and Swedish versions of this Treaty shall also be authentic".

program[15], the LOIS project which will develop a multi-language database made up of law wordnets in five European languages (English, German, Portuguese, Czech, and Italian, linked by English).

The WordNets resulting from the *EuroWordNet* project cover standard language: *LOIS* will extend them to legal language by tracking the relations existing between common language and legal jargon synsets. In this way it will be possible to map queries expressed in a non-technical way onto effective queries to highly technical document bases. The Legal Wordnet developed by the ITTIG will be used as a basis for all localization of legal lexicons.

The localisation methodology is a solution that has already been adopted by other projects[16]. It is based on the automatic junction between already existing lexicons. The basic premise is that semantic connections between the concepts of a language can be mapped through the relationship between equivalent concepts in another language. This procedure serves to test what is covered by the lexicon with respect to the domain and provides an initial base of conceptual equivalents. From the first results of this intersection with the lexicon of EU laws (via the Eurodicautom[17] database) it was evident that out of the 2000 synsets of the Italian law lexicon 800 could be found in the German, 470 in the Dutch, 490 in the Portuguese and 580 in the English. The intersection with the Princeton WordNet showed 600 JurWordnet synsets in the English lexicon, and these were classified as legal terms.

These initial operations allow for the automatic locating of some of the correct semantic relationships that exist between terms in two different languages. For example, it has been possible to eliminate the ambiguity between the two meanings of the word "contratto" (sense 1, *document* and sense 2, *voluntary agreement*). In fact, using the hypernym "document", *contratto* 1) was linked to *"instrument: document that states some contractual relationship or grants some right"*, and contratto 2) *"contract: a binding agreement between two or more persons that is enforceable by law"*.

A further example is the word *Diritto* which has two meanings in Italian, 1) *"faculty deriving from law or custom"* or 2) *set of legislative or customary norms that regulate social relationships"*. In English sense 1 corresponds to *right,* and sense 2 to *Law*. Through the automatic comparison of Italian JurWN and legal terms in the Princeton Wordnet it is possible to connect to the correct translation by using hypernym relationships. In fad *diritto pubblico* is correctly translated as *public law* and from this the correct hypernym "law" is created.

Conclusion

At present E-Government projects focus on the creation of standards that public organizations can adopt universally; as a consequence the definition of semantic standards must necessarily be at the generic level. The creation of cognitive interfaces based on semantic lexicons allows for the overcoming of linguistic barriers in a dynamic way during the research phase; from another angle lexicons can become a

[15] The project started on the 1st of March 2004

[16] Amongst others, see the MultiWordNet project http://tcc.itc.it/projects/multiwordnet/multiwordnet.php

[17] Eurodicautom is an aid for translators created by the European Commission http://europa.eu.int/eurodicautom/Controller

marking source that can be used for the semantic tagging of legal documents with a high social interest.

The Jur-WordNet project will shortly attain the following objectives:

- to enable full *Legal coverage Wordnet* localization for at least 6 languages of the EU members and candidate countries.
- Create links across several localized Legal Wordnets and across Legal Wordnets and Standard Wordnets (whenever base Wordnets are available).
- Configure an information retrieval system able to exploit the above resources in terms of more effective monolingual retrieval and cross lingual retrieval of legal document bases.

References

1. De Grott G-R., *La traduzione di informazioni giuridiche,* in Ars Interpretandi n.5, Padova, CEDAM, 2000.
2. Fellbaum C. (editor), *WordNet: An electronic lexical database,* Cambridge, MA: The MIT Press, 1998, 305, downloadable from: http://mitpress.mit.edu/book-home.tcl?isbn=026206197X.
3. Gangemi A., Guarino N., Masolo C., Oltramari, A. *Sweetening WordNet with DOLCE,* AI Magazine 24(3): Fall 2003, 13-24 *Legal Knowledge and Information Systems, Proceedings of JURIX Conferences,* Amsterdam, IOS Press.
4. Gangemi A., Sagri M.T., Tiscornia D., *Metadata for Content Description in Legal Information,* Workshop Legal Ontologies, ICAIL2003, Edinburgh. In press for Journal of Artificial Intelligence and Law, Kluwer.
5. Greenleaf G., *Solving the Problems of Finding Law on the Web:* World Law and DIAL, 2000(1) The Journal of Information, Law and Technologiey (JILT).
6. Hirst G., " Ontology and the lexicon " In Staab, Steffen and Studer, Rudi (editors) Handbook on Ontologies in Information Systems, Berlin: Springer, 2003, p. 14.
7. Miller G., *WordNet: A lexical database for English,* in Communications of the ACM 38(11), 1995, pp. 39-41.
8. Miller, G., Beckwith R., Fellbaum C., Gross D., Miller K.J., *Introduction to WordNet: An On-line Lexical Database.* In International Journal of Lexicography, Vol.3, No.4, 235-244, 1990.
9. Pörn, I., *Action Theory and Social Science, Some Formal Models,* Reidel, 1977.
10. Roventini A., Alonge A., Bertagna F., Calzolari N., Marinelli R, Bernardo Magnini, Manuela Speranza, Zampolli A. *ItalWordNet: A Large Semantic Database for the Automatic Treatment of the Italian Language* First Internationa WordNet Conference, Mysore, India, 2002.
11. Sacco R., *Lingua e diritto,* in Ars Interpretandi n.5, Padova, CEDAM, 2000.
12. Sagri M.T., 2003, *Progetto per lo sviluppo di una rete lessicale giuridica on line attraverso la specializzazione di ItalWornet,* in Informatica e Diritto, ESI, Napoli, 2003.
13. Visser P., T. Bench Capon, 1999, Ontologies in the Design of Legal Knowledge Systems, towards a Library of Legal Domain Ontologies, in Proceedings of *Jurix 99,* Leuven, Belgique.
14. Vossen P., ed., EuroWordNet A Multilingual Database with Lexical Semantic Networks, Kluwer Academic publishers, 1998.

Impact of e-Government Interoperability in Local Governments

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Abstract. Interoperability is a key concept for understanding the changes in progress in e-government. These changes are made gradually and with a phased implementation. The paper proposes conceptual frameworks to analyse actual practices and to guide the development of electronic administration. It stresses the need to consider different dimensions (political, organizational, human and technical) when implementing interoperable systems in local governments.

1 Introduction

There are many databases, European or national, relative to "good practices" in e-Government. A first investigation reveals that the most relevant projects are in general instigated by central governments or national agencies [1] [2]. Local governments develop thematic or territorial portals, but few of them use actually provide on-line services. If they try to do this, they encounter organisational problems which limit the impact on the initiative and often preclude any generalisation attempt.

Analysing these "good practices" is necessary to build models which will guide the implementation of electronic administration. We present hereafter a conceptual framework which is based on the examination of many case studies from available databases, on the pilots developed within the European project TERREGOV[1] and on a literature review. We will show that the concept of interoperability is crucial to the understanding of the changes in progress in e-Government. We will also analyse the different dimensions to take in consideration when implementing an interoperable electronic administration (political, organizational, human and technical dimensions).

2 Interoperability: Key Concept of e-Government

A bureaucracy imposes on its environment its rules, its operating modes and it transfers the management of complexity to the end-user. A modern customer-oriented organisation aims on the contrary at being simple for the user, reactive and efficient. Because of citizen's new requirements and increasingly budgetary constraints, public

[1] TERREGOV Project (IST-507749) – Impact of eGovernment on Territorial Government Services.

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administrations are today facing this challenge. To be more efficient and accountable, the modern administration must transfer complexity from the front-office (the end-user) to the back-office. This supposes major political, cultural and organisational changes. The objective is not only to work better, at lesser cost, but to work differently. Such changes need to be made progressively since the awareness of the business reengineering needs does not grow spontaneously and since public bodies, like all human organisations, are faced with inertia and resistance to change.

Information technologies (IT) provide a great opportunity to take up the challenge. Coming together thanks to **information provision** "anytime, anywhere" constituted the 1st stage of electronic administration. It becomes complex when information is held by various actors. In this case, the solution is to link different websites or to build an information portal without changing the structure of the organisations involved. It makes it possible to improve collaborative work between departments of the same administration and between different administrations.

Cooperation becomes more complex with the change from information provision to service delivery and represents the 2nd stage of eGovernment. The service is a bidirectional flow and supposes action of both information supplier and recipient:

- a request and a feedback (I register my child at the school and its registration is taken into account, I request for a driving licence after the purchase of a car...)
- in some cases a financial transaction (I register my child at the canteen and I recharge on line the credit on his smart card, I pay my parking fees by phone,...).

Service delivery does not only make public whole or part of the information held by the administration. It also leads to a modification of the database itself (addition, correction, update of one or more elements) and end-user actions have direct impact on the information systems, thus calling for better internal co-operation (not only limited to exchange of information) among department.

Coordination is an inherent challenge for on-line service delivery on a large scale due the complexity of involving multiple actors (national or local administrations, public agencies, associations, private service providers...). If service provision is a mix of different services, the mediator (the civil servant in charge of the request) has to know and optimise the different configurations. This has several consequences:

- the request and its response have a direct impact on the information systems of the actors involved. These information systems have to interact with each others, i.e. to become technically interoperable ;
- the involved actors have not only to cooperate (to exchange useful information) but also to coordinate their action (to act together); they have also to be capable of serving citizens in an interoperable environment and of interacting with various administrations, i.e. to become organisationally interoperable;

Technical and organisational interoperability are therefore crucial for the development of digitalised services and thus for the modernisation of the public administration. Society can not be changed by decree. In the same way, technological innovation is not enough to bring about in-depth transformation of an organisation. The transformations are progressive and driven by the conjunction of several factors which are not limited to technology. Electronic government is built step by step. The steps identified above (information, co-operation, coordination) make it possible to analyse and classify the various observed initiatives and to highlight the conditions necessary for the achievement of the successive transformations.

3 Interoperability and Management of Innovation

Introduction of inter-operable systems is a major innovation for local public administrations and a necessary condition for the implementation of an offer of on-line services. It would be wrong however to reduce this concept to its purely technical dimension ("ability to exchange functionality and interpretable data between software entities"). Organisational dimensions are also crucial when concerning political, managerial and behavioural considerations ("ability of different systems to have the same interpretation – i.e. expected induced behaviour – of a message despite different systems of symbols – i.e. their information structure and coding"). This implies:

- harmonization (i.e. "capacity to dialogue") of different information systems
- reengineering of involved organisations and business process rebuilding, in order to make effective technical and organisational interoperability
- knowledge empowerment necessary to the management of complexity.

Interoperability is thus one of the main drivers of a change management strategy.

3.1 Political Issues

Strategies of change never appear in a spontaneous way but are generally built by a vision, a political willingness. At the local level, the importance of politics is reinforced by the fact that services are generally provided by several actors whose motivations and organisations are very different. Coordination and regulation are in this case as crucial as political drive.

All case studies confirm it: political involvement is essential for the success of such projects. Political willingness is expressed in very different ways in Europe and widely depends on domestic administrative and political cultures. Although decentralisation is a major trend everywhere, there still are great differences between countries. The main approaches to e-government interoperability development are:

- "top-down": The central government gives objectives, deadlines, support and funding and local authorities are responsible for implementation, e.g. in the UK or in France.
- "bottom-up": Deployment of e-government interoperability comes from local initiatives but are supported by national harmonization strategies. (e.g. in Germany). There are also local initiatives in centralised states but they often remain isolated, due to a lack of coordination and reorganization at a higher level (e.g. Point Com' initiative in the French Region of Nord Pas de Calais) [3].
- A "mixed" vision (Austria).

At the local level, introduction of interoperable services clearly raises a political issue which concerns three principal questions: strategic objective of the public policy, associated implementation means (at the technical, financial, organisational level), required processes. Strategic analysis takes into account the context (European, national, local) and the main drivers which guide the action. The question of means and resources is crucial because it conditions the success of the whole operation. It supposes the identification and the analysis of the different actors and their motivation; available information systems and their capacity to integrate the innovation; organisations involved and their interrelations; capacity of the social environment for adapting to the innovation.

3.2 Organisational Issues

As local online services are developed, interpenetration of information systems and coordination of actors make necessary to reengineer organisations. This reengineering relies on **part or full integration of the back-offices** involved in the service provision. Interoperability is optimal when the various back-offices are fully integrated; however that remains largely theoretical as shown in a report of the Danish Technological Institute and the University of Bremen [4] which emphasises the existence of "back doors" to allow networking and cooperation without in-depth organisational change and business processes reengineering [5]. As usual with managerial issues, **there is no "one fit all" solution** and relevant solutions depend on the nature and the complexity of the service provided, on the flexibility of the organisations and their ability to be restructured.

Two dimensions can be used to categorise the **complexity of the whole process of service production and delivery:** the number of stages necessary in the supply chain and the number of services provided. The simplest case (one service, one stage) does not require important organisational change and can be solved by simple digitisation of procedures (e.g. on-line income tax declarations). The more complexity increases, the more reorganisation is necessary, the extreme case being represented by a multiple offer of services implying several back-offices.

To analyse the **flexibility of the organisations and ability to be restructured,** a cases-based approach has led us to propose empirical models that fit in 3 categories:

- ***Status quo:*** The service is digitized without changing the processes and the structure of the organisations. Actual workflows involving several actors having a long tradition of co-operation are supplemented with digitised content.
- ***Partial integration:*** An interoperability platform ("back-office clearing house", "portal") enable each actor to continue its own legacy and processing systems. The use of generic and modularised components (identity management, electronic payments, etc.) also enables each actor to improve the quality of service provision, without deep organizational change.
- ***Full integration:*** Back-offices are deeply reorganised, with two alternatives (single front office or on the contrary decentralised front offices with a multichannel approach).

Ideally, status quo and partial integration are unsatisfactory but constitute inevitable transition stages when the organisational evolution is difficult to put into practice. They allow an improvement of service provision and reinforce the collaborative practices which will be necessary for a later better integration.

3.3 Change Management

Political willingness is needed to drive the transition to e-government. Reorganisation of back-office and business process reengineering are necessary to build interoperable organisations. Nothing can be done however without the people in charge of the different tasks. Three main issues have to be addressed:

1- **Change strategies:** Study of change management in bureaucratic organisations clearly shows that it has a better chance of success with a phased implementation, if it enriches the old practices with new ones and if it respects the professional and social identities of all actors involved. It is a matter of evolution rather than revolution, as shown by the CAUTIC method's designers [6]. They oppose a persuasion-based Utopian vision of change (revolution, substitution) to a negotiation-based pragmatic one (evolution, hybridizing) that they consider to be much more effective.
2- **Knowledge empowerment:** In a customer oriented administration, the role of civil servants has to change; they must be able to move in an open and complex environment and to act as adviser to the users. Civil servants involved in interoperable e-government processes need to have a clear knowledge of processes and of services in order to act as a knowledgeable front-end to citizens (providing advice, identifying the most adequate services, launching the processes for specific individual cases).
3- **Human resources management and training:** Interoperable e-government will usually bring change for front office civil servant in terms of responsibilities and flexibility. These changes will need new delegation schemes sometime not compatible with legal, bureaucratic or managerial patterns, but they enrich the civil servant job, changing the job image and their professional identity. Training in this implementation process is essential. Training contribute to cultural change, to knowledge transfer, and to enable civil servant to use technology.

3.4 Technologies Issues

The citizen/service re-orientation taking place in public administrations all over Europe is driving the development of e-Government services. In particular, to act as a front-end to citizens and businesses, local governments need to interact with multiple administrations; e-Government interoperability technologies are thus needed for them to offer public services that would be cross-organisational, cross-level, transparent, integrated, secure, decentralised and available anywhere at anytime.

Current research and technology development (RTD) conducted in Europe addresses the various interoperability levels identified in the EIF – **European Interoperability Framework.**

- **Technical interoperability:** Most research assumes the future deployment of *XML* and *Web Services* as key technologies for linking up governmental information systems and services.
- **Semantic interoperability:** New technologies are needed for enriching *Web Services* with *metadata* that can be used by different applications to "understand" the meaning of exchanged data.
- **Organisational interoperability:** Starting from business episodes or citizen events, eGovernment services will rely on technologies for *modelling business processes* and managing *workflows* orchestrating access to services across administrations.

The re-design of government processes also induces the need to **support civil servants** involved in these processes in getting a clear knowledge of the processes and of

the services in order to act as a knowledgeable front-end to citizens – providing advices, identifying the most adequate services, launching the processes for specific citizen cases. RTD conducted in the *TERREGOV* Project thus also concerns the combination of **Community & Knowledge Management** techniques for enabling civil servants to focus on the added value of the service delivered to Citizens.

4 Conclusion

Interoperability is a key concept for electronic administration. The present paper highlighted the need for inclusion, beside technical issues, of political and organisational dimensions, as shown in the following diagram:

References

1. Cap-Gemini Ernst & Young: Web based survey on electronic public services – Report of the fourth measurement – October 2003 – European Commission DG Information Society, January 2004
2. European eGovernment Conference 2003 (Como, Italy): 351 initiatives from 29 countries – http://europa.eu.int/information_society/eeurope/egovconf/exhibition/text_en.htm
3. IRIS (Initiatives Régionales, Innovations et Stratégies), Observatoire des télécommunications dans la ville, http://iris.telecomville.org
4. Danish Technological Institute and University of Bremen: Reorganization of government back offices for better electronic public services – European good practices, – Final Report to the European Commission – January 2004
5. Waggemaar, R.: From legacy to modularity, Proceedings of Second International Conference EGOV2003, Prague, Czech Republic, September 2003
6. Cayuela, Guilloux, Mallein, et Toussaint: Multimédia et significations d'usage: les critères sociologiques de qualité d'usage d'Internet, Etude socio-cognitive des usages du multimédia, CNET-ERHIST-CNRS-CAUTIC, 1998.

e-Government Intermediation

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Abstract. The recently proposed intermediation schemes in e-government are meant to speed up and facilitate integration and access to services offered by local and regional public sector service providers. They should provide end-users with ubiquitous e-government services, in the sense of adapting to citizens/businesses location, context, channel, language or skills and, what is more, take care for the seamless (i.e. transparent to end-users) integration of cross-organisational services. In this paper we present e-govemment intermediation requirements.

Introduction to e-Government Intermediation

In order to achieve the citizen and/or business participation in e-government, a new model has been recently proposed: e-government intermediation, sometimes also referred as e-GSP (government service provision). The UK government framework (www.e-envoy.gov.uk/intermediaries) defines intermediaries as commissioned agents of the citizen/businesses and not as agents or partners of public sector bodies engaged in the delivery of public services. We believe, as stated by [1] that intermediaries must be seen as a new interface for the relationship between the citizen/business and public sector, but should not replace that relationship. Several European countries are at the moment considering e-government intermediation in their "mixed-economy" policy with the main objective to increase usage of cost-efficient and citizen-centred e-services. As an example for the current discussions we recommend readings about a partnership between the Italian government and Lottomatica, the operator of the Italian lottery [8] or UK policy framework for a mixed economy [9].

While most of the government's framework papers focuses on the justification and the efficiency gains that will be made for government through the inclusion of intermediaries in e-service delivery, in this paper we focus on requirements for e-government intermediation and describe two use cases. The basic and essential assumption is that a citizen/business should be treated as a "customer" and should know, in any moment and from any place, the exact status of its service instance, even in the cases of cross-organisational processes where the intermediator might invoke different public sector agencies and in this way replace technical integration solutions. Additionally, the intermediation platforms can be used to achieve interoperability on a high level (that of business processes, which can be synthesized in the context of cross-organisational workflows), without focusing on the individual public sector agency requirements, which proved to be hard to implement due to political, legal and operational obstacles.

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Functionally, electronic intermediation typically provides facilities such as aggregation of service offers, streamlining of the information exchange, the coordination of the respective processes or matching complex specifications of demand and supply. There are several technical solutions proposed for service aggregation (e.g. ontologies based) and matching (e.g. agents), but here we will limit our attention on process integration, streamlining and orchestration. The widely accepted e-government taxonomy would identify our use cases as cross-organizational transactional services, those that interchange administrative data and documents between citizens/business and various public sector agencies.

Architectural Issues in Intermediation

The main issue in implementation and deployment of cross-organizational transactional services is, and it will always be, e-government application interoperability. From the software developers' point of view, the application component interoperability is facilitated by the extensive use of middleware. However, the wide choice of middleware infrastructures, spanning from well-known CORBA, COM/COM+ and Enterprise JavaBeans to more academic and open source alternatives, is instead of solving the problem, actually imposing additional interoperability barrier to the overall solution.

When it comes to e-government, the list of government-wide middleware infrastructures is currently including UK Government Gateway, Irish Inter Agency Messaging service (under development), Belgian Universal Messaging Engine and some few others early specifications (Sweden has probably the most advanced infrastructure), but the real challenge has been the realisation of requirements and specifications of IDA eLINK [5], the ultimate candidate for pan-European e-government middleware.

In [2] a term "intermediation architecture" has been used to describe the CB-BUSINESS architecture.

This project (CB-BUSINESS, IST-2001-33147, http://www.cb-business.com) represented an effort of our team to achieve interoperability between administrative e-services at an operational level by use of a commercial workflow tool, originally developed in the 4th framework project (Cross-Organisational Workflow, CrossFlow, ESPRIT E/28635). The middleware layer has been built around a CORBA-compliant object request broker [6] and is mainly used to support distributed process execution in the intermediation architecture. However, in the real application we need, besides message (which is a stream of bytes which could be an XML document, a serialized Java object, a text string, etc) management, a number of additional features such as security, load balancing, failover etc.

Workflow Management System (WFMS) can provide this. Traditionally, workflow management systems in public administration have been restricted to static workflows completely contained within the single organizational unit. With the advent of the cross-organizational e-government, there is a need for workflow management technologies capable of handling dynamic workflows distributed across both physical and organizational boundaries. In [3] a "one-stop-shop" toolkit with a supervising inter-workflow hub has been proposed as the control and co-ordination tier between front office for citizens/companies and separate single agency managed workflow and

groupware tools. This hub accesses external applications for tasks and services execution; via standardised software applications named connector agents. Positioned between the WFMS and the communication layer, these agents can be suitable for a specific application or for a class of common applications. In addition, they also take care of commands for requesting the cancellation of a linkage between instances and negotiate the information needed by elements, specifying name and type of the information element (variable or document).

However, as mentioned in conclusions of [3], each possible interleaving of steps that might occur at execution time has to be predicted at process designing time, which leads to low flexibility for citizen/business personalised service provision or ad hoc e-government service provision situations. An e-government intermediator can solve these issues in more efficient manner.

Additional requirements for e-intermediation platform are imposed by potential unreliability of communication channels (e.g. mobile channels), or unreliability of public sector organizational and service provision models. Beyond its role as a "bridge" between citizen/business and different (local/regional/central) agencies, e-government non-functional requirements are related to ensuring the accountability and security of a transaction monitoring. Finally, the alternative communication patterns among the components of a distributed system that involve more than two parties (e-government "change of service" notification), and content driven/triggered processes (license expiration date) are object of our study at the moment. A promising approach to address the above issue could be the *event-based paradigm [7].* The components of an event-based system cooperate by sending and receiving *events,* a particular form of messages. The sender delivers an event to an *event dispatcher.* The event dispatcher is in charge of distributing the event to all the components that have declared their interest in receiving it. Thus, the event dispatcher supports a high degree of decoupling between the sources and the recipients of an event.

In order to design our e-government intermediation system we use communication pattern criteria. These patterns should include all important interoperability constraints as well as the e-government legal, organisational and communication requirements:

- The push style, where the information producer always initiates the communication
- The pull style, where the information consumer initiates it.

Notice that both citizen and public administration can act as information producer or consumer.

Connection, data and process state and control exchange between two administrations is not an easy issue, mainly due to the different kind of systems and formats supported by each administration, and in a case of multilingual environment, to the intrinsic question of the language. The part of the solution resides in a set of agreements (identification of the services that each administration may offer, the conceptual name for each service, a format of the exchanged information, security policy for process steps execution etc). This usually results in a number of interactions between involved parties in order to fix these external issues for the process that is both tedious and time consuming. The information to exchange will be encapsulated in an object that will be transmitted between the administrations once the secure and direct communication has been established in a previous stage. The establishments of this direct communication requires the exchange of process execution environment, security and

physical location information, which can be incorporated into XML contracts. On the other hand, intermediates should also take care of service adaptation to actual Quality of Service or end user profile requirements (e.g. bandwidth, mobility, usability…).

Short Illustration of Use Cases

The first example of e-intermediation (PUSH service) consists in providing an integral solution for notifying a debt to a taxpayer independently of the place of residence. The main goal is to notify non-resident, which has a tax relationship with municipalities (owning a flat, garbage collection, etc.) of terms and procedures to pay these taxes, regarding their main residence place. Currently, many citizens ignore their obligations because they do not know which taxes must be paid, when should be paid, or simply because notifications arrive to a flat which is used only one month a year, usually during the summer season. The requirement for messaging of the case instance status can be solved in a number of ways to interact with the case initiator: an e-mail notification, SMS message or placement in case initiators virtual tray, depending on citizens preference configuration data, which in this case should be stored on e-intermediation platform.

The second example is PULL service, which is related to the payment of taxes for a new company start-up. The choice of this service is strategic since it integrates taxes related to activities of citizen (or a group of citizens) and taxes related to "services for companies". In this scenario, interested party pays a totality of taxes to its e-government intermediary (previously calculated and presented), which is then processed and distributed among different public agencies. The intermediator also performs remote identification, as well as receipts and notification forwarding.

Conclusions

As the governmental service provision moves towards the competitive environment, adopting some of the business world paradigms, it is to expect a growing number of public-private partnership for performing a number of independent services that nowadays are completed by the public administration agencies (e-intermediation).

The set of local eGovernment services forms a large service base of the intermediation architecture. Although, in special cases, a particular service of the service base can be intermediated by the intermediator as a stand-alone service, the general principle is that he shall intermediate entire combinations of such services that are customised and meet concrete end user needs (quality of service, language, context etc).

As a number of these e-government applications grow, the difference and incompatibility increases as well. Integration implementation is based on a number of underlying protocols, applications, interfaces and integration logic, which is often not compatible. Interoperability is therefore viewed as a critically important issue for the cross-organizational public service delivery. In this sense the objective of intermediation might be enhanced in order to support seamless interoperability between parties. The main advantage, however, is the flexibility of this service provision model when it comes to adaptation of services to a citizen.

References

1. Ian Kearns: Intermediaries and the Electronic Delivery of Public Services: A Mixed Economy in e-Governmen,: A Public Response to the UK Government Consultation Paper, ippr
2. Giannis VERGINADIS, Dimitris GOUSCOS, Maria LEGAL, Gregoris MENTZAS:An Architecture for Integrating Heterogeneous Administrative Services into One-Stop e-Government, Proceedings of e-Challenge 2003 on October 22th-24th in Bologna (Italy)
3. Aljosa Pasic, Sara Diez, Jose Antonio Espinosa, IMPULSE: Interworkflow Model for e-Government, A Electronic Government: First International Conference, EGOV 2002, Aix-en-Provence, France, September 2-5, 2002. Proceedings Publisher: Springer-Verlag, Pages: 472 – 479
4. J.C. Wileden and A. Kaplan, "Middleware as Underwear: toward a more mature approach to compositional software development", digest of the OMG-DARPA-MCC workshop on Compositional Software Architectures, Monteresy, CA, January 1998
5. europa.eu.int/ISPO/ida
6. G. Sánchez, D. Chan, J. Vonk, , P. Grefen, P. Apers: A Specification Language for the WIDE Workflow Model; Proceedings 1998 ACM Symposium on Applied Computing; Atlanta, USA, 1998; pp.197-199
7. G.Cugola,E.Di Nitto, A.Fuggetta, "The JEDI event based infrastructure and its application to the development of the OPSS WFMS", IEEE transactions on Software Engineering September 2001, p.827-850
8. http://www.innovazione.gov.it/ita/comunicati/2003_11_04.shtml
9. http://www.e-envoy.gov.uk/Responsibilities/EnablingEGovArticle

Comprehensive Process Management in Public Administrations – A Case Study

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Abstract. Way up to now, e-government was mostly seen as an IT issue and rather had a technical dimension. Taking process modelling and process reorganisation into account and determine them as key criteria in regards to successful implementation of e-government, strengthens the fact that this topic is complex and has to be treated in a comprehensive way. The purpose of this paper is to point out process management with specific requirements of public authorities including legal as well as security aspects. Reading through this contribution, the reader should recognise the added-value of BPM for public administrations and that the management of processes within public administrations is a relief and not a burden.

1 Introduction

The keyword e-government was determined by a number of political strategies all over Europe like UK-online and the e-government interoperability framework e-GIF[1] in Great Britain, BundOnline2005[2] in Germany, eAustria[3] in Austria or the regulation of the European Union[4] to create prerequisites for an efficient administration until 2005.

As a request of above mentioned national and international strategies and policies towards successful implementation of e-government, process modelling and process reorganisation are becoming key criteria and a major part within such projects. This may be due to the high complexity of governmental processes and organisational structures. Another reason may be that, up to now, focus of BPM tool developments was put on the industry sector, where BPM has been accepted as an important step in modernisation and optimisation of business processes. Appropriate modelling methodologies and tools for the public sector are not really available yet.

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[1] Office of the e-envoy, http://www.e-envoy.gov.uk, and e-GIF http://www.govtalk.gov.uk/schemasstandards/egif_document.asp?docnum=731

[2] BundOnline 2005 in Germany, http://www.bund.de/BundOnline-2005-.6164.htm

[3] e-Government initiatives and strategies of Austria's chief information office and ICT-Board, www.cio.gv.at

[4] Initiatives eEurope 2002 and eEurope2005, europa.eu.int/information_society/eeuropenews_library/eeurope2005/index_en.htm

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In this contribution, we demonstrate that process modelling is not a burden to public organisations but a turnkey solution to support public administrations in the efficient and effective reorganisation and re-engineering of administrative processes towards customer-oriented online service provision.

2 Business Process Management Within Public Administrations

Business Process Management (BPM) comprises a number of different tasks concerning organisational processes. BPM is often used as a generic term for Business Process Reengineering (BPR), Quality Management or Implementation of Workflow Management Systems[5]. Important parts of Business Process Management are the acquisition of relevant data and the illustration of models of the organisation, the products and processes as well as the usage of resources like for example information technology. The analysis and simulation of the models deliver advice for the strategic optimisation and quality assurance.

Being successful in managing business processes within public administrations means to find out what public authorities want and need from process management. The lack of an already existing modelling tool leaded to the initiation of a research and development project in Austria to implement and customise a BPM methodology and tool specifically targeted for the public sector. This project result is called ADO*amt*®[6] (ADO*egov*® for the English speaking market). The approach was to develop a modelling tool, which realises the most important requirements to support the implementation of e-government solutions from a business process management (BPM) and integrated service modelling perspective. Some of these requirements are the identification of actors and their roles, the definition of possible communication channels, the transparency of the flows, the standardisation of terminologies for an efficient and transparent communication, the integrated modelling from the portal to the back office and the integration of the citizen as customer and company clerk as service provider.

Government's internal and external traditional business processes need to be adapted to electronic businesses processes. For the external perspective, this means to provide public services in a well-structured and well understandable way meeting the needs of the specific users (i.e. citizens, businesses, other organizations). Here, reengineering of business processes for better serving the needs of citizens or enterprises in specific situations ("life-events, business situations") is an important option.

Implementing integrated e-government means to adequately map external service structures to internal process structures of public authorities as well. Integrated service and process models are of utmost importance for achieving a seamless government. A great help in this respect is a logical and organisational separation of front offices, which bundle citizens' demands and pass them on, and back offices, which satisfy these demands through adequate business processes and products.

To realize the need of developing such integrated process models, an appropriate BPM methodology and tool is key. The next section describes the practical use of this methodology within the Austrian town of Vöcklabruck.

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[5] Pook, K., Starkloff, P.: Geschäftsprozesse und Wissensmanagement in: Praxis Wissensmanagement 4/01, page 2.

[6] www.adoamt.com

3 Vöcklabruck – A Modern City Management

As pointed out above, e-government requires a holistic concept and integration of technological, organisational, user-specific and process-specific dimensions. An integrated approach of BPM is an instrument to harmonise the issues of these dimensions and to realise a comprehensive business process re-organisation motivated by innovative IT potentials.

The project idea was born after the successful closing of the nationally funded project called "Holistic modelling in public administrations" where the city manager of Vöcklabruck was involved as test user of the modelling methodology implemented within this project.

All together 215 persons are working for the municipality of Vöcklabruck. These can roughly be divided in four groups. There is the town hall itself, let us call it "core-administration", where mainly sovereign acts are set. Taking the municipal police and the public library into account there are about 60 employees in this branch.

Secondly there is the department caring for the streets, the parks, illumination, water supply and sewage systems, refuse collection and disposal and the like by the help of about 50 men (and two women). In the municipal senior residence another fifty persons, mainly women, are employed, who take care for 130 aged people and guarantee related services like "food on wheels". Additionally there are kindergardens; an after-school care centre, a refectory – and last but not least caretakers and cleaners. The whole organisation is well structured and performing. Modernisation on the other hand always has to be considered and the first but most important step is about getting to know ones own organisation.

The initial project phase will last four months and will be finished by the end of June 2004. The first project step was to define a process map containing ten core processes that should be identified, described, reorganised and documented. Examples of this process map are presidential elections, water management, civil engineering or the application for a place in a senior residence.

These ten processes will be analysed by a group of students who will conduct workshops with the process owners within the city authority. In clear words there will be one workshop per core process where the main process and all relevant additional processes will be discussed in detail and documented within the process modelling tool ADO*amt*®. The next phase is the first coordination phase where the processes will be made available to the city management and the process owners with the help of an automatic HTML generation out of ADO*amt*®. After the coordination phase the students will adjust the processes according to the comments of the responsible persons. The final processes will be presented to all representatives of Vöcklabruck.

This first phase of documenting the current situation of the processes of the local authority should be followed by a reorganisation project.

4 Added Value

So what should be the added value expected in Vöcklabruck? The public sector is quite often described as conservative in the most basic sense. While on the one hand estimating their work as inefficient most regularly mistreats employees, the introduction of fundamental changes is not an easy job for public employers and their repre-

sentatives respectively. Generally, conviction is more promising than persuasion or even direct orders. By identifying business processes alone, persons concerned get a better view of their own work. This should be motivating in any direction; either the given process is already done in the best possible way, alas – but let us be proud. If the process can be done better and more efficiently, then we should go for it and put an emphasis on the "we"!

As described in recently published papers[7] the co-author Rapp is convinced of the concept of a "mediative manager". The core facts of this concept are the idea of using tools of dispute resolution so to speak in advance and the usage of this idea according to the rule of 80:20. Apparently, not all conflicts can be solved by the use of mediation and "talking it over" can do so not all management. Still, on the long run the mediative way will be more successful because all this is also a matter of acceptance. The shift to e-Government could be achieved by force – but this could end up in the proof that all ideas of e-Gov are a failure (possibly only because of the clerks doing work-to-rule).

Managing the administration of a city quite often means to be the translator of messages sent from one political party to another. Every topic that is a challenge for each party in more or less the same way makes work easier. Modern city management is undoubtedly one of these topics. The better new steps are prepared the better they can be realised. Apart from that, other topics with less matching opinions can be treated in a rather constructive manner as well.

5 Conclusions

After more than one year of working intensively with the topic process modelling within public administrations and the development of a tailor-made modelling methodology the authors come to the conclusion that public authorities need an integrated platform for developing innovative and new public services in order to become more citizen-oriented and transparent in their day-to-day business. The high level of interest in our work coming from representatives of different administrative organisations makes us confident that we are on the right way helping e-government projects become successful.

References

1. Commission of the European Communities: The Role of eGovernment for Europe's Future, Communication from the Commission to the Council, the European Parliament, The European Economic and Social Committee and the Committee of the Regions, COM(2003) 567 final, Brussels, 26.9.2003, http://europa.eu.int/information_society/eeurope/2005/doc/all_about/egov_communication_en.pdf [2003/10/20]
2. Karagiannis, D., Kühn, H.: Metamodelling Platforms, Invited Paper, appeared in: Bauknecht, K., Min Tjoa, A., Quirchmayer, G. (Eds.): Proceedings of the Third International Conference EC-Web 2002 – Dexa 2002, Aix-en-Provence, France, September 2-6, 2002
3. Pook, K., Starkloff, P.: Geschäftsprozesse und Wissensmanagement – vom Umgang mit erfolgskritischem Fachwissen, in: Praxis Wissensmanagement 4/01, page 2

[7] Some social aspects on the introduction of eGovernment (in IURIX 2003), Practical approaches to e-Government (in IDIMT 2003, together with Aigenbauer)

Government Support for Energy Saving Projects

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Abstract. We discuss briefly in this paper the design of a knowledge based DSS developed for supporting local government staff in the choice of energy saving projects. The modelling process concerns: the quantitative models, the qualitative knowledge, the data and the user/DSS interface. We show that by combining reasoning and the evaluation of models we can simulate a complex cognitive process and support better the users by providing diagnosis and explanation.

Decision Situation, Nature of Knowledge Involved for a Solution and DSS Functions

Buildings are emitting 25% of total CO_2 as against 28% for transport and 22 % for industry. Buildings are responsible for 45% of energy consumption. One of the important problems faced by governments is reduce these effects. This can be achieved by supporting projects which replace the use of a polluting non renewable energy source by a less polluting energy source or one which reduces the consumption of non renewable energy. In the first category replacing a heating system using fuel by a heating system using solar energy in the second category projects such as insulation of buildings are good examples. It is crucial to allocate properly public money to such projects. Another problem to be solved is related to the rarity of expertise needed to evaluate such projects. The problem to apply this public policy is not only to support the work of members of the service in charge of studying application for financial help it is also to support their learning process. In other words the task is to make the knowledge of a few experts as widely accessible as possible. A more detailed description of the knowledge used in such situation can be found in (Freudiger 2003). The system we have developed is able to:

- create and manage the files of data concerning the project holder and his project.
- guide the user with respect to the data needed to make a good diagnosis .
- capture the data to make a diagnosis or design a solution coherent with the project holder goal and constraints.
- provide a diagnosis on the project and eventually propose other alternatives.
- automatically explain the diagnosis or the proposed solution to support learning.
- manage the parameters of the system not related to the project holder or the project.
- in a later stage, store the accepted projects in a data base to be able to work on a group of projects to evaluate the public policy.

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The system is used, not only to help in making a decision, but also in providing a consulting service to project holders. The explanation function is a crucial function in this context. It is crucial because the knowledge is diversified, because it is more complex and because of the learning objective. The complexity comes from the fact that technical knowledge is used in addition to more standard administrative and financial knowledge. The learning objective comes from the desire to improve the working skills of the non expert users and also to make the expert knowledge transferable. The goal is to formalise and model the knowledge of the domain and of the expert so that by dealing with the projects, the other persons of the service can learn as they study projects. The learning theory here is that in showing in many different situations how the knowledge is used to derive a solution a better understanding is obtained. The economic analysis it is necessary to measure a criteria which help decide if the project importance of explanation in learning was stressed in AI (Mitchell et als,1986) and in the DSS context (Klein Methlie,1990,1995). The learning cannot be limited to explanation of reasoning since knowledge is also formalised in models used by the system. Learning also implies understanding of quantitative relations used in models and hypothesis of models. As a consequence very clear notation for the models equations is essential as well as comments to express hypotheses on the equations within the text of the model itself.

Evaluation Methodology and Modelling of the Cognitive Process

We shall take the case of a solar thermal project proposed by a private person. This can be a project for providing hot water for a building. The first part of the analysis, once the type of project holder and the type of project is known, is related to administrative rules and legal constraints. These rules are related to the conditions under which the service of the local government can provide its support. A very simple example of such rule is related to the location of the project. The local government, is required by law to only support projects located on its territory. Another set of administrative rules provides the amount of the financial support such a project is entitled to receive as a subsidy. The subsidy is computed as a function of the characteristic of the project. In the case of a solar thermal project the amount of the subsidy is a linear function of the surface of the panels: subsidy = surface * a + b. The value of the a and b parameters changing in step function according to the surface of solar panels. However this subsidy (*subvention* in French on fig 1) will be allocated only if the project has a minimum of efficiency. A project the technical analysis of which shows it generates a very small amount energy saving will not be granted a subsidy. Such a situation may happen in projects, such as insulation, where wrong design or badly selected material may not improve the situation.

The second part of the analysis is the thermal characteristic of the project. The goal of this part is to identify, with as much reliability as possible, how much energy will be saved.

In our case (a solar thermal project) the answer to this question is a function of the present energy source used and its price and the amount of kwh which will be saved if the project is completed. The amount of energy (E) saved is a function of the technology and the geographical location. The model used is then of the form:

E = F(surface of panels, coefficient, location)

Where the surface measures the number of square meters of panels. The coefficient being function of the surface and the technology used. The location determines the external temperature day after day. For most application F is a linear function , the value of the coefficient changing by steps according to the panel surface. In our first application coefficient values for the 3 most standard technologies (glass panels, non glass panels, tubular panels) were used.

The third part of the analysis is related to the economic analysis of the project. The thermal analysis is made difficult because of uncertainty of parameters of the projects. In the economic analysis it is necessary to measure a criteria which help decide if the project is worthwhile for the project holder. A project may be worthwhile for the local government, because it saves much KWh, but not for the project holder because the project may break even beyond the horizon he considers appropriate.

For many project holders, mainly private person the most clearly understood criteria is the pay back (*delai* in French on fig 1) which has a clear intuitive meaning.

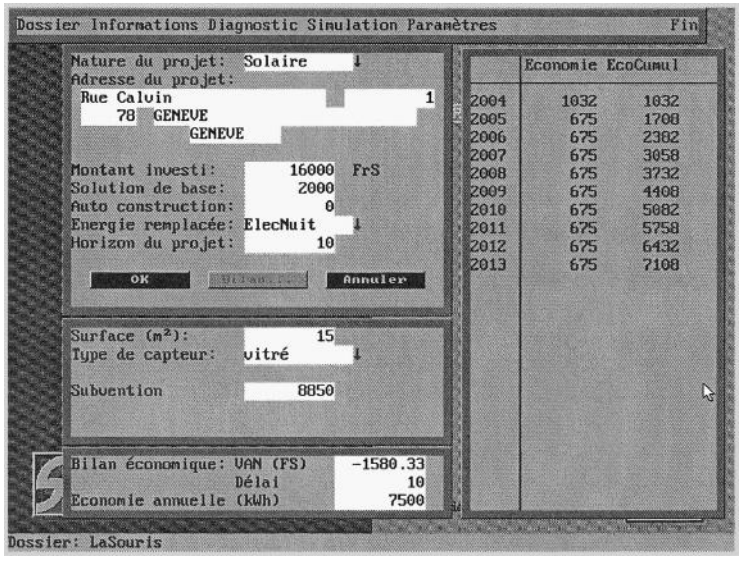

Fig. 1. Main results of Thermal and Economic evaluation.

Since this criteria is weak on a certain number of methodological points it was decided to also compute the net present value (*VAN* in French on Fig 1) of the project. To compute any of these two criteria implies computing the savings generated by the project, i.e. comparing the differences in investment and operating costs between the base solution (the present technology, kept with eventual replacement over the horizon of the project) and the new solution. The actualisation is made, in both case, to the horizon considered meaningful by the project holder. The computation of both criteria require an evaluation of the annual savings (*économie* in French on fig 1) of the project compared to the base solution. The savings can be computed taking into account the changes in: cost of energy, maintenance, fiscal consequences. When computing these criteria certain hypotheses will be made concerning the trends of various energy costs and maintenance costs. These variables are uncertainand simulation will be useful to ascertain the consequences of various scenarios The financing

consequences are related to the financing mix. Personal financial contribution of the project holder, loans of various kinds (banking loan and loan made by the local government at preferred rates to support interesting projects), leasing. It is also important to notice that the service can be improved by providing a way for the project holder to compare the consequences of the project with norms for similar projects (benchmarking). It is clearly useful to isolate the impact of the financing on the return of the project and be able to compute the criteria before or after financing. If the economic analysis has been done it is important then to move to the fourth phase which is the diagnosis of the financing strategy.

Very often the financing proposed first by the project holder relies on personal contribution plus a banking loan. The project holder comes to the local government service, in charge of promoting energy savings, in order to explore how to diminish the investment as well as the cost of financing the project. In any case a diagnosis of the financing proposed by the project holder is useful. A diagnosis concerning the likelihood of obtaining the expected bank loan due to standard banking practice for loan granting may be useful if a bank loan has not yet been secured. How the financing can be improved through public support in case the project is considered worthwhile by public authorities will be even more appreciated . A classical rule applied by bankers is the necessity to maintain a maximum ratio between the net annual revenues and the annual loan reimbursement (old loans + new loan related to project). This kind of analysis requires computing standard loan schedules in terms of interests and capital repayment over the horizon of the loan. Over and above a certain amount the loan financing will need to be underwritten or mortgaged.

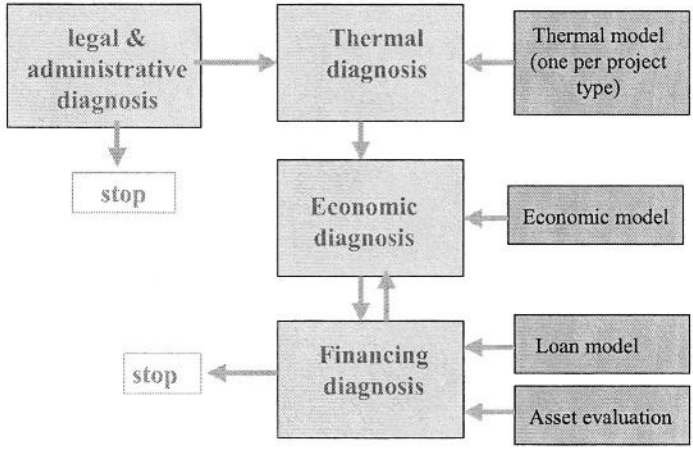

Fig. 2. Steps in the reasoning process during project study.

This mortgage can be provided only if the project holder owns the building. The project and the building owner may already have a mortgage loan on a part of the value of the building, as a consequence there is a limit to the amount of the new mortgaged loan.

However since the evaluation of the building may have been made at the time of its acquisition, a new evaluation of the building may increase the project owner borrowing capacity. This reasoning implies using a model to re-evaluate the value of the

building given the date of the initial evaluation. The line of thinking used by an expert in the evaluation can be represented on fig2. In each phase deductive reasoning is carried out and this reasoning may require information on variables values which are the result of model evaluation. The call to model evaluation is made only as required by reasoning. It may also be pointed out that some set of rules, for example the set of rules used for economic diagnosis may have to be reused. It may be the case to obtain a diagnosis before or after financing. In other words it may be necessary to reuse a rule subset according to new incoming information or change of hypotheses. With respect to the implementation and structure of the application the reader is referred to Klein 2004.

First Results and Conclusion

The first results were obtained during the validation phase of the application on a certain number of cases. The results can be summarised by the following observations:

A considerable reduction in the time needed to deal with an applicant file. The applicants are often led to modify their hypotheses given the results of the initial scenario. As a consequence the service to the applicant is improved since he can obtain a series of diagnosis concerning various types of scenarios. The first experiments with the tool tend to show that project holders like to be helped by experts to find a solution. They discover consequences of their project by interacting with the government staff and they are ready to modify their initial project if proposals with good arguments are made. In contrast with the situation before, the application also furnishes a written assessment of his project.

An important improvement in quality, not only due to the various scenarios which can be studied to fit the constraints of the applicant, but due to the elimination of errors in computation or reasoning, always possible when one knows the number of cases to be dealt with and the level of attentiveness of the staff.

This application led to a near complete formalisation of the knowledge used in the evaluation of projects. This formalisation made the knowledge easily available and comprehensible to all members of the local government service. Furthermore the possibility of comparing the staff own diagnosis with that of the application together with explanation greatly speeded up staff training and application improvements. In particular change in legislation can be easily accommodated by just changing the rules and models.

References

1. Freudiger Christian, Encouragement et financement des projets energétiques dans le cadre d'une politique cantonale, Postgrade Mémoire, Ecole Polytechnique de Lausanne, 2003
2. Klein Michel, Modelling concepts in a KB-DSS , evaluation of Energy Saving Projects, in Proceedings 16 th International. Conference on Systems Research, Simulation based DSS session , Miroljub Kljajiae & George Lasker (Eds), IIIAS 2004
3. Klein Michel, Methlie Leif, Expert Systems a DSS Approach, Addison Wesley, 1990
4. Klein Michel, Methlie Leif, Knowledge-Based Decision Support Systems, Wiley, 1995.
5. Mitchell, R.M. Kellar, R.M. and Kedar-Babelli, S.T., Explanation–based learning: A unifying view. Machine Learning1,(1986), pp47-80.

Reducing the Integration of Public Administration Databases to Approximate Tree Matching*

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Abstract. The integration of data from distributed sources within and among different public authorities is an important aspect on the agenda of e-government. In this paper we present a specific data integration scenario at the Municipality of Bozen-Bolzano, where data from different sources have to be joined via addresses of citizens. We analyze in detail the problems which arise in this scenario. We show that addresses can be represented in a tree structure, and hence, the problem of matching addresses can be reduced to approximate tree matching.

1 Introduction

Electronic government (for short e-government) promises to revolutionize government and its interaction with customers. This transition is often characterized by keywords such as improved transparency, improved quality, and efficiency of service delivery, or one-stop government [1,2]. To reach these high-level goals, a difficult technical problem has to be solved first: the integration of distributed, inherently heterogeneous, and possibly inconsistent data sources [3].

The integration process poses a number of problems. Some of them are of organizational nature, such as privacy issues or competence and ownership conflicts. Others are more technical problems, such as the use of different data formats, schema integration, or limited access. Moreover, databases tend to become inconsistent since different databases store information about the same real-world objects, constraints are rarely used, and people apply different conventions in referencing the same real-world object.

In this paper we use a scenario from the Municipality of Bozen-Bolzano where data from distributed data sources have to be integrated. Since the databases do not use key elements, we have to join data sets via other elements, such as the residential address of citizens. Unfortunately, addresses have some peculiarities: (1) they are referenced with a different granularity level, (2) streets might have been renamed and this change has not been updated in all databases, and

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LIVES

name	*street*	*num*
Augsten	Ofenweg	5
Gamper	Ofenweg	5
Boehlen	Ofenweg	5

LEASES

landlord	*tenant*	*street*	*num*	*apt*
Mayer	Augsten	Ofenweg	5	A
Laimer	Boehlen	Ofenweg	5	C

PAYS

name	*street*	*num*	*apt*
Mayer	Ofenweg	5	1
Gamper	Ofenweg	5	2
Boehlen	Ofenweg	5	3

OWNS

name	*street*	*num*	*apt*
Mayer	Ofen Weg	5	1
Gamper	Ofen Weg	5	2
Laimer	Ofen Weg	5	3

Fig. 1. The tables LIVES of the registration office, PAYS of the electric power company, LEASES of the official register, and OWNS of the cadastre.

(3) different databases might use different labels to enumerate apartments. This makes it very difficult to link data across databases using standard join techniques. We show how in our scenario the integration of data via addresses can be reduced to approximate tree matching.

The paper is organized as follows. Section 2 motivates our work with a concrete application scenario. In Sect. 3 we first introduce a tree representation of residential addresses. Then we analyze two specific data integration problems and show how they can be reduced to tree matching. Section 4 discusses related work. In Sect. 5 we draw conclusions and point to future work.

2 A Data Integration Scenario

A typical situation in a public administration environment is a number of autonomous databases which store information about the same real-world objects. For example, the registration office, the cadastre, and the electric power company all store data about citizens and apartments. Although they refer to the same objects, they are interested in different relations between them, e.g. who lives in an apartment (registration office) or who pays the electricity bill for an apartment (electric power company).

Figure 1 shows four database tables which are stored in different departments at the Municipality of Bolzano and other public institutions. The database of the registration office holds a table LIVES which stores the names of citizens (*name*) and their primary address (*street* for the street name and *num* for the house number). The electric power company uses the table PAYS to store addresses, for which the citizens pay the electricity bill. The address is stored as *street*, *num* and *apt*, where *apt* is the number of an apartment inside a house. The official register stores for leasing contracts the name of the citizens that let (*landlord*) and rent (*tenant*) an apartment, and the address of the apartment. The cadastre has a table OWNS which stores the apartments owned by citizens.

Additional information about the terrain can be retrieved by combining data from these databases, e.g. who pays the electricity bill for X or who has to pay taxes. Thereby, addresses turn out to be an important linking element. However,

due to their structure and the way they are stored in practice, it is rather difficult to match addresses from different databases. In the following we analyze two typical queries over the tables shown in Fig. 1.

Query 1: Who Pays the Electricity Bill for Augsten? We try to answer this query by selecting all addresses from table LIVES, where the citizens name is `Augsten`, and then selecting all citizens from PAYS that pay for one of these addresses.

As a result we get $A_1 = \{(\texttt{Mayer}), (\texttt{Gamper}), (\texttt{Boehlen})\}$, which is different from the intuitive answer, namely `Mayer` pays the bill for `Augsten`. The reason for getting too many results is that we cannot exploit the apartment number *apt*, since this column is missing in table LIVES.

Query 2: Which Addresses Exist? Now we are interested to get a list of all existing addresses without duplicates. To answer this query we have to extract all addresses from the four tables and to take the union of them.

We have to patch the missing column *apt* in table LIVES with `null` values, as the `UNION` operator requires union compatible results. Then we get as a result A_2 = { (`Ofenweg`, 5, `null`), (`Ofenweg`, 5,1), (`Ofenweg`, 5, 2), (`Ofenweg`, 5, 3), (`Ofen Weg`, 5, 1), (`Ofen Weg`, 5, 2), (`Ofen Weg`, 5, 3), (`Ofenweg`, 5, A), (`Ofenweg`, 5, C)}. If we consider only the columns which are common to all tables (i.e. *street* and *num*), we get {(`Ofenweg`, 5), (`OfenWeg`, 5)} as a result.

Again, both answers are different from the intuitive answer: It is very likely that `Ofen Weg` and `Ofenweg` are the same streets, and the apartment numbers `A`, `B`, and `C` in LEASES refer to the same apartments as the numbers `1`, `2`, and `3` in PAYS and OWNS, following just another convention for numbering apartments.

As we can see from the examples above, standard join and union operators do not lead to satisfying results, as they hide the most plausible possibilities.

3 Matching Addresses

3.1 The Address Tree

The addresses that we use consist of street name, house number, and apartment number. For the purpose of this paper we represent a set of addresses as an *address tree,* where the root node represents a street name, the children of the root represent house numbers, and the lowest level (if available) represents apartment numbers. A single address is then a path from the root node to a leave node in an address tree. Figure 2 shows an example of an address tree.

Joining relational tables on addresses can then be reduced to matching the corresponding address trees. In the following section we will analyze the address trees that we have to match in our example queries.

3.2 Matching Incomplete Addresses

In order to give an answer to query 1, we have to match addresses that are stored with a *different level of detail.* While table LIVES gives only street name

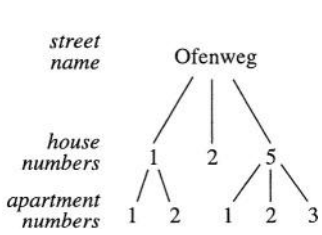

Fig. 2. Address tree.

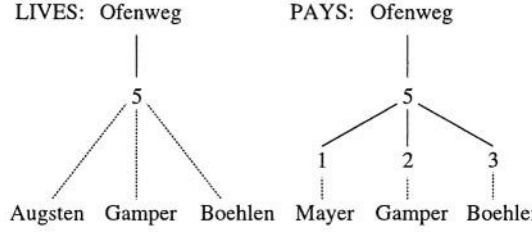

Fig. 3. Matching incomplete address trees.

and house number, PAYS stores also the apartment numbers. Figure 3 shows the addresses of both tables as address trees. In addition, we assign the citizen names to the leaves of the trees (dotted lines).

Note that addresses appear neither in the query nor in the answer. They are merely used to join the two tables. Therefore, the goal of matching the address trees in this case is to find a mapping between the citizens associated with the leaves of the trees.

In the address tree LIVES all citizens are associated with the same node (the house number `5`), while in PAYS they are associated with the children of the corresponding node. This is the case, because addresses are given with different levels of detail. As a consequence, we have to match a single node in one address tree with a subtree in the other address tree.

In order to find a match between incomplete trees, such as a match between a node and a subtree, we will exploit knowledge about the data sources and their respective domain. Continuing our example, we assume the following domain knowledge:

- It is more likely that someone pays the electricity bill for the apartment he lives in than for another one.
- If there is an electricity bill for an apartment, then the apartment is probably occupied.

Then we would conclude that `Mayer` pays the electricity bill for `Augsten`, which is the most likely answer.

In this example we only use databases directly involved in the query. But one could also exploit knowledge from other databases storing information about the same addresses. Using also the tables OWN and LEASES we could confirm our choice for the most likely matches.

3.3 Matching Street Names

In query 2 we ask for all existing addresses without duplicates. One reason, why we get too many results for this query is that street names are spelled differently in the tables. In practice, it is rather likely that different databases use different conventions for street names. Moreover, street names can change over time, and these changes are not always updated in all databases.

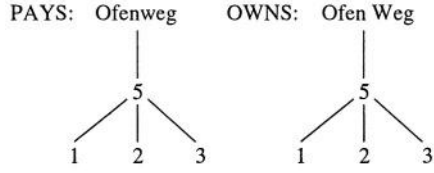

Fig. 4. Matching street names based on the address tree structure.

We could try to apply conventional techniques for matching similar strings. This approach has two major drawbacks for street names:

- The method fails when streets get renamed.
- Different streets with similar names are likely to be merged, although the names are correctly spelled, e.g. "Triester Straße" and "Trienter Straße" are two distinct streets in the city of Bolzano.

To improve this situation we propose to consider the structure of address trees. In one of our databases, which contains approx. 50,000 addresses and 300 streets, we found that more than 90% of the address trees have a unique structure. None of the ambiguous address trees contains apartment numbers. It seems that in presence of apartment numbers we have good chances to identify a street only by the structure of its address tree.

Figure 4 shows the address trees for the tables PAYS and OWNS. They differ only in street name stored in the root node, while the rest of the tree is identical. Note that in general address trees from real-world databases are much larger.

4 Related Work

Matching ordered labeled trees has been studied in combinatorial pattern matching [4]. [5] represents XML documents as ordered labeled trees and does an approximate join on them. A metric tree distance function is used to decide, whether two trees are similar enough to be joined. In our case an analogous distance function could be used to find similar street structures, but would fail for matching incomplete addresses trees.

Approximate string matching has been extensively studied over the last years. An overview is given in [6]. [7, 8] apply approximate string matching to data integration and cleaning. Our approach differs from pure string matching in that we exploit also the structure of the data items we match.

Another body of work analyzes integration architectures for a set of data sources by using a global schema which provides a reconciled, integrated, and virtual view on the single sources [9]. Query answering with inconsistencies is also addressed in this community [10]. Inconsistent data are defined as data that violate certain constraints. Unfortunately, in most of our cases we can only express "weak" constraints, i.e. we can indicate likely situations but we cannot exclude exceptional cases.

5 Conclusions and Future Work

This paper analyzes the situation, where data from different sources have to be combined, focusing on the case where residential addresses are the linking elements. The analysis of real-world data from the Municipality of Bozen-Bolzano revealed that addresses are stored with different level of detail in different databases and that coding conventions vary. Examples show that standard techniques to query these data fail also for simple queries.

We introduce a tree representation, called address tree, for residential addresses, which allows us to reduce the comparison of addresses to approximate tree matching. Two common problems in matching residential addresses are studied in detail: (1) if addresses are stored with different levels of detail, address trees with missing leaves have to be matched with complete address trees; (2) if the street names do not match (e.g. due to different naming conventions), we can try to match the corresponding address trees. We further point out that domain knowledge could be exploited to facilitate the matching problem.

Currently, we analyze in more detail domain knowledge for address matching. Future challenges will be to develop efficient algorithms for approximate tree matching, which are tailored to address trees and exploit domain knowledge.

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References

1. Fernández, A.: Towards interoperability amongst european public administrations. In: Proc. of EGOV 2002. Volume 2456 of LNCS. Springer (2002)
2. Wimmer, M.A.: European development towards online one-stop government: The "eGOV" project. In: Proc. of the Int. Conf. on Electronic Commerce. (2001)
3. Gamper, J., Augsten, N.: The role of Web services in digital government. In: Proc. of EGOV 2003. Volume 2739 of LNCS. Springer (2003)
4. Apostolico, A., Galil, Z., eds.: Pattern Matching Algorithms. Oxford University Press (1992)
5. Guha, S., Jagadish, H.V., Koudas, N., Srivastava, D., Yu, T.: Approximate XML joins. In: Proc. of ACM SIGMOD, Madison, WI (2002) 287–298
6. Navarro, G.: A guided tour to approximate string matching. ACM Computing Surveys **33** (2001)
7. Galhardas, H., Florescu, D., Shasha, D., Simon, E., Saita, C.A.: Declarative data cleaning: Language, model, and algorithms. In: Proc. of VLDB. (2001)
8. Gravano, L., Ipeirotis, P.G., Jagadish, H.V., Koudas, N., Muthukrishnan, S., Srivastava, D.: Approximate string joins in a database (almost) for free. In: Proc. of VLDB. (2001)
9. Lenzerini, M.: Data integration: A theoretical perspective. In: Proc. of ACM PODS, ACM Press (2002)
10. Chomicki, J., van der Meyden, R., Saake, G., eds.: Query Answering in Inconsistent Databases. In: Logics for Emerging Applications of Databases. Springer (2003)

Software Acquisition Based on Business Models

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Abstract. In this paper, we present an approach based on hierarchically structured business models as artifacts of business process modeling that are used in a stepwise acquisition process for large software systems to reduce complexity and to increase efficiency and effectiveness. These models are abstract enough so that the scope for ideas of the suppliers is not unnecessarily narrowed. But, they can be detailed and deeply technical if this is necessary. An adequate degree of abstraction allows the public authority to benefit from the ideas of the supplier in a collective learning process. The business models are furthermore a lingua franca for all parties concerned in the acquisition process and a valuable source of information for the time after.

1 Motivation

Since the beginning of electronic government, business process management and modeling have played an important role in the public sector, and still do. They offer comprehensive procedures and techniques to receive a clear picture of the processes and the associated objects in this field, improve them if necessary and select appropriate forms of IT support [4].

The selection and procurement of IT support is not as trivial as it is in the private sector. The acquisition of services in the public sector is subjected to European directives and national laws. These directives and laws have a great deal of influence on the process and the artifacts that are necessary to obtain IT services [5].

Hierarchically structured business models as artifacts of business process management are used to deal with complexity. In our approach these different levels of detail play an important role as information parcels in a multilevel acquisition process to decrease the complexity of the acquisition process.

In an analysis of acquisition documents we have observed, that the information and the criterions built on this information to select the appropriate supplier, are too detailed and technical although this seems not to be necessary. This narrows the scope for an effective solution and increases the complexity of the acquisition process. Our approach is to solve these problems through a stepwise information flow based on business models integrated into a legal acquisition process.

The acquisition of IT based services in the public sector, especially the acquisition of software systems, is not a core area in the field of electronic government. But, we think that the improvement of this process is an important and valuable contribution on the way to increase the efficiency of administrative processes and their IT support and so on the way to electronic government.

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2 Hierarchically Structured Business Models

Business process management is a concept to deal with the complexity of the administrative domain through structured processes. On the one hand the model design is characterized by a high degree of process complexity and on the other hand the information model is characterized by a high degree of object complexity [2]. Different views on information objects like for example organization view, data view, function view or control view in ARIS [10] and different levels of abstraction are common in business process modeling to handle object complexity.

There are two dimensions of abstraction in business models. The first is from a global view like a value chain or business process map to a detailed view like a process diagram as shown in [9]. The second is from business domain to technical representation as it is implemented for example in the ARIS house: requirements definition, design specification, implementation description [10].

3 Public Service Acquisition

The acquisition of services in the public sector encompasses the acquisition process with its artifacts on the one hand and the criterions to determine the appropriate supplier on the other hand.

The European directives on service acquisition basically provide three types of award procedures, the open procedure and the restricted procedure that allow a one shot acquisition and the negotiated procedure that allows a flexible and stepwise approach [1]. The fact that the negotiated procedure allows the negotiation of the contracts with the services providers renders it unnecessary to have a complete specification of services in advance. The specification is then completed and detailed by the public authority and a service provider during the acquisition and software development process.

The criterions are not determined by directives in detail. A classification based on [6] and [11] could be the following:

- *Business models.* This criterion comprises the frame within the software system to procure is accomplished. It covers the processes and the organization structure to support, the information objects necessary to these processes and the other information systems.
- *Vendor's ability to execute.* This criterion consists of two aspects. These are the financial execution capabilities like investments in research and development and in sales and marketing and the technical execution capabilities like the relative quality of the personnel within the key departments or references on similar projects.
- *Vendor services and support.* This criterion includes the quality, availability and reliability of the value added services offered by the vendor like installation, training or maintenance.
- *Product and service costs.* This criterion evaluates the relative cost of the services.

4 A Stepwise Approach

For us, business process management is an enabler for the efficient acquisition of software systems, not solely in the public sector. A long term concern of an organization with its processes and the involvement of the staff of all levels within the scope of organizational-learning [3] create a better understanding of what happens and pinpoints the aspects for process and IT change. An upcoming acquisition demand for a software system is a good time to introduce procedures of business process management in an organization if this opportunity has been missed so far. When considering the aim of the modeling (selection of software) it is necessary to determine the object of modeling and the modeling methods and tools as described in [2] or [4].

With business process management as a pathfinder, a concrete acquisition project should start in an optimized environment with documented process information. The first part of an acquisition project using the negotiated procedure, consists of steps of formal communication in terms of structured documents. It is fundamental not to oversize the information parcels in these first steps and to use a communication notation that is adequate in dealing with complexity and that is understood by all stakeholders (lingua franca).

The first major step in an acquisition project is the posting of the prior publication that is used to inform potential candidates about the planned project so that they can decide if they are qualified and capable. The business models used in this step are giving an overview of the domain on a high level. Value chain models or business process maps are used in this document. Based on the prior publication the candidates send in a request for participation that is used to shortlist the most eligible candidates primarily based on vendor's ability to execute criterions.

The second major step that is conducted with the selected candidates is the request for proposals that are the foundation for the negotiations afterwards. In this step the business models have to be detailed enough to create a first proposal. The degree of detail depends on the problem. The candidates have to make assumptions if information is missing that are discussed in the negotiation step. The proposals encompass a specification based on the candidate's system architecture and details about service and support and a price.

Based on the offers the public authority starts negotiations with the candidates about the offers. This step is used to fix details and prove the technical execution capabilities through prototypes. The negotiations are based on the business models that are refined in this process. More detailed and technical models based on system architecture are added if necessary. Variants of business models exist for each candidate. The goal of the negotiation step is a contract that is used to select the most eligible candidate, the supplier.

Beyond the acquisition project the business models are used during the development and the transition of the software system and as organizational documentation that is continuously maintained.

5 Conclusion

The information transferred from the public authorities to the service providers during an acquisition project is in the majority of cases too complex and detailed. This narrows the range for an effective solution from the beginning of the project.

Our approach is based on hierarchically structured business models as artifacts of process modeling that are used as adequate information parcels in a stepwise acquisition process. This enables a collaborative and evolutionary process between the public authority and the service provider with a maximum of flexibility.

The method presented in this paper fits into a wider concept based on business process management, software engineering and the directives and laws on public service acquisition, to increase the efficiency and the effectiveness off the acquisition of software system in the public sector so that the acquisition process is an efficient enabler for electronic government (see [7], [8] and [9]).

References

1. Council Directive 92/50/EEC of 18 June 1992 relating to the coordination of procedures for the award of public service contracts, Official Journal L 209 , 24/07/1992 P. 0001 – 0024
2. Becker, J., Algermissen, L., Niehaves, B.: Processes in E-Government Focus: A Procedure Model for Process Oriented Reorganisation in Public Administrations on the Local Level; Proceedings of EGOV 2003; Springer Lecture Notes 2739; 2003
3. Falck, M.: Business Process Management – As a Method of Governance; Proceedings of EGOV 2002; Springer Lecture Notes 2456; 2002
4. Klischewski, R., Lenk, K.: Understanding and Modeling Flexibility in Administrative Processes; Proceedings of EGOV 2002; Springer Lecture Notes 2456; 2002
5. König, W., Reichel-Hozer, C.: Bundesvergabegesetz 2002, Kurzkommentar und Leitfaden für die Praxis, Linde, Wien; 2002
6. Murphy, T.: Analytical Hierarchy Process/Analysis in Achieving Business Value from Technology; Wiley; New Jersey; 2002
7. Regner, P., Wiesinger, T., Küng, J., Wagner, R.: Towards a Process Model for Efficient Advertised Bidding in the Field of Software Projects; Proceedings of EGOV 2003; Springer Lecture Notes 2739; 2003
8. Regner, P., Wiesinger, T.: Extreme Advertised Bidding; Proceedings of the 4th International Conference on Extreme Programming and Agile Processes in Software Engineering, Springer Lecture Notes 2675; 2003
9. Regner, P., Wiesinger, T., Wagner, R.: Geschäftsprozessmanagement und -modellierung zur Steigerung von Effektivität und Effizienz bei der öffentlichen Ausschreibung von Softwareentwicklungsprojekten; Tagungsband der EMISA; 2003
10. Scheer, A.-W.: Architektur integrierter Informationssysteme – Grundlagen der Unternehmensmodellierung; 2. Auflage; Berlin et al.; 1992
11. Schreiber, J.: Beschaffung von Informatikmitteln; 4. Auflage; Haupt; Bern et al.; 2003

Customer Support for Job Learning on Demand*

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Abstract. The success of job qualification depends strongly on the transfer of learning aspects into everyday business. Within the project "Customer Support for Job Learning on Demand" a multi-functional hotline via internet video conference was built up to guarantee properly matching vocational IT qualification on demand. The results of the project include a contribution for an improvement of the quality of occupational training towards specifically required qualifications, and focus on lifelong learning through active inclusion of the users' actual work. Learning and training are not "stored", but really available on demand. It was also possible to demonstrate the successful feasibility of such job training programmes with immediate reaction to current customer concerns in the area of public administration with its high security requirements.

Background

Qualification of employees in enterprises, institutions or public administrations, lifelong learning and above all the conversion of the learning within everyday business situations is all becoming more and more important, and certainly, far more significant than is generally recognised. If a real increase in effectiveness and efficiency of training programmes is to be achieved, then learning has to concentrate on the solution of actual work problems. This presupposes employees who have a greater scope of action and a greater sense of their own responsibility for lifelong learning. In addition the conditions must be created to be able to learn electronically in work within the organizational units.

Within the project "Customer Support for Job Learning on Demand" setting up the customer support studio with the hotline MamBHo (stands for "maßgeschneiderte multifunktionale Beratungshotline" or customised multifunctional advisory hotline) via the internet and the use of the video conference system with multimedia equipment had to be achieved on an uncomplicated everyday level for the customer. The project received financial support from the industrial research association "Otto von Guericke e.V." (AiF), promoted within a program of the Federal Ministry for Educa-

* This paper is a short version of project results written in German in more detail about the video conference hotline called MamBHo and the development of the customer support studio, to be published in the Wissenschaftliche Beiträge (Forschung – Lehre – Technologietransfer) of the TFHW, vol 2/2004, ISSN 0949-8214. The website http://www.tfh-wildau.de/web_wvr/scholl/mambho provides information about the project.

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tion and Research (BMBF) for applied research and development (aFuE) and ran from 01.09.2002 to 29.02.2004. Besides hard- and software, two persons, a research assistant (20 h) and an administrator (10 h) were funded - so the project was strictly limited, both as regards running time and also equipment and personnel. Within the project we had contacts to 16 institutions and 21 employees, with a training course potential of altogether 100 participants. Unfortunately some partners in particular from enterprises withdrew their participation in the project due to their own continuously negative economic situation.

Some Technical Problems and Further Aspects

When clarifying the technical feasibility especially in the field of public administration we encountered more complex problems than we had expected. As soon as a firewall in the network system is present, the necessary inclusion of the network administrator can become the "bottle-neck" of the implementation of electronic learning, because ports must be opened and administrative access on the respective PC must be ensured. These conditions are often difficult to solve in public administrations because of the strict data security and general security rules – however a solution to this problem was pursued in the district Dahme Spreewald and will be described further below. In contrast video conference is technically feasible without such problems, if neither side uses a firewall, or, if electronic learning is carried out via an enterprise-wide intranet.

To participate in the hotline the following minimum requirements were necessary: a standard up-to-date PC, a web camera, an audio mechanism (headset or loudspeaker and microphone), free internet access (e.g. ISDN, TDSL, network with internet access), and suitable video conference software. In order to keep the technical and financial expenditure low for possible participants, we decided to use Microsoft Windows NetMeeting as a common basis. Microsoft NetMeeting activates functions of real-time audio and real-time video as well as data communication via the internet. Microsoft NetMeeting supports the H.323 audio and video conference standard as well as the T.120 data conference standard; it can be used for calling and receiving products which are compatible to these standards. With this sufficient equipment and appropriate services Microsoft NetMeeting can call using a H.323 gateway and beyond that it can call H.323 MCU (multi-point control units) and participates in multipoint audio video conferences. The installation of all components mentioned presupposes administrator rights on the appropriate user's PC. If the PC is directly connected with the internet, a video conference can be immediately started. But Microsoft NetMeeting can only manage an audio-video-connection with one partner - therefore our video conference system was only used for audio-visual connections (also multipoint links) and a second PC was used at the same time as a data PC for data communication. With our technical equipment the following variant of the connection proved to be optimal: First the participant selected our video conference system from the Microsoft NetMeeting window (input of the static IP address of the server) and connected for audio and video[1]. Second a coincident connection to our data PC was established (input of the special IP address) with data exchange via T.120, meaning that the use of chat, whiteboard and file transmission within Microsoft NetMeeting

[1] Sony Corporation, multimedia terminal PCS-6000P, operating instructions, 2000.

was possible. After successful connection the audiovisual contact between participants and lecturer was realized via the video conference system. On the lecturer side this included an interactive digital wall display with a large canvas in the studio, so up to four participants can be seen sufficiently, or it can be used to develop learning content written on this wall. The partners can see and hear themselves and each other, so the feeling of a real contact in this virtual area is developed. The connection via our data PC made it possible for both lecturer and trainee to use the necessary programs together and in alternation. In the process of the project with this kind of connection different scenarios of electronic learning were developed and tested. Besides the pure learning content all participants had to make themselves familiar with the technical conditions, hardware and software, and had to analyse video and tone problems and had to solve those problems together step by step.

The example of the administrative district Dahme Spreewald is chosen here to illustrate use of our hotline because it is an example of a public administration with substantial data security. Internet access of all users is protected via a multi-level firewall and for data transfer generally an appropriate proxy server is used, which examines and assigns rights of user access. As an result of our solution video conferences between users in the local area network and users of the internet were made possible without security risk to registered participants in the in-house net. The server was set up with open source software, which is a combination of gatekeeper and proxy server with the designation "gnugk-2.0.6" (www.gnugk.org). This solution would also be conceivable in other secured mechanisms of public administration.

Job Learning Results

Many variants of a video conference were tried out, experiences were gathered, knowledge was transferred and problems were solved. Apparently simple conditions gained in significance: For example within a multipoint connection the partners should not talk at the same time, and it is important that this is understood from the outset. In addition the participants must guarantee that all necessary ports are open. Four main scenarios of job training programmes via internet video conference were defined:

- Scenario 1: A customer, e.g. a former participant of a traditional training programme, has a software problem on the job, selects our IP addresses and calls us as described above. It makes sense to have the same versions of the software, but this is not necessary. The customer starts his program and afterwards hands the control to the lecturer, who shows corresponding solutions as an answer to the questions and discusses the problems. In the further process the lecturer hands the control back to the customer who tries out the solution. Lecturer and training course partner keep in audiovisual contact so that explanations and further inquiries are effective. The use of the main camera and later of the object camera (for handwriting or book hints) by the lecturer make it possible to show all the different necessary materials within the job training programme. Likewise the further functions of Microsoft NetMeeting can be used successfully, i.e. in this case above all the possibility of the file transfer.

- Scenario 2: Similar to the first scenario, however with more participants. When using our video conference system as described, up to four participants could be included in each session. All functions of Microsoft NetMeeting can be used, including the chat to give a signal if tone problems occur.
- Scenario 3: A group of experts sits in the customer support studio at the table with a table microphone and discusses a question. The experts show different aspects of the topic with different media (white-board, flipchart, figures etc.), which are shown to the participants by selected cameras. Moreover, the main camera of the video conference system can shadow movements of walking people.
- Scenario 4: A problem solution or a training session is recorded either with a video camera or with the "eBeam-function" of the digital wall display, in order to be able to show it to further participants later on.

Short interruptions could almost always be repaired quickly and did not impair the implementation of the training session, as the participants confirmed. But the operational business of the hotline including speedy disturbance recovery and technical assistance for the participants requires the presence of an administrator beside the lecturer, so the former retains an overview of the technical security and the latter is completely concentrated on the individually aligned training. This is also important because the lecturers have to react ad hoc and very flexibly to concrete questions in such a non-pre-defined training situation. Those situations can sometimes cause lecturers to become disconcerted, i.e., such a custom-made and electronically based learning situation also presupposes lecturers with wide training course experience.

Not only was the feasibility of training courses for the job required proven by this project, but there was also a remarkably large acceptance by all participants of this kind of job qualification (even of those, who do not understand information technology as a major task of their own work situation). Within our project, which was strongly limited by financial and personal resources, it was possible to guarantee qualified assistance for problems and purposeful reaction to current vocational requirements as well as take into account changes in new program versions. Likewise the video conference system provided intensive contact and good communication, so that knowledge transfer was always possible. Video-connection played an important role in creating the right feeling between the participants, nevertheless without sound quality the hotline doesn't work. The main use is to create a properly matching qualification to solve IT problems at work with an individually tailored advice programme, with customised coaching for different types of learners and with adapted material using different media. This is, no longer learning on supply, and in addition travel expenses are saved. MamBHo facilitates a competent, advisory knowledge hotline at the right time at the right place for properly matching qualification. However, in order to be able to operate MamBHo in the customer support studio as a permanent business to teach employees in enterprises and public administrations on demand in future, the development of an economically viable operating model is necessary.

Levels of Difficulty in Introducing e-Voting

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Abstract. Recent e-voting pilots in the UK have demonstrated that there are different factors to be considered in the administration of electronic voting. In this paper we present a framework for the evaluation of the level of difficulty involved in the deployment of e-voting schemes. Taking the public authority's point of view we identify eight factors, which increase the overall difficulty of e-voting administration. We suggest that as new e-voting technologies and associated activities are introduced in the re-design of the electoral process, its administration becomes increasingly more difficult. We provide examples explaining the practical use of the suggested framework based on some of the 2003 UK e-voting pilots. In concluding we refer to existing limitations of the framework and suggest future work, which could expand its analytical value.

Introduction

Two recent publications, one from the US and one from the UK, highlight the fact that the successful deployment of electronic voting is proving to be more difficult to achieve than originally envisaged. In the US, one of the most publicized experimental projects SERVE, on behalf of the US Department of Defense, was cancelled [12]. In the UK, the evaluation of the 2003 e-voting pilots highlighted many areas of current e-voting practice that need to be improved [2]. The UK e-voting pilots in particular, have provided us with useful experience, aspects of which we analyze in this paper.

In our research we have found it necessary to differentiate clearly between e-voting pilots that provided an additional voting mechanism, i.e. a new channel for voting, and those which add technology to different stages of the electoral process but which did not provide technology for actually casting a ballot – we define these as e-enabled elections. Overall 36 fully evaluated e-voting pilots have been conducted in the UK to this date, 16 in May 2002 and a further 20 in May 2003 [14], [3]. These were in all cases legally binding elections on a Local Authority level. The possible e-voting channels for casting a ballot were: touch-screen voting kiosks, internet voting, interactive voice response (IVR) landline telephone voting, SMS text message voting, digital television voting. Seventeen of the UK pilots (4 in 2002 and 13 in 2003) provided voters with multiple e-voting channels. When these channels were offered concurrently the need for an electronic on-line version of the electoral register was created to allow real-time valid voter identification. When paper ballot voting was maintained as an option, whether polling station or postal, that added extra channels in which a ballot could be cast. The use of the e-register, in combination with traditional polling

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station voting, also enabled voters to cast a ballot at any polling station within their ward. Additionally smart card technology was used for partial voter identification and there was electronic counting of paper ballots. These e-voting pilots, which used the e-register or the e-counting of paper ballots, are examples of semi-automated processes, which partially supported or "e-enabled" the voting process. Finally it should also be noted that some of the new e-voting channels piloted, due to their nature, allowed remote, unsupervised voting. The introduction of such a range of technical innovations makes the management of an election more difficult for public authority electoral administrators. The purpose of this paper is to provide public authorities, considering deploying e-voting in the future, a framework to assess the potential degree of difficulty that a suggested e-voting pilot fosters.

The research presented in this paper forms part of a doctoral program concerned with the identification of the emerging constraints in re-designing the electoral process in relation to information and communication technologies (ICTs). Empirical research was undertaken which comprised interviews and observations, conducted both during the run-up to the election and on the actual polling day in one of the 2003 UK pilots. The analysis of the published evaluation reports combined with findings from our empirical work have lead us to conclude that there are eight main factors which can increase the level of difficulty of an e-voting pilot. In the following section we present these factors and justify why we consider them to increase the level of difficulty involved in deploying electronic voting.

Difficulty Factors

The introduction of e-voting technology. The traditional voting process makes little use of ICTs. In contrast e-voting implies the introduction of technological elements in some or all stage of the voting process. In the UK pilots we have identified five different e-voting channels: Voting kiosks, which have been used in two variations, either dedicated hardware for the sole purpose of voting as was the case in the 2003 Epping Forest pilot [4] or existing multiple-use kiosks as was the case in the 2003 Sheffield pilot [5], interactive Voice Response (IVR) touch tone telephone voting, SMS text message voting, interactive Digital television voting (iDTV) and Internet voting, accessed either from PCs, at home, work, and publicly made available PCs, or internet connected kiosks. The use of WAP enabled mobile telephones has been suggested in the literature as an extra gateway for casting an e-ballot [13], [11], however it has not been piloted yet in the UK and therefore not included in this analysis as an extra voting channel. It has also been suggested that e-voting channels and the necessary technical infrastructure to support them should be considered differently [11], and that the ownership of infrastructure should initially remain with the control of public authorities [1]. However, the provision of channels and infrastructure has been outsourced to commercial suppliers, with the exception of the 2003 Broxbourne pilot e-enabled schemes where an "in-house" PA developed e-counting system was deployed, [6]. Thus Local Authorities (PAs) remained with the task of providing the necessary administrative support to make all these technologies operational for voting. Such tasks included the provision of voter and candidate data to commercial suppliers, the dissemination of pins and passwords to voters or the collation of results from the different voting channels used. The fact that PAs typically had no ownership

of the technology decreased the level of control that they had over a process for of which they were legally liable. In effect PAs had to rely on technology providers for adequate performance and support of the e-voting technologies. Furthermore PA staff had little or no experience in the use of the voting technologies. Therefore the introduction of the innovative "e" element in the voting process makes its delivery more difficult than the delivery of traditional elections.

Paper ballots along with e-ballots. In most cases the introduction of e-voting channels was complementary to existing polling station voting. That meant that provision had to be made for two different kinds of ballots: the paper ballot and the e-ballot. Double voting could be encountered in more than one ways: two paper ballots, two e-ballots or one paper and one e-ballot. Therefore the parallel provision of paper and e-ballot provides malicious voters with three alternatives of double voting instead of one in the traditional process (two paper ballots). Having two versions of ballots also means that two separate counting processes must be held and results of the two need to be collated at the end to produce the overall final result.

Multiple channels of voting. Every extra channel for casting a ballot provided to voters has two main effects. In the first instance it creates additional workload for those charged with the administration of the extra channel, i.e. the PA staff. Moreover the voting process in general becomes more vulnerable to double voting as each extra channel provides voters with one more opportunity to cast a ballot. It is therefore harder to secure the overall integrity of the election, as every extra channel requires its separate authentication mechanism. However in introducing this factor we consider that the multiple channels offered are not made available at the same, or overlapping voting periods.

Duration of the voting period. In the traditional polling station voting, all voters cast their ballot within the same time frame. The usual time frame for voting at polling stations of one day (8am to 9pm in the UK) is considerably increased when e-voting channels are introduced. To provide an example, internet voting, at the 2003 South Somerset pilot, was available 24hours a day for a period of one week [7]. Extending the voting period, also extends the time frame during which the electoral process has to be safeguarded and therefore more resources, dedicated to this aim, are required.

Simultaneous multiple channels. When multiple channels of voting are available over the same or overlapping voting period then the degree of difficulty is increased, as they need to be secured against multiple uses from the same person. To achieve this objective each voter needs to be uniquely identified through the authentication options followed in the different channels. In effect it requires an integrated e-register available in real-time. On the other hand if voting channels are offered in successive voting periods, then the channels can be more easily controlled, as this is done for one channel at the time. This creates a paradox in relation to the traditional single channel polling station voting, where the fact that voters cast their ballot within the same time frame makes the process more controllable

The use of the electronic register of voters. The deployment of an on-line, real-time updated version of the electoral register was proven to be a more difficult task than originally expected [8], [9]. The "e-register" has two main uses. Firstly, as back-office application, it serves as a single point of reference for voter authentication, and thus allows multiple channel simultaneous voting. Secondly, as a front office tool, the use

of the e-register can allow voters to cast a ballot at any polling station linked to the e-register. The concept of specific voters being attributed to a specific polling station has long served the integrity of elections, therefore the use of the e-register creates a less secure environment for voting as voters are no longer related to a specific polling station. This is even more relevant in the UK, where no formal token identification is required in the voter authentication process, other than stating one's name and address to the polling staff. In this case, the idea of "familiar faces" going to a certain local polling station offered some extra layer of security to the process which is now lost. Security is therefore sacrificed for the sake of convenience.

E-enabled voting. The electoral process becomes e-enabled when at least one of its sub-processes is re-engineered to a semi-automated procedure that introduces some technical element to the electoral process, and involves the action of a human agent for its completion. In such cases the overall process is e-enabled and no longer the same as the traditional process. Still, it cannot be characterized as e-voting as technical elements are introduced in some of the electoral process stages and not all. E-counting of paper ballots is an example of hybrid processes as there is staff involved in the operation of the e-counting machines. The operation of the e-register by staff at polling stations (front office version) is another example. The use of the e-ballot box, which automatically counts a specially printed paper ballot at the same time a voter casts the ballot at a polling station, as piloted in 2003 at South Oxfordshire [10], is yet another example. The human element in these sub-processes although providing greater transparency to the overall process, imply staff costs and effective staff training, while at the same time opening the process to human error related risks.

Unsupervised voting. Polling station voting provides a controlled environment. A supervised process is by nature more secure, as there are more opportunities for audit of the process, therefore a higher level of transparency provided. The presence of a human agent in supervised voting insures voter authentication, voter privacy and eliminates the possibility of undue influence imposed upon a voter's free choice. All these benefits are lost when voting is unsupervised. Remote voting from home or workplace, using any of the available technologies, voting from public kiosks and postal ballot voting are examples of unsupervised voting channels.

It should be noted that we do not suggest in our analysis, nor have identified in our research that some factors pose greater difficulty than others, or that some channels are more difficult to deliver than others. We therefore attribute the same degree of difficulty to all factors and voting channels. As each factor or channel is introduced the level of difficulty of an e-voting pilot is increased. The starting point for establishing the degree of difficulty is the traditional polling station voting process. This is attributed a difficulty degree of 0 as none of the eight factors which could increase its existing level of difficulty is applicable. In the following section we demonstrate how the framework can be used to assess the potential levels of difficulty of e-enabled or e-voting pilots.

Using the Framework to Establish the Difficulty Level of an e-Voting Project

Paper ballot based voting can be polling station voting, all postal ballot schemes (no polling stations), or a combination of polling station voting with postal voting. As no

e-voting channels are included, the degree of difficulty of e-enabled paper ballot voting can increase by the remaining six factors: more voting channels (in this case up to two), offered for a prolonged period of time, being run concurrently, allowing voting from any polling station through the use of the e-register, involving semi-automated processes such as the e-counting of ballot papers and finally some channel being unsupervised (in this case postal voting). As each factor is added the degree of difficulty is increased by one level. Polling station voting can be jeopardized by a prolonged voting period, an e-enabled element or the use of an e-register. The fact that it is supervised and the only voting channel offered, excludes all the remaining difficulty factors, so this option can reach the third degree of difficulty. Similarly all postal voting being the only channel offered and unrelated to the use of the e-register, can also reach the third degree of difficulty. When both polling station and postal voting are available over the same voting period, then the sixth degree of difficulty can be reached by introducing an e-register of voters and in addition e-counting.

The second part of this framework starts from the premise that at least one e-voting channel is present. The use of e-voting technology automatically attributes one degree of difficulty. Each of the remaining seven factors could then increase the degree of difficulty by one level for that specific e-voting channel. However this does not cover the extra levels of difficulty that occur with the introduction of more than one e-voting channels, nor the option of paper ballots being offered both at polling stations and as postal voting. On the basis that any extra channel, whether e-ballot or paper ballot, adds one more degree of difficulty, we therefore increase the level of difficulty by one degree for every extra channel offered (other than the original e-channel). Given that we have a total of five e-channels and two paper channels, the degree of difficulty could increase up to six (5 e-channels –1 e-channel already calculated +2 paper ballot channels). Therefore, according to the suggested framework the maximum degree of difficulty that an e-voting scheme could reach is fourteen, (8 difficulty factors, plus 6 if all possible channels are offered). To demonstrate the use of the framework to assess the degree of difficulty involved in an e-voting pilot, we provide an example based on the 2003 UK pilots. In Sheffield, the local authority piloted a simultaneous multiple channel e-voting process involving IVR, unsupervised kiosk, SMS and internet voting, provided for period of seven days, combined with e-register enabled polling stations and postal voting. According to the suggested framework this pilot reached a total difficulty degree of 13, adding the 8 levels of difficulty factors, the 3 extra e-voting channels and the 2 paper channels.

Conclusions

The framework presented in this paper aims at providing public authorities with a method to evaluate the prospective level of difficulty that the deployment of an e-voting scheme might foster. As such it could facilitate the strategic planning of similar pilots, on the basis of which difficulty factor poses an acceptable risk to the overall successful delivery of an election. Some factors are inter-related. The difficulty, which occurs from the administration of simultaneous channel voting, can only apply when multiple channels of voting are made available to voters, as we need at least two voting channels being offered to provide simultaneous process delivery. Similarly when more voting channels are provided concurrently then the introduction of the e-

register is imperative since it provides the necessary infrastructure for all-channel voter identification. Furthermore in e-voting pilots, when the paper ballot is also made available then the multiple channel factor is always applicable, since the existence of a paper ballot option presupposes the existence of at least one extra voting channel. This framework does not address the issue of multiple agents being involved in the delivery of such schemes, as we consider this is more of an organisational issue rather than an implementation one, which proper management can resolve. Finally we suggest that the classification of channels and factors in different levels of difficulty could expand the analytical value of the presented framework.

References

1. California Internet Voting Task Force (2000), A report on the feasibility of Internet Voting, January 2000
2. Electoral Commission. (2003a). The shape of elections to come: A strategic evaluation of the 2003 electoral pilot schemes, July 2003
3. Electoral Commission. (2003b) Local electoral pilot schemes 2003, April 2003
4. Electoral Commission. (2003c) Pilot scheme evaluation Epping Forest District Council 1 May 2003
5. Electoral Commission. (2003d) Pilot scheme evaluation Sheffield City Council 1 May 2003
6. Electoral Commission. (2003e) Pilot scheme evaluation Broxbourne Borough Council 1 May 2003
7. Electoral Commission. (2003f) Pilot scheme evaluation South Somerset District Council 1 May 2003
8. Electoral Commission. (2003g) Pilot scheme evaluation Sheffield City Council 1 May 2003
9. Electoral Commission. (2003h) Pilot scheme evaluation St Albans City and District Council 1 May 2003
10. Electoral Commission. (2003i) Pilot scheme evaluation South Oxfordshire District Council 1 May 2003
11. Fairweather, B. and Rogerson, S. (2002), Technical Options Report, De Montfort University, Leicester, 2002
12. Jefferson, D., Rubin, A., Simons, B., Wagner, D., (2004), A Security Analysis of the Secure Electronic Registration and Voting Experiment -SERVE, January 2004
13. OASIS (2003) Election and Voter Services Technical Committee, Election Mark-up Language (EML), Version 3.0
14. Pratchett, L. (2002) " The implementation of electronic voting in the UK " LGA Publications, the Local Government Association

Implementation of Quorum-Based Decisions in an Election Committee

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Abstract. The paper proposes a method to implement the role of an election committee in electronic voting. Decisions in the committee need not be made unanimously, rather arbitrarily defined quora are supported.

1 Introduction

One of the main issues in electronic voting is the protection from fraudulent manipulations of votes by the administration of the election system. A method to prevent such manipulations is to asymmetrically encrypt the submitted votes by the voter client using public keys supplied by the election committee, where each committee member retains the private key part. Hence, nobody including the election server administration has access to the encrypted ballot sheets. Only when the ballot box is "opened" by the election committee, the private keys are provided by the committee members and the votes are accessible. This procedure was implemented in the system used by [1].

It requires, however, all private keys to be supplied correctly by the committee members, which means that all decisions in the committee have to be made unanimously. Also, it gives every member the opportunity to sabotage the election by supplying no or a fake private key. Also simple accidents of committee members or loss of storage media may result in the ballot sheets to be inaccessible and hence lost.

The question of quorum-based decisions on opening the ballot sheets arises. "Quorum" may refer to a unanimous, majority or minority decision. The protocol presented in the paper is to meet the following requirements:

a) Nobody outside the committee is to know any of the private keys of the committee until the opening of the ballot box.
b) No committee member knows the private keys of any other committee members used for encrypting the votes until the opening of the ballot box.
c) Any pre-defined quorum of the election committee can open the ballots.
d) A group of members short of the quorum even by one member only shall have a non-realistic chance in deciphering what a valid quorum may decipher.
e) No committee member is able to sabotage the process by supplying fake keys.

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2 The Protocol

2.1 Implementation Options

Shamir [2] suggested the use of polynomial equations where a polynomial curve intersects the y-axis at a given secret number N and the knowledge of a certain number of points on the curve enables Lagrange interpolation of the curve and eventually knowledge of N. The scheme can be expanded to general geometrical hyperplanes [3], which enable representation of the most complex majority decision schemes in committees also with members of different levels of authority [4], [5]. However, these schemes presuppose that the original secret is known at some stage – at least to the person constructing the polynomial curve around N or the hyperplanes. The same applies to [6].

In the present application this is to be avoided: At no stage prior to the committee's (quorum) decision to open the ballot box shall the secret keys of the individual members leave their respective domain.

A number of threshold signature schemes have been suggested in the literature, for RSA-based [7] as well as for ElGamal/Diffie-Hellman [8], [9] signatures. Even though they have primarily been suggested for distributing signature keys, particularly in the RSA system, it is possible to adapt them to distributed decryption keys as well (s. [10] for DSS with general application), however, the aim of repetitive use of the signature keys is not an issue in this application. Such distributed signature protocols have been suggested by Desmedt and Frankel [11] based on the RSA scheme, a very elegant extension using Lagrange interpolation can be found in [12]. Gennaro et al. suggested dealer-based schemes based on RSA and ElGamal signatures [13],[14], which rely on a central dealer or verifier, resp., which would not be appropriate here, even if the algorithm could hide the secret to the central dealer, as the election committee should also function when any member is absent. No member may have the possibility to obstruct the committee.

On the other hand, the dishonest use of the keys in the signature (here: encoding) phase itself (cf. [10], [15]) is not an issue, as the use of the keys is outside the responsibility of the election committee.

2.2 Proposed Protocol

Denote i a committee member in an election committee of M members, and Q the quorum that is necessary to open the ballot sheet. $0 < Q \leq M$. The algorithm assumes that there is an election committee server (ECS) run on behalf and under the control of the election committee. It can be assumed that the ECS is only accessible to the committee members, but this does not constitute a requirement for the protocol.

Preparation Phase

(1) Each committee member i creates an asymmetric key pair (d_i, e_i, n_i) publishing the external key and the modulus, (e_i, n_i), on the ECS. The moduli meet the con-

straints $n_i < n_{i+1}$, $d_i < n_i$[1] and $d_M < n_1$. Members are ranked in increasing order by their published moduli. This coordination is compatible with decentralized key generation, as the moduli are published anyway and the above conditions can be checked by every member.

(2) d_i remains within the domain of each committee member, stored on a secure media; it is also assumed that key generation happens in a tamper-prove environment (e.g., a smart card).

(3) Each member i computes one or several c_{ik} according to:

(3.1) All quorum combinations of members without repetition are established and listed in the ECS. Their number is $\binom{M}{Q}$; denote each of them q_k; it represents a quorum that may make a valid decision to open the ballot sheets.

(3.2) Each combination q_k is randomly assigned to one of the committee member i, who is not member of q_k; every member is at least assigned one such combination, who uses the generally known public keys and moduli (e_j, n_j) of all $j \in q_k$ ordered by the size of the respective modulus to sequentially encrypt his d_i thereby deriving the c_{ik} value(s), which is/are then published on the ECS.

(4) Each member i has a number of "challenge tokens" t, which she may use to challenge another member j's c_{jk} to supply his secret d_j. Once d_j is supplied, it can be checked whether (i) (e_j, d_j, n_j) form a valid key pair, (ii) the c_{jk} originally supplied by j can be recomputed according to the public keys e_k $\forall k \in q_k$ and checked. If either identity cannot be re-established, j must have cheated; if both identities can be established, it is proven that j acts according to the rules (cf. Proposition 2).

(5) If a member had to supply the secret key d, he creates a new key pair and recomputes the c_{ik} assigned to him according to steps (1) to (3), whereupon the next round of challenges may happen. Assignment of challenges may also be subject to a random selection.

Voting Stage

(6) All (e_i, n_i) are delivered[2] together with the voting software on election day and are consecutively used to code the ballot sheets. Hence, the ballot sheets BS stored on the ballot box server(s) are encoded as $\left(\left(BS^{e_1} \bmod n_1\right)^{\cdots}\right)^{e_M} \bmod n_M$.

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[1] A condition, which should hold for well-formed key pairs anyway, as the values for d and e should avoid extremes.

[2] A possible method may be real-time key resolution from a defined server by the voting software.

Opening Stage
(7) BS are decoded after the election closed, either unanimously or after a quorum decision in the committee (cf. Proposition 1). ■

The obvious solution for Step (3) would be to encrypt each d_i with all combinations of Q keys of the members of $M' = M \setminus \{i\}$, which is $\binom{M-1}{Q} = \frac{(M-1)!}{(M-1-Q)!Q!}$. This, however, could be difficult to manage in larger committees; in the case of a committee of 11 with a quorum of 5 it would be $\frac{10!}{5!\,5!} = 252$ combinations of encrypting each d_i with a sequence of $Q = 5$ public keys. The above version is more parsimonious and takes into account that each quorum has to only access one single additional key in order to move on to deciphering the next key.

2.3 Discussion

Criteria a) and b) in the Introduction are clearly met, the d_i of all election committee members remain strictly private. Let us discuss the remaining criteria.

Proposition 1: Any quorum Q of the committee can access the BS. ■

Step 3 of the above Algorithm assigns one encrypted d_i to every possible combination q_k of committee members that constitute a valid quorum and do not contain member i. Hence, q_k can access the secret key of a member, who does not belong to q_k. Since this is valid at every step, all secret keys will eventually be available. □

As to requirement d), if a group of members short of a valid quorum collude, the key is at least as difficult to break as a single RSA signature, as at least one key would be missing; e.g., with M=5 and Q=3, d_1 would be encoded to $\left(\left(d_1^{e_2} \bmod n_2\right)^{e_3} \bmod n_3\right)^{e_4} \bmod n_4$; if 3 and 4 collude, the code would still be $d_1^{e_2} \bmod n_2$, which corresponds to usual single-key encryption.

As to requirement e), the following proposition holds:

Proposition 2: The verification proposed in Step (4) is complete and sound.■

Completeness: The protocol requires member i to (i) create a correct RSA key pair (e_i, d_i, n_i) and to correctly communicate public exponent and modulus to the ECS, (ii) to use the published e_j of a quorum q_k assigned to him to encode his private key. Step (4) directly proves the fist point by verifying whether d_i matches the public key part published by the member. Since the e_j remain the same for re-computation of the encoded d_i, also this part can be verified.

Soundness: If i's private key fails to meet the above criteria, the question arises whether anybody else's manipulations could be responsible for the mismatch. There are two possibilities:

i) Another (or several other) committee member j: Given the published e_j it is i's sole responsibility to compute the consecutive $d_i^{e_j} \bmod n_j$ using the RSA key member i himself generated.

ii) (ii) The administrator of the ECS or a third party; points of interference are (iia) the key generation (which was assumed to happen in a secure environment), (iib) key transmission and storage on the server. This may be corrupted, particularly by the server administration, however, the public key parts are published and hence, can be checked by every committee member. □

3 Implementation

In regards to implementation, the protocol employs standard RSA functionality and should be straightforward to implement. The weak spot will rather be the handling of the challenge tokens by the committee members. The number of possible challenges t per member is a decisive security parameter. To see this, consider $t = 2$. After two challenges it is generally known that no more challenge could come from the member, hence, no member will actually use 2 challenges, and the maximum will be 1 challenge (which can only be directed against a single c_{ik}). Hence, a larger maximum number of challenges are clearly desirable, where each member faces a real likelihood that he has to "show" the d_i and verify the c_{ik} he created. This however increases the preparation stage of the protocol. Future research may be directed towards reducing the complexity of the preparation stage.

References

1. Prosser, A., Kofler, R., Krimmer, R.: Deploying Electronic Democracy for Public Corporations. In: Traunmüller, R. (ed.): Electronic Government, LNCS 2739(2003), pp. 234-239
2. Shamir, A.: How to share a secret. Comm. ACM, 22 (1979), pp. 612-613
3. Blakley, R.: Safeguarding cryptographic keys. FIPS Conference Procedings 48(1979), pp. 313-317
4. Beutelspacher, A., Rosenbaum, U.: Projektive Geometrie. Vieweg, 1992
5. Kersten, A.G.: Shared Secret Schemas aus Geometrischer Sicht. Mitteilungen aus dem mathematischen Seminar Giessen, 208, 1992
6. Alon, N., Galil, Z., Yung, M.: Dynamic re-sharing verifiable secret sharing against a mobile adversary. Proceedings European Symposium on Algorithms 1995, pp. 523-537
7. Rivest, R., Shamir, A., Adleman, L.: A Method for Obtaining Digital Signatures and Public Key Kryptosystems. Comm. ACM, 21(1978), pp. 120-126
8. ElGamal, T.: A Public Key Cryptosystem and a Signature Scheme based on Discrete Logarithms. IEEE Trans. Inf. Theory, 31(1985), pp. 469-472
9. Diffie, W., Hellman, M.E.: New Directions in Cryptography. IEEE Trans. Inf. Theory, 6(1976), pp. 644-654

10. Langford, S.: Threshold DSS signatures without a trusted party. LNCS 963 Proc. Crypto 91, Springer-Verlag, pp. 397-409
11. Desmedt, Y., Frankel, Y.: Shared Generation of authenticators of signatures". Advances in Cryptology – CRYPTO 91, 1992, pp. 457-469
12. De Santis, A., Desmedt, Y., Frankel, Y., Yung, M.: How to share a function securely. 26th ACM Symposium on the Theory of Computing, 1994, pp. 522-533
13. Gennaro, R., Jarecki, S., Krawczyk, H., Rabin, T.: Robust Threshold DSS Signatures. Proceedings of Eurocrypt 96; LNCS 1070, 1996, pp. 354-371
14. Gennaro, R., Jarecki, S., Krawczyk, H., Rabin, T.: Robust and Efficient Sharing of RSA Functions, manuscript, 1996
15. Feldman, P., Micali, S.: An Optimal Algorithm for Synchronous Byzantine Agreement. ACM Symp. on Theory of Computing 1988, pp. 148-161

Translating Customer-Focused Strategic Issues into Operational Processes Through CRM – A Public Sector Approach

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Abstract. In spite of doubts and misunderstandings regarding CRM implementation in the government context, its adoption has been significantly growing in the last years. Different initiatives have been uncovering CRM benefits for government. Such as benefits may potentially enhance government responsiveness and acceptance by society. In this paper we address the issue of what makes CRM different from other existing solutions and approaches towards customers. We also further analyze the importance of customer-focused strategies for government and which CRM functionalities are being exploited in order to improve organizational performance and relationships with stakeholders. Different dimensions of CRM are briefly mentioned in order to provide a better understanding of its scope and concepts.

1 Introduction

The adoption of Customer Relationship Management (CRM) initiatives is gradually becoming one of the main concerns of senior public managers. Some of the main government drivers of CRM are: the search for provision of seamless services via one interaction point, the optimization of workflow processes, the implementation of e-government initiatives, and the reduction of operational costs.

The aspects above can be implemented through several different systems and applications available in the market. Yet the whole area remains problematic. The pressures are evident, but what is the deeper rationale: Why should governments spend large amounts of financial resources to implement CRM initiatives? What does CRM do that cannot be done by other, perhaps cheaper solutions? Maybe these questions are in the mind of many managers who stand one step behind the trend waiting to see what will happen next.

Indeed, it is still difficult for many people to understand all this interest in CRM since there are so many other good products in the market. Perhaps these doubts and fears begin in the way one approaches CRM subject. A main fundamental issue is that CRM is more than a mere product. CRM can be understood as a broad business strategy that implies the redevelopment of organizational structures so that there are new service units and new product offerings arranged around a refreshed understanding of customer needs. If one sees CRM as a system that can be bought and implanted in an off-the-shelf manner, then it becomes difficult to visualize the advantages of investing in an expensive product compared to other options in the market.

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As a matter of fact, governments have already started to deploy CRM initiatives to support their activities. It is becoming very common to find government initiatives focusing upon improving relationship strategies by the allocation of new information and communication technologies [1]. In so doing, CRM seems to be an element that bridges between service improvement initiatives and democratic renewal, both key aspects of e-government. CRM appears to be somehow implicated in a general scenario that provides an answer for new social needs and citizen expectations, as well as facilitating back-office processes and sharing information between government institutions and their stakeholders. The application of CRM systems in the government context is thus seen as constituting a strong initiative to promote the proximity between government and citizens [2].

In this paper we intend to approach the issue of how CRM can help public organizations to focus on customers. In the following sections we are going to expand on customer-focused strategic aspects; concepts and functionalities of CRM; and which CRM practices and solutions governments are adopting in order to enhance their organizational performance and relationships with stakeholders.

2 CRM and Customer-Focused Strategies for Government

CRM seems to be becoming an important element of corporate strategy for many organizations throughout the world. In order to implement relationship strategies and exploit their information technologies, companies are deploying and integrating CRM systems with other legacy systems and network channels. When well managed, these integrations are reputed to constitute a successful combination of technologies that provides the necessary resources to make possible the execution of strategies that will situate a company closer to its customers.

According to Starling [3], the building of well-managed relationships with citizens is crucial for allowing government's prompt acquiescence to popular demands. Hence, cognisance of public opinion is a fundamental requisite for improving government responsiveness. He also comments that responsiveness can mean more than merely reacting to popular demands, it can also mean that government takes the initiative in the proposal of solutions for problems previously identified.

Building and managing customer relationships are key successes factors for government as much as they are for private companies. For government, the capability of one-to-one responses at citizens' interactions regardless their point of contact enables the following benefits [4]: i. Gain a deeper understanding of customers' needs and maximize return on programmes and services; ii. Better meet customer expectations when recommending services and information that people are most likely to need; iii. Service representatives could respond citizen calls for service with personalised actions; iv. When designing programmes, departments would be able to know which of their many potential participants were most likely to enroll and be successful in these programmes.

3 CRM Concepts and Functionalities

Governments can be considered as the largest service providers in the world and they are becoming increasingly aware of the need to become more responsive to their own

customers [5]. Each customer interaction produces extensive data and the purpose of CRM is to make inferences over this data in order to promote the organizational benefits mentioned before. Implementing customer-focused strategies can be feasible with support and adoption of a series of different information technology such as Data Warehouse, Data Mining, Online Analytical Processing (OLAP), Statistical Analysis tools, Segmentation tools, Interfaces to the communications channels, etc; however, these technological solutions were developed in different periods and a gradual implementation of their resources may lead to a disaggregated operational environment. As a result, there may be a maximization of the effort for accessing customers' information and managing the relationship with them. Therefore different software developers have been developing a broad number of CRM solutions that embrace or fully interact with one or more of those existing technologies. In other words, those technologies were not developed exclusively for implementing CRM systems; however, their resources and potentialities made the implementation of CRM systems a feasible process [6].

It is important to bear in mind that CRM system is not a single product. According to McKendrick [7], CRM system is an umbrella term involving four categories of applications: Sales force automation, Marketing automation, Customer service and support, and Channel and partner management.

Also commenting on the range of CRM solutions, Silverman [8] argues that CRM is an extremely broad solution area involving a large number of products and services such as call centre and telephony, email customer service, Web personalization, customer self-service, interactive sales and support, contact management, etc.

As we can see, a number of existing technologies are being termed as CRM solutions. Such unbounded generalizations might provoke misunderstandings or even disbeliefs regarding CRM subject. In reality, the technological sphere only is not enough for providing a complete understanding of CRM scope, for it extrapolates technical matters. In spite of its strong link with technology, CRM is not just a set of software applications and information technologies integrations, but a business strategy that focuses on building customer service excellence [9].

4 Practical Aspects of CRM Implementation

In order to respond to social expectations for automated services, governments are increasingly developing e-government initiatives that empower customers to conduct transactions themselves, without the need to visit a government office or speak with a government employee. Government initiatives to implement e-government solutions meet the public sector need for delivering service by electronic means, and this is doubtless a significant step towards customers. This confronts us with a further conceptual knot; what is the point of CRM in this context? Why expend more money to implement CRM solutions if the current e-government initiatives through the Web already enable a closer relationship with customers?

It seems that the main strengths of CRM lie in its integrated strategic and operational approaches toward customers. Considering CRM strategic concepts organizations can better align its operational processes and structure to really improve relationships with customers in a wider and integrated manner, which entails service reorganization and integration in order to avoid or ameliorate the effect of fragmented solutions and isolated actions.

In practice, CRM goes beyond "electronic" service delivery, since one of its premises is the development of organizational capability for delivering seamless services to customers regardless of the point of interaction (Figure 1). Goldenberg [10] comments that CRM provides seamless coordination between all customer-facing functions; hence, productivity enhancement can be achieved by customer-facing personnel being able to do customer-related work more quickly and less painfully once they no longer have to re-type customer information several times and do not have to look up a customer's overall dossier in multiple computer systems.

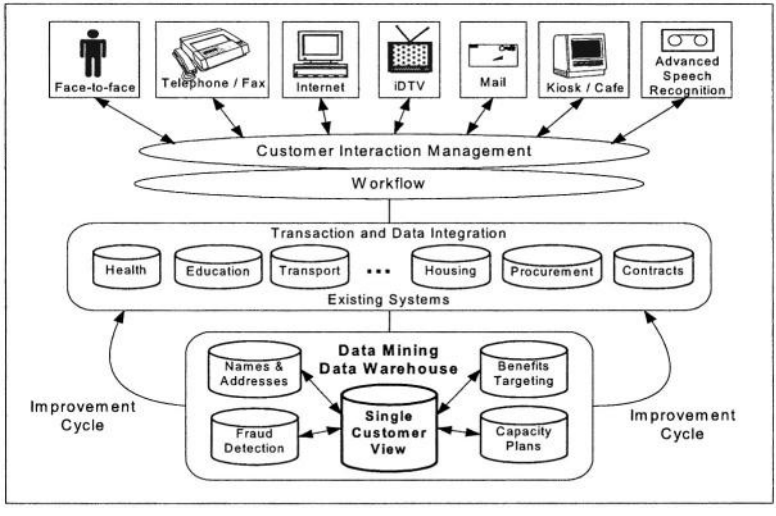

Fig. 1. CRM solutions: integration towards customers. Source: adapted from Detica [11].

CRM solutions can play an important role within the context shown in Figure 1, allowing government to track a customer through a number of interactions whatever is the channel of contact and also enabling the development of joined up services. The general view is that CRM puts systems in place at all customers' channels of interaction and combines all this data into one place in order to provide a single customer view and a consistent level of service across channels. Consequently, any time a customer is contacted, a department is able to see a customer snapshot. Since all data is in one place the thinking is that departments and agencies should be able to analyze it, discovering patterns and acquiring knowledge that allows proactive approaches [12].

Understanding the mechanisms of relationship with stakeholders allows a better definition of an organization's processes. Computer software that automate and track customer processes, as well as integrate these processes with back-office systems, are known as "workflow applications". This characteristic makes workflow products ideally situated to address the demands for CRM. Chambers et al [13] have conducted a comparative assessment of workflow products focusing on how well workflow vendors have adapted their technologies to provide CRM solutions. They recognized two main techniques with which workflow vendors began to provide workflow-enabled CRM solutions: providing tightly coupled workflow and CRM capabilities or offering workflow solutions that can be easily embedded in any CRM platform.

CRM implementation enables a series of different organizational capabilities. Looking at CRM initiatives that were already developed in the government context, it is possible to find out several cases in many different agencies and departments. The following examples offer some illustration of CRM applicability and potentialities:

a) The Swiss City of Biel has wanted to automate its business processes from end to end for improving the quality of public service. The administration has opted for developing a broad e-government project for improving citizens and businesses interaction. The system infrastructure includes a portal platform and a Web content management system. A CRM system component provides the link between the front and back office, allowing seamless integration linking Web-based forms to workflow and electronic records. The solution also integrates data from legacy and third party systems in order to build a unified system. As a result, they improved the level of local population, staff, and media positive feedback, as well as improved their productivity once the system has reduced staff workloads, enabling them to concentrate in other tasks [14].
b) The London Borough of Haringey has invested in a major restructuring project for improving access to local services, building services around individual needs, and maximizing efficiency. Adopting Call-Centre and CRM solutions the Council is creating an integrated, multi-channel, multi-agency system that allows employees to maintain a seamless, uninterrupted dialogue with customers. When a resident has an inquiry about a particular Council service, the resident can either visit the local service centre in person or communicate with the call centre by telephone, email, post, or fax. The whole solution provides an instant snapshot of which residents are using each service, allowing the Council measure which sections of society are under- or over-represented by the service [15].

5 Conclusion

CRM implementations have already started to come together with e-government initiatives. Shine [5] warns that CRM techniques and principles must be integrated into e-government implementations since the beginning, it is not a simply "add-on" technology that can be incorporated later.

The greatest challenge of implementing CRM systems is the integration of these technological resources across all sort of media and channels of interactions. Besides, the integration of CRM systems with back-office systems is a crucial point for successful implementations. Dean [12] comments that government agencies are already trying to tie together old existing technologies with new ones in order to move themselves into e-government. Such a concern is extremely important to preserve value of existing systems.

In spite of the crucial importance of the technologies involved in CRM initiatives, it is important to point out that the strategic aspects of CRM are as crucial as technology. Actually, the business perspective of CRM should be considered prior to the technological perspective [5]. Taking this approach into account, governments are more likely to succeed and harvest the great benefits of CRM adoption, which in the end reflects to the community in form of better public services and development of public policies actually craved by the society.

References

1. Harris, S.: Red Tape Carpet. Government Executive, September, Vol. 33, Issue 12, p48 (2001)
2. Neff, D. and Kvandal, S.: Connecting Citizens to Government Online. San Diego Business Journal, 6th April, Vol. 22, Issue 23, p14 (2001)
3. Starling, G.: Managing The Public Sector, Revised Edition, Homewood: The Dorsey Press, London (1982)
4. SPSS Executive Briefing: Making e-Government a Reality. White Paper EGOVWP-0700, www.spss.com (2000)
5. Shine, S.: Building Customer Relationship Management in Government. Accenture Insights, The Government Executive Series, January, Issue 6, www.accenture.com (2002)
6. Ling, R. and Yen, D.: Customer Relationship Management: an Analysis Framework and Implementation Strategies, Journal of Computer Information Systems, Spring, Vol. 41, Issue 3, p82 (2001)
7. McKendrick, J.: The Bottom Line on CRM: Know Thy Customer. ENT, 13rd December, Vol. 5, Issue 20, p40 (2000)
8. Silverman, R.: CRM Dichotomies. Intelligent Enterprise, May 24, V4, Issue 8, p90 (2001)
9. Elliot, M.: CRM Software: Old Hat or New Trick?. IIE Solutions, November, http://solutions.iienet.org (2000)
10. Goldenberg, B.: Barton Goldenberg's Advice: The Truth about Customer Relationship Management, May, www.crmcommunity.com (2002)
11. Detica: Making Citizen Relationship Management Work, White Paper, www.detica.com/publications (2001)
12. Dean, J.: E-government Evolves. Government Executive, November, Vol. 32, Issue 13, pS-3 (2000)
13. Chambers, B., Medina, R. and West, K.: Customer Relationship Management, The New Battlefield for Workflow. Document World, Boulder, Jul/Aug, Volume 4, Issue 4, p18 (1999)
14. SAP: SAP Customer Success Story – Public Sector, February, www.sap.com (2003)
15. Siebel: Siebel Customer Success Story – Government, February, www.siebel.com (2003)

Impact Analysis of Two World Custom Organization Technical Instruments – Customs Data Model and Unique Consignment Reference – On Customs Operations and Performance: Survey at 18 Customs Administrations

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Abstract. Information and documentation are central elements in the control of international cross-border trade and logistics, aiming for provision of necessary level of society, economy and revenue protection by the Customs administration and other border agencies and as well as acceptable border release times for the trade. Standardized data sets and electronic messages using international code standards are key for effective and efficient B2B, B2G, or G2G exchange and sharing of such information. Historically there is a major lack of global standards for cross-border trade business processes such as import, export or transit. This paper presents the results of the first survey study on potential impacts of two cross-border related technical instruments under development at the World Customs Organization – Customs Data Model and Unique Consignment Reference - on operations and performance at Customs administrations in 18 countries worldwide.

1 Introduction

The World Customs Organization (WCO) has the mandate to develop technical standards to facilitate cross-border trade business processes including import, export and transit. These standards include Customs Data Model (CDM) and Unique Consignment Reference (UCR). CDM contains a maximum set of standard and harmonized data requirements and standard electronic message formats to be submitted by trade for Customs and other regulatory purposes. UCR is aimed at providing an origin-destination reference key for all international consignments.

This paper presents the results of a survey study on potential impacts of CDM and UCR on operations and performance at Customs administrations in 18 countries. In November 2002, the Secretary General of WCO sent an invitation letter to 61 member Customs administrations, selected by the two authors to gain a broad coverage of

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different geographical, economical and cultural aspects within the WCO community of 162 member Customs administrations. Between February and April 2003, the first author of this paper conducted 15 phone interviews and 1 live interview, and received 2 written replies (in total 18 replies = 29.5% answer rate). The responses came from Customs administrations in 5 EU countries, in 6 other industrial countries, and in 7 developing / transition countries. All of the interviewed customs experts had at least some level of knowledge on CDM developments (56% had good or very good knowledge). UCR was less recognized within this group of experts.

2 Interview Template

Each of the interviewed Customs experts was sent an interview template in advance. The template had four sections, on (i) customs key performance indicators, (ii) CDM and (iii) UCR impacts on customs operations and performance, and (iv) anticipated implementation costs for CDM and UCR. In this paper, we focus on sections (ii) and (iii), that is CDM and UCR impacts on customs operations and performance. The following set of predefined potential impact areas were presented in the template, to facilitate the interviews in a highly uniform manner:

1. Transparency and predictability in customs rules, regulations and practices, including countrywide harmonization of regulations and practices.
2. Advance reporting / notifications from trade to customs and customs pre-arrival responses to trade
3. Audit-based control replacing / complementing transaction-based procedures.
4. Electronic protocols replacing or complementing paper-based protocols and procedures.
5. Advanced risk assessment and profiling methods replacing high degree of physical border checks, leading to high safety, and security standards.
6. Collection of customs duties on deferments accounts instead of payments up-on clearance.
7. Advanced trade-customs partnerships within the country, such as authorized trader-schemes, replacing standard, “one-size-fits-all”-approaches.
8. Advanced customs – other government agencies collaboration within the country, i.e. “single window filing”.
9. Trade region – specific harmonization and advanced international bi-lateral and multi-lateral customs-customs partnerships.

3 CDM and UCR Impacts

As a result of the interviews, we found that both instruments were perceived to have quite similar impacts on Customs operations and performance, as presented in table 3 below (three least important ones were omitted from the table).

Table 1. Survey results on CDM and UCR - six most important impacts areas on Customs operations and performance.

Impact area	CDM rank	UCR rank	CDM* index	UCR* index
Customs-customs partnerships	1.	2.	20	16
Risk assessment & profiling	2.	1.	12	14
Single window filing	3.	3.	10	9
Electronic protocols	4.	6.	8	9
Audit-based controls	5.	4.	6	5
Trade-customs partnerships	6.	5.	5	5

*Basic points for each reply: 0 = no impact; 1 = some impact; 2 = major impact; in total 18 replies, maximum 18 x 2 = 36 index points.

3.1 Customs-to-Customs Partnerships

The most important CDM impact, and second most important UCR impact, was considered to be facilitation of Customs-to-Customs (C2C) partnerships on bi-lateral and multilateral basis. By having these two instruments in place, the Customs administrations can efficiently share trade partner and transaction related information and data over the borders, including off-shore filing of customs declaration data. In addition, C2C partnerships are becoming increasingly important in the context of supply chain security, while they enable the Customs at import to start the risk management process already at the place of departure in the exporting country.

3.2 Risk Assessment and Profiling

The second most important CDM impact, and the most important UCR impact, was assessed to be the facilitation of Risk assessment and profiling activities. As part of C2C partnerships, risk management is an essential component, which needs to agreed upon between the parties involved. The CDM lays the foundation by establishing a common business language and database structure for creating the risk profiles, which can then be shared among the parties of the C2C partnership, therefore enhancing supply chain security. On national level CDM can also generate synergies between the various law enforcement agencies in one country for their respective systems for risk assessment.

3.3 Single Window Filing

The third most important CDM and UCR impact was considered to be facilitation of Single window filing environments. Single Window systems are regarded as single entry points where the trader gets the opportunity to provide all relevant regulatory information pertaining to an international transaction in one submission. The CDM supports such systems by providing a common regulatory data standard across multiple border agencies on national level. The UCR supports the exact identification of cargo and transactions at all border agencies by providing a common access key.

3.4 Other Impact Areas

The following three areas where considered to have lower level impacts related with CDM and UCR introductions:

- Electronic protocols: CDM helps to replace proprietary protocols and syntaxes and move to using international standards;
- Audit-based controls: CDM supports risk analysis and controls after release; CDM can reduce the number of different specialists doing the work; UCR also provides a detailed level tracking mechanism for audits;
- Trade-customs partnerships: UCR supports the concept of authorized traders.

4 Concerns and Critics on CDM and UCR

In addition, each of the interviewed Customs experts were asked to explain any concerns or critics they might have on these two technical instruments. The following four points were highlighted in several discussions:

- Complexities, high costs and long lead-times in practical implementations (both).
- Geographical variations and imbalances: smaller countries have very limited saying in defining these technical instruments (both instruments).
- Other Customs administration modernization and automation priorities may be more urgent (especially with CDM).
- Potential problems with data protection and confidentiality of commercially sensitive information (especially with UCR).

5 Conclusions and Discussions

This survey study has shown that there is a strong momentum behind the WCO Customs Data Model (CDM) and Unique Consignment Reference (UCR) initiatives on a worldwide basis. Both CDM and UCR are expected to have multiple positive impacts on customs operations and performance parameters, in particular by supporting Customs-to-Customs partnerships, Risk assessment and profiling, and Single window filing environments. Both CDM and UCR are also seen as critical aspects of the future Integrated supply chain security management programs.

There are also multiple challenges related to both technical instruments. Firstly, the level of awareness within the global customs community should still be increased, in particular with UCR. Secondly, the costs associated with implementations are likely to be significant, and therefore both quantifiable cost/benefit studies as well as direct capacity building support will be required to facilitate global implementation. Finally, the CDM and UCR interaction with trade and logistics companies needs to be highly promoted and lifted to new levels, in order to get these instruments into wide practical usage during the coming years.

Electronic Public Service Delivery: Exploring the Use of Focus Groups for Ex Ante Program Evaluation

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Abstract. This paper discusses the results of a research project that the Utrecht School of Governance of Utrecht University and a Dutch Ministry conducted in 2003 to know to what extent focus groups are a useful instrument to get insight into citizens' expectations related to electronic service delivery by municipalities and how the results of such ex ante program evaluation can be used to develop a citizen oriented policy in this field. We asked citizens for which service(s) delivered by their municipality they would like to use new media (such as e-mail) and for which ones they would rather prefer old media (such as a letter). The conceptual framework which Mayer & Greenwood (1980) developed for investigating a policy problem will be used to analyse the results of the focus group for ex ante program evaluation.

Introduction

EGOV 2003 argues that 'Seen from afar, e-Government looks like the perfect success story: yet there is another side as well. Although powerful and ambitious systems have been produced, users - intern and extern to the governmental realm - seem to be dissatisfied. (…) There is a challenge from critical questions arising about whether the systems we use are adequate and user-friendly. (…) What are the needs of users and how can e-services be designed to fit their needs and to bring benefit and comfort to them?' [6]

This paper explores the use of a tool which can be used to answer this question: focus groups. It discusses the results of a pilot case study in the field of electronic public service delivery. The Netherlands Ministry of the Interior and Kingdom Relations asked the Utrecht School of Governance of Utrecht University to conduct this empirical research at a municipality in 2003 to know to what extent focus groups are a useful instrument 1. to get insight into citizens' expectations related to electronic service delivery by municipalities and 2. whether the results of such ex ante program evaluation can be used to develop a citizen oriented policy in this field.

In its report Citizens as Partners published in 2001 the OECD suggests that 'New forms of representation and public participation are emerging in all countries. (...) Citizens are increasingly demanding greater transparency and accountability from their governments, and want greater public participation in shaping policies that affect their lives. Educated, well-informed citizens expect governments to take their views and knowledge into account when making decisions on their behalf. Engaging citizens in policy making allows governments to respond to these expectations and, at the

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same time, design better policies and improve their implementation.' [1] Though most people will agree that it is important to respond to citizens' expectations, it is not easy to know how to proceed to actively engage citizens in policy making.

Our contribution will therefore first discuss the possible use of focus groups as part of ex ante program evaluation for policy making related to electronic public service delivery (section 2). Then, in section 3 we present Mayer and Greenwood's conceptual framework [3] which can be used to understand the relationship between alternative courses of action and a policy objective, in this case a policy leading to citizen oriented electronic service delivery by municipalities. Section 4 presents the results of our case study at a municipality, Hengelo in the Netherlands. Finally, section 5 discusses the conditions for successful policy making related to citizen oriented electronic public service delivery.

Inviting Citizens to Participate in Focus Groups

If we really want to engage citizens in active participation ex post program evaluation is not sufficient. It is necessary to offer them the possibility to propose options for new policy. Such ex ante program evaluation recognises the capacity of citizens to discuss policy options with policy makers. The OECD argues that 'only a few OECD countries have begun to explore such approaches and experience to date is limited to a few pilot cases' [2].

Our pilot case is an example of such an exploration. We used focus groups as a tool to actively engage citizens in policy making. A focus group is a qualitative research method which uses group interviews to gather data in an effective way by focusing on a specific topic. Participants are invited to participate and to react to each others opinions which promotes a dynamic discussion and allows us to get a better understanding of their wishes: 'The comparative advantage of focus groups as an interview technique lies in their ability to observe interaction on a topic. Group discussions provide direct evidence about similarities and differences in the participants' opinions and experiences as opposed to reaching such conclusions from post hoc analyses of separate statements of each interviewee.' [5] Focus groups are an excellent opportunity for citizens to speak, to listen to their voices and discuss policy options with them.

We asked fifty citizens, present at a meeting organised by the social service department of Hengelo's municipality, to make a choice out of one of five workshops related to different aspects of service delivery. Nine of them (aged between 35 and 45, five women and 4 men) told us they wanted to participate in our workshop which focussed on electronic public service delivery. In this focus group we asked those citizens for which service(s) they would like to use new media and for which ones they would prefer the use of old media.

The focus group was prepared and conducted by a researcher from the Utrecht School of Governance of Utrecht University and a civil servant from Hengelo's municipality responsible for policy making related to electronic public service delivery. First, the civil servant explains the participating citizens that Hengelo would appreciate discussing the municipality's future policy in this field with them in this focus group. Accessible information and interaction between the municipality and its citizens are important key words. Then, the researcher explains the procedure which will be used in the focus group. Each citizen receives five yellow self-stick notes to be

stuck to one or more of the old or new media (phone, letter, fax, "face-to-face" communication, website, e-mail or an electronic information screen in the town hall) related to citizens' communicative goals 'getting information', 'asking questions', 'ordering forms' and 'sending forms', which are indicated on a white board. In this way they can make clear which medium/media they wish to use for which goal of service delivery by their municipality. After having done this they discuss their choices with each other and the civil servant.

Before we present the results of our pilot case study in sections 4 and 5, we present a conceptual framework which can be used to get insight into the conditions leading to citizen oriented electronic public service delivery.

A Conceptual Framework of Policy Making

In this section we present the conceptual framework which Mayer and Greenwood [3] developed for investigating a policy problem. The heart of their conceptual framework is the relationship between the alternative courses of action (the independent variable) and a policy objective (the dependant variable):

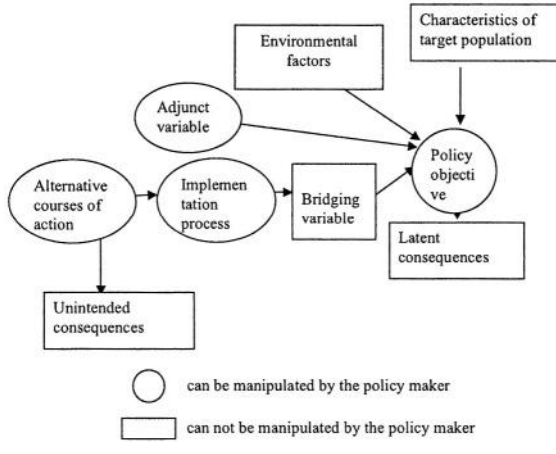

Fig. 1. Conceptual framework of policy making.

Mayer and Greenwood (1980: 125) distinguish between two intervening variables:

> 'implementation variables: specific administrative strategies adopted to carry out the policy or program; as such they are distinct from the substance of the program. (…)
> bridging variables: intermediate outcomes that must occur as prerequisites to the attainment of the policy objective. (…)
> The difference between an implementation variable and a bridging variable lies in the fact that the policy maker can presumably manipulate the first but not the second. Thus an implementation variable may be thought of as an action to which the policy maker can resort to achieve the policy objective, whereas a bridging variable is an attitude or behaviour necessary to attaining

> the policy objective but beyond the policy maker's direct control. Understanding the success or failure of policy may hinge on the decision maker's awareness.'

Then, they explain that adjunct and constraint variables as factors influencing the policy process (1980: 127):

> 'An adjunct variable refers to any auxiliary action the policy maker might take to enhance the effectiveness of the adopted policy or program. It might be thought of as a supplementary policy or program. Because an adjunct variable can be instituted independently of the alternative courses of action, it should not be considered just another alternative. (…) A constraint variable represents any factor influencing the policy process over which the decision maker has no control. Constraint variables may be of two types; *environmental factors* or *characteristics of the target population.* (…)'

The final type of variable which they present is the side effect, or secondary effect, of policy (1980: 128):

> 'When the side effect flows directly from the fact that a course of action has been taken (the independent variable), it will be considered as an *unintended consequence* of the policy. (…) When the side effect flows directly from the fact that the policy objective has been achieved (the dependant variable), it will be considered as a *latent consequence* of policy.'

Mayer and Greenwood focus on *policy makers* and use their framework for *ex post* program evaluation. In our opinion it is possible to use it also for *ex ante* program evaluation, conducted by *policy makers and citizens.* It enables to get insight into which conditions have to be fulfilled in order to implement a policy leading to citizen oriented electronic service delivery by municipalities. In our pilot case study the alternative courses of action refer to citizen oriented electronic public service delivery and the policy objective is to improve electronic service delivery by municipalities. In section 5 we will interpret the results of this case study - presented in the next section - by using Mayer and Greenwood's framework.

Case Study at the Social Service Department of the Municipality of Hengelo

Hengelo is a town in the eastern part of the Netherlands. As explained in section 2 we used a focus group to ask nine citizens for which service(s) they would like to use new media and for which ones they would rather prefer old media for the communication with their municipality. Most citizens prefer using a website if they want to get information. They have a preference for "face-to-face" communication if they want to ask questions. Letters and websites are favourable media for ordering forms, and websites for sending forms. This shows that citizens do not always prefer using new media. It depends on the communication goal whether a new or an old medium is favoured. Finally the following interesting remarks were made:

1. The citizens asked the civil servant if the municipality could give financial support (PC, phone costs) to poorer citizens.
2. They also wanted to know whether the municipality could support citizens, for example older people, needing a training in using websites and e-mail.

3. More PC facilities in libraries to guarantee access for those who do not have a PC at home, is a wish some citizens express.
4. The citizens explicitly asked the civil servant to guarantee that their municipality will not substitute old media by new ones. They prefer having the opportunity to make a choice between new and old media.

The civil servant promises that both old and new media will be used in the future by the municipality to communicate with its citizens and that the other three questions will also be part of the future municipality's policy related to electronic public service delivery.

Citizen Oriented Electronic Public Service Delivery: Conditions for Successful Policy Making

The wish of the Netherlands Ministry of the Interior and Kingdom Relations to conduct a pilot case study at a municipality to get insight into citizens' expectations related to electronic service delivery by municipalities and to see if the results of such ex ante program evaluation can be used to develop a citizen oriented policy in this field was not easy to fulfil. Almost all municipalities we asked did not have time to participate or their citizens did not want to participate in focus groups. The municipality of Hengelo was an exception. The Social Service department of this town organises regularly different meetings with its citizens. As explained in section 2 we used one of those meetings to offer a focus group as a workshop to the citizens which allowed us to know their expectations related to electronic public service delivery.

In our opinion focus groups can only be used by municipalities which already discuss policy options with their citizens on a regular basis. If this it not the case the whole concept of "e-government", and specifically that of "citizen oriented electronic public service delivery" will appear to be what McGee calls an "ideograph": 'an ordinary language term found in political discourse. It is a high-order abstraction representing collective commitment to a particular but equivocal and ill-defined normative goal.' [4] (see also [8]) If, however, the use of focus groups is imbedded in a practice of continuous dialogue between the municipality and its citizens, it can be used as a tool to understand citizens' expectations related to electronic public service delivery. Acting in his way minimises the risk of devaluing the fruitful concept of "e-government" to a useless "ideograph".

Finally, we will show how Mayer and Greenwood's conceptual framework which we discussed in section 3 can be used by municipalities as input for new policy in the field of electronic public service delivery. In the pilot case study *the alternative courses of action* refer to citizen oriented electronic public service delivery and *the policy objective* is to improve electronic service delivery by municipalities. Investigating citizens' expectations regarding the use of electronic public services can be considered as *implementation variable.* Citizens being able to use a PC can be seen as *a bridging variable.* The results show that citizens fear that old media will be substituted by new ones, this can be considered as *a latent consequence,* which has to avoided according to them. *Unintended consequences* are not mentioned by the citizens, but what could happen is that civil servants who are going to answer more and more questions by e-mail and less and less by phone, will formulate their answers more vaguely because in case of difficulties citizens could use e-mails to prove what has been promised. An example of *a constraint variable* to be taken into account is

that people who do not have a PC at home and therefore do not have access to websites and e-mail *(an environmental factor),* which could be to be solved by offering PC's in libraries *(an adjunct variable).* Older people's possible lack of knowledge of websites and e-mail use is another type of *constraint variable (characteristics of target population)* to be taken into account, and training facilities to learn to use a website and e-mail are an example of another *adjunct variable.*

Our pilot case study shows that ex ante program evaluation in the field of electronic public service delivery offers interesting possibilities. More empirical qualitative and quantitative research is necessary to develop and implement a real citizen oriented policy in this field. Conducting focus groups as described in our paper and using Mayer and Greenwood's conceptual framework for the interpretation of the results are useful tools to travel the road of excellence. Those who travel this road 'will be rewarded, when they closely perceive the impending e-transformation of society; for them the journey might become an overwhelming experience.' [7]

References

1. OECD 2001 "Citizens as Partners: Information, Consultation and Public Participation in
2. Policy-making", p. 9-12
3. Mayer, R.R., Greenwood, E., The Design of Social Policy Research, 1980, Englewood, Cliffs, New Jersey: Prentice-Hall.
4. Mcgee, M.C., "The ideograph": A Link Between Rhetoric and Ideology, in: The Quarterly Journal of Speech 66: 1980, pp. 1-16.
5. Morgan, D. Focus Groups as Qualitative Research, 1997, Thousand Oaks, California, Sage, p.10.
6. Traunmüller, R.,Wimmer, M.A., E-Government at a Decisive Moment: Sketching a Roadmap to Excellence, in: EGOV 2003, LNCS 2379, pp. 1, 3 and 14.
7. Wilde, R. DE, De voorspellers. Een kritiek op de toekomstindustrie, 2000, Amsterdam: De Balie, pp. 128-132.

An e-Government Interface for the Director-General – Or: How to Support Decision Makers with an Electronic Chief Secretary?

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Abstract. The present focus of e-government on one-stop shop applications is justified as a medium goal but does not take into account the importance of proper interfaces for decision makers. More and more information has to be assessed and approved by decision makers where instruments of easy access, selection, structured representation and data analysis are still missing. The support provided by the chief secretary has to be (partly) supplemented by a new decision-making interface. This paper contains a sketchy analysis of this need and gives directions for future research. Main elements of such *electronic assistants* are the index and related support features, a structured knowledge representation and data mining. Such specified interfaces may greatly improve the acceptance of the new IT environment for decision makers.

1 Introduction

e-government applications are rather complex because of the requirements of the legal system (public function, interaction with citizens, human rights, procedural rights etc.) and the highly structured and distributed way of public administration. An urgent need for a model-based transformation of public services has been noticed [7, 12, 13] in order to support a smooth change from traditional to electronic applications.

Business Process Management (BPM) comprises as a generic term Business Process Reengineering (BPR), Quality Management or Implementation of Workflow Management Systems [8], all endeavours concerning organisational processes. For public administration, a good definition of business processes may be: "A business process is a bundle of activities, where one or more different inputs are needed and that produces a valuable result for the customer." [3] The main focus is on the *bundle of activities* required for achieving a *certain result* in an *efficient process* minimising *required resources.*

In implementing the ADOamt project, *Wimmer* [6] has described the way of implementation: designing and optimising the process models of public administration based on a tailor-made modelling of a business process management tool.

The complexity of this process may require the focus on the modelling and implementing of existing government process models. The main purpose of providing on-line government justifies this goal. The existing process models have to be extended to include on-line transactions of the citizens. This orientation on the client – the citi-

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zen – and the structuring according to live situations/business situations requires a more complex process model with co-operation between the various authorities and functionalities for citizen guidance and authentication [10, 12]. The term *one-stop shop* describes quite fine this aim.

If this task is achieved, it is without saying that the main work is done. The citizen should have priority. However, in order to achieve a high acceptance in the back office but also higher efficiency for decision makers, some improvements are necessary. What is missing is the necessary abstraction of the process and the knowledge management for decision makers.

This can be also described as a problem of interoperability. The pressing need for interoperability of the high number of different legacy applications may put a veil on the other end of this challenge: interoperability with all users of the systems. Without question, the process models focus on the needs of administrators etc., but special users have their own needs. The process models suits quite well all important needs of public administration, beginning with the various submissions and letters of citizens and ending with the archiving of decisions respecting all procedural rights. All involved civil servants have to know the whole process and have to contribute their part for finishing the case. Time is scare but still available for these tasks.

However, decision makers have no time to follow the whole process model. The high number of decisions to be done based on dynamically selected insufficient information puts the pressure not on working process models but also on time, efficiency and support. The present process models seem to have severe deficiencies in this respect. Public administration is well known for decision making by a quite high number of people – decision makers and controllers in the various process models in e-government (e.g. prime ministers and their cabinet members, general directors, directors, head of units, head of sections, auditors etc.). This aspect may also reflect some lack of focus on back office efficiency that is overshadowed by the focus on one-stop government. In the literature, this aspect is hardly represented. Only in one article, in a quite small reference, is mentioned the poor support for officials or agencies in their way to organise or redirect processes according to situated needs [5].

At present, no developed process model or application can be provided so far. The purpose of this contribution is to give some directions for further research in giving a sketchy model.

The remainder of this article is organised as follows: Section 2 deals with the interface, section 2.1 with the improved index, section 2.2 with knowledge representation aspects, section 2.3 with data mining and section 3 with conclusions and future research.

2 An Interface for Decision Makers

In general, decision makers have no special needs in comparison to the standard IT environment in e-government. The main difference is the very high number of documents to be retrieved, read, summarized and approved. Even if time for retrieving and representing a document may be measured in seconds, the very high multiplicator for decision makers requires a profound consideration. Any second may be multiplicated by a factor of 20000 (200 working days, about 100 documents a day), e.g. one saved second means a time saved of about 5 hours and 33 minutes per year. The IT environment reduces the number of *screens* on a working table from about 15 (in this

count, every paper or monitor is calculated as one screen) to only one. The standard presentation of various documents as one front and several back screens is a working solution but a time consuming one. Building-up this environment takes much time. The same is true for changing between the various screens. Before, the various papers and files were distributed on the working table. Now, they appear as a high stack of papers without proper personal organisation. This move from a horizontal distribution to a vertical concentration of papers is a major disadvantage of state-of-the-art IT environments for all big knowledge workers on electronic documents but in particular for decision makers.

As a first step, the very best equipment of IT that is available at a good cost-price relationship may help to improve this situation. However, the limits of existing IT are very pressing. Standard monitors (even 19" monitors) are too small to look at various documents at the same time and any change of representation takes some time. Even in the very best environment, only two documents may be presented at the same time. This represents a huge deterioration if one may compare with the 15 (or more) screens on a standard working table. At the moment, no technology allows to provide a full substitute for a writing table with its various files. This would require a screen of the size of a big writing table representing the various files in the same manner as on a writing table. Besides for overcoming the still too low resolution of monitors for reading, the printing of documents provides a necessary substitute for this unsolved question.

As a start for improvement, at least three monitors should be available: one for daily business like e-mail, internet access, notes etc., the second one for structured information on the various process models and the third one for checking the documents or using analysis models. Various print-outs are still necessary for better reading and organisation but this may be done also in an automated process.

2.1 Index and Support Features

Time is a decisive element for decision makers. Due to the various pressures from customers, authorities, employees, etc., time has to be allocated according to strict criteria. Decisions can be delegated but performance of the decision makers has still to be controlled. Anyhow, important decisions have to be done by the decision maker. Therefore, all available options for saving time are important. This focus on time saving is shown in the highly developed support in traditional office environments. Documents and files are presented for signature in a highly structured manner taking much time of administrators and secretaries to prepare but saving precious time of the decision maker.

It should be the same in an electronic environment. Decision makers should not bother with opening of files or applications. All required information should be properly presented for decision and (electronic) signature. At the moment, decision makers have very often to take additional steps themselves in order to achieve the same level of information and presentation as provided by the conventional environment. Secretaries are often excluded from support due to security reasons.

Therefore, a structured but also personalised index for presentation of the various files has to be included in all applications. The main element of this programme is the index. As support, all files and documents required for decisions are opened and properly presented. The index is a structured representation of the decision making

process allowing a detailed scrutiny of the file but also a very summary handling, e.g. only looking to the document to be signed. Speeding up of signing can be done in allowing *block decisions.* Similar decisions should be clustered together for a joint decision slot (e.g. all approvals for travel or going to external courses). It is important that this index can be easily adapted according to the needs of the user. After finishing the decision process, the support element of the index will take care of closing all files and transmitting the required documents to others.

2.2 Structured Knowledge Representation for Decision Makers

The structured knowledge improves greatly the index of the decision process. Using existing structures of relational databases or of XML documents, this knowledge supports a very specific presentation of the required information for the decision maker. This support may also include the use of ontologies that allows linking properly various sources of relevant knowledge in a very efficient way [2].

The tool should allow a personalised structured knowledge representation that can be changed easily according to daily needs by the decision maker. Such a support would take into account that decision makers have to be very selective in choosing their knowledge needs in order to take good decisions.

A summary document of the various documents may best describe this information. It includes structured information (parties, file number, matter, responsible civil servant, etc.) but also very selective parts of the document to be signed or extracts from the file. Starting with this file, decision makers should be quite free to choose the required level for decision making, e.g. reading only this very abstract information, browsing through the document or reading the whole documentation. Electronic environments can add to the convenience of paper environments. Access to documents is much easier, and the structuring can be changed easily. This would allow the decision maker to focus his scrutiny on difficult and problematic cases.

In addition to that, the structured knowledge presentation includes in-depth analysis of the various files but also presents additional knowledge from internal and external sources. This allows the decision maker to take into account a much broader context and check appropriate information.

2.3 Data Mining - Unstructured Knowledge Representation for Decision Makers

Decision makers are also affected by the Storage Law. This – in comparison to Moore's Law – far less familiar law says that the capacity of digital data storage worldwide has doubled (and will double) every nine month for at least a decade. Now, the ability to capture and store data has far outpaced man's ability to utilise it according to his needs. Data tombs (or data stores) are created and maintained that are very often never accessed again [1]. Data mining – the task of reducing data in order to explore, analyse and understand it – focuses on this aspect. Data mining is the identification of interesting structure in data [4, 9, 11]. Data should be explored for organisations and users in an easy, convenient and practical way. Structure means patterns, statistical or predictive models of the data, and relationships among parts of the data.

The task of data mining for decision makers focuses on a different aspect than general data mining. In the latter, patterns as subsets of the data or models of the entire data set are the main task. In the former, the aimed structure is very personalised and dynamic. The data set is already pre-selected according to the agreed decision processes but the data may be regularly checked for consistency between the pre-selected data and the data stores of the authority.

The goals of data mining for decision makers fall into two categories: automatic search and finding patterns and models. Automatic search is tedious and data-intensive search according to certain algorithms. Finding patterns and models concerns searches for particular words, text patterns or data in the various documents and summarizing this information in a particular model. Accuracy and reliability are important additional information for quality assessment.

The data mining model for a decision maker consist of a very easy adaptable knowledge base including the data for automatic search and finding patterns and models. Some algorithms may support the task. The decision maker can also adapt the presentation of the data. In practice, the submitted files are checked for particular words, phrases, text patterns but also situations (e.g. particular party, subject, money involved, aspects of sensibility etc.). The results are presented in addition to the index, the summary structured information and the file. If the aim is achieved, decision makers may easily select important and sensible files requiring more scrutiny. In a more developed environment, the application of production rules for semi-automation of decision making may be a further improvement. A small knowledge base with very specific data for decision purposes may be maintained but also updated when decisions are taken.

3 Conclusions and Future Work

The present focus of e-government on one-stop shop applications is justified as a medium goal but does not take into account the importance of more efficient interfaces for decision makers.

Such *electronic assistants* for decision makers have to be provided by all applications in the future. The presented, only sketchy concept of such assistants focuses on the main elements: an improved IT environment, an index for decision makers, a structured knowledge representation and data mining. Such specified interfaces may greatly improve the acceptance of the new IT environment for decision makers.

Future work should include the development of additional interfaces for decision makers based on the model of such an electronic assistant. Research on structured knowledge presentation and data mining may also include more focus on the specific needs of decision making situations that can be later included in such interfaces.

References

1. Fayyad, U. and Uthurusamy, R.: Evolving Data Mining into Solutions for Insights, Introduction. CACM 8 (2002)
2. Breuker, J. et al.: Ontologies for Legal Information Serving and Knowledge Management. In: Proceedings JURIX (2002)

3. Hammer, M. and Campy, J.: Business Reengineering: die Radikalkur für das Unternehmen. 2nd edition, Campus, Frankfurt (1994)
4. Han, J. and Kamber, M.: Data Mining: Concepts and Techniques. Morgan Kaufmann Publishers, San Francisco (2000)
5. Klischewski, R. and Lenk, K.: Understanding and Modelling Flexibility in Administrative Processes. In: R. Traunmüller and K. Lenk (Eds.). Electronic Government, Proceedings First International Conference EGOV 2002. Springer, Berlin (2002)
6. Krenner, J. and Wimmer, M.A.: Prozessmodellierung in der Öffentlichen Verwaltung: Erste Ergebnisse aus dem FFF-Projekt ADOamt. In: E. Schweighofer et al. (Hrsg.), Zwischen Rechtstheorie and e-Government, Aktuelle Fragen der Rechtsinformatik 2003. Verlag Österreich, Wien (2003)
7. Palkovits, S. and Wimmer, M.A.: Processes in E-Government – A Holistic Framework for Modelling Electronic Public Services. In: R. Traunmüller (Eds.). Electronic Government, Proceedings Second International Conference EGOV 2003. Springer, Berlin (2003)
8. Pook, K. and Starkloof, P.: Geschäftsprozesse und Wissensmanagement – vom Umgang mit erfolgskritischem Fachwissen. Praxis Wissensmanagement 4 (2001)
9. Schweighofer, E.: Legal Knowledge Representation, Automatic Text Analysis in Public International and European Law. Kluwer Law International, Law and Electronic Commerce, Volume 7, The Hague (1999)
10. Traunmüller, R. and Wimmer, M.A.: E-Government at a Decisive Moment: Sketching a Roadmap to Excellence. In: R. Traunmüller (Eds.). Electronic Government, Proceedings Second International Conference EGOV 2003. Springer, Berlin (2003)
11. Tukey, J.: Exploratory Data Analysis. Addison-Wesley, Reading, MA (1977)
12. Wimmer, M. A. And Traunmüller, R.: Geschäftsprozessmodellierung im Bereich E-Government: Eine Zwischenbilanz. In: E. Schweighofer et al. (Hrsg.), IT in Recht und Staat, Aktuelle Fragen der Rechtsinformatik 2002. Verlag Österreich, Wien (2002)
13. Wimmer, M.: Online Services für one-stop Government: Prozessmodellierung, in: E. Schweighofer et al. (Hrsg.), IT in Recht und Staat, Aktuelle Fragen der Rechtsinformatik 2002. Verlag Österreich, Wien (2002)

Presentation Strategy of Data Analysis and Knowledge for Web-Based Decision Support in Sustainable Urban Development

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Abstract. The need to measure and evaluate urban development has led to the development of numerous social-economic indicators. However, depending upon the large set of indicators, we find difficulties in interpreting the progress and often reach different conclusions regarding economic and social development of towns and evaluating the sustainability. The aim of the research reported in this paper was to develop the research methods and analysis tools for assessing and implementing the goals of sustainable urban development, including the presentation of information needed for decision making in the Internet. The research presented in this paper uses factor and cluster analysis methods to generate a set of underlying attributes (factors) that capture the sustainable urban development. Based upon the factor scores of systems', the study finds the towns with similar characteristics (clusters). We demonstrate an application of the model using a database of economic and social development of towns in Lithuania.

1 Introduction

Description of urban development could be explained like common endeavours of society to coordinate economical growth and social progress, to save usage of non-renewable resources without threat of ecological balance. This process consists of four main elements: health environment, lively economics, social welfare and active community of a city or region [9]. Seeking to achieve sustainable urban development in Lithuania, planners usually face with the underlying problems as follows:

- municipalities don't possess land proprietary rights;
- the majority of Lithuanian towns haven't prepared any strategic or general plans for town development that should correspond to the conditions of market economy as well as the principles of sustainable development;
- new territories are being reclaimed for constructions, while social, technical and communicational infrastructure lag behind hopelessly;
- the majority of construction objects are being built within a very long time period and this necessarily causes the high price for buildings;
- the work quality of public transport is getting worse. [7]

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These problems goes together with the consequences that impact on social life of the town when some of the town's districts degrade, while other economical processes lead the cities towards stagnation and they become unattractive for investments. Some depression regions emerge even regarding the territory of Lithuania. In addition, EU directives constantly highlight the importance of the regions and their equal development. During the last decade, however, uneven development was on the increase [3].

Uneven distribution of quality of life is a possible reason for citizens' misbehaviour that makes difficulties seeking to change their current situation. Sustainability, however, should be separated from both quality of life and fulfilment of the main needs [6]. On the other hand, such a luxurious alternative can not continue for a long time without any effort of town's community. Moreover, the priorities of the development lay in environment humanisation and it requires more sustainable lifestyle. Decision-makers get information about specific issues and it facilitates the decision making process. Local Government institutions are the main users of GIS (geographic information system) and databases of these institutions are connected to it. Therefore, it enables to analyze the spatial information and supports the decision-making for urban and regional development [8].

2 The Knowledge Representation Methodology

The refinement and presenting of knowledge, trends, and patterns within the data is one of the essential conditions for assessing and implementing the goals of sustainable urban development, social control, and development strategy. In describing the socio-economic situation, a great volume of initial data and indicators are used that characterize the development of a process, therefore it is very important to select the most significant of them and to consider a small amount of indicators or their groups.

The knowledge representation process may be performed by special methods of artificial intelligence [1, 3]. The knowledge that helps us to abstract and present the data and information about the current situation and to have a possibility of prognosis, apply the methods of decisions and development of advising systems is of particular importance. The process of dynamic structures recognition can be arranged in the following order:

(a) Observation objects of interest (towns, regions, districts, etc.) are selected, i.e., a sample $O = (o_1, o_2, \ldots, o_N)$. The object of a data set is a unit of data whose features are to be investigated. The objects have respective features (or indicators) $X = (x_1, x_2, \ldots, x_n)$ that describe their attributes. These features are measured within particular time intervals (ranges, e.g., a year interval), $\Delta t = (\Delta t_1, \Delta t_2, \ldots, \Delta t_k)$.

(b) In order to explain system performance the factor analysis is applied in reducing the number of variables and for detecting a structure in the relationships between the variables.

(c) Thereafter the factors are defined and the number of variables is reduced the observed objects should be organized into meaningful structures. For this purpose the cluster analysis algorithms have to be applied.

3 Estimation Results

The economic and social development of Lithuania presented by the Department of Statistics of Lithuania was the data source of this study. These data provide social, economic, environment, cultural characteristics for each Lithuanian town and county. The data for this analysis include 35 registered indicators in 12 Lithuanian towns: Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Alytus, Marijampolė, Palanga, Druskininkai, Birštonas, Neringa and Visaginas in 1998 – 2001 [5]. We consider the matrix denotes as $X[n \times N]$. The matrix elements x_{ij} illustrate the value of the j^{th} indicator at the i^{th} research object and have particular values and semantics: $x_{i,1}$ – registered crimes, $x_{i,2}$– average annual number of employed, $x_{i,3}$– unemployment rate, etc., where $i=1,2...35$.

The core objective of the research was to estimate and present the current situation and predict the tendencies for even distribution of the quality of life in Lithuanian towns. The factor and component analysis are used for this purpose. The first step in the factor analysis is extracting an initial meaningful number of factors. The number of factors to be extracted can be determined in a scree plot [4]. After identifying three potential factors, indicators with low communalities were excluded from further analysis. The next logical step is to determine the method of rotation. *Varimax* method was selected as providing the simplest structure solution.

When the rotation method is applied, one part of the output from the factor analysis is a matrix of factor loadings. The KMO measure of these variables KMO=0.68, thus, we conclude that the data are adequate to the factorial analysis.

3.1 Interpretation of Factors

The meaning of the rotated factors is inferred from the variables significantly loaded on their factors. A decision needs to be made regarding what constitutes a significant loading. In general, the larger the absolute size of the factor loading for a variable, the more important the variable is in interpreting the factor.

As we can see from analysis results, the most significant variables for the first factor are: the population, average monthly gross earnings, number of physicians, direct foreign investment, sales of industrial production, turnover of retail trade and catering mill.

We may state that the first factor measures the growth of economy and improving life conditions of population. The greatest impact on this factor is made by the variables such as *sales of industrial production* (*L=0.873*), *turnover of catering (L=0.733),* that reflect the increasing retail trade, *direct foreign investment* (*L=0.851*) which indicates the increasing influence of foreign investment.

The second factor reflects the significance of both cultural life and tourism and consists of five indicators.

The third factor is constituted of three variables and may be considered as reflecting the ecological situation and human impact on the environment in the towns.

Having computed the regression estimates of factor scores, the data were partitioned by separate years and their common diagram drawn. The aim of this diagram is to assign one factor score to each investigated town and to evaluate the development of each town in three stated areas.

It is apparent in Fig. 1 that the concentration of economy in Lithuanian towns mentioned above are distributed unevenly. Comparing the models created for the year 1998 and 2001, we can notice that this uneven distribution of economy is increasing. The best economic situation is in Vilnius - the capital city of Lithuania. The tendency of higher development in the biggest towns - Vilnius, Klaipėda, Kaunas disagrees with the attitudes of sustainable development, where the main objective is to improve quality of life all over the country not excluding separate territories.

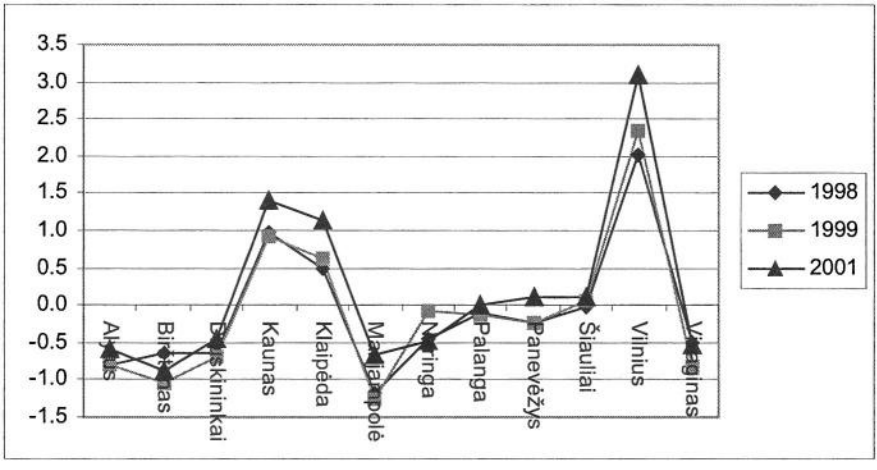

Fig. 1. Factor scores of Lithuanian towns in 1998, 1999, and 2001 for the first factor.

The results of factor scores for the second factor show that tourism and cultural life is the most significant areas for the resorts – Palanga, Neringa, Birštonas and Druskininkai. To compare the data of 1998/99 and 2001 we can state that the perspectives of tourism and cultural life development in Lithuanian towns are rather positive.

4 Hierarchical Cluster Analysis

Another way for urban development presentation is to identify relatively homogeneous groups of towns based on selected characteristics. For this purpose the methods of cluster analysis can be applied. In the case when a large number of variables are used for cluster analysis, it is recommended to reduce the number of variables before starting cluster analysis procedure [2]. We will use the indicators that are significantly loaded on the factors for the regions classification.

Having selected the most significant variables for the factors, the agglomerative hierarchical cluster analysis was performed. Agglomerative hierarchical clustering helped to determine the number of clusters. Applying this procedure the optimal number of clusters - three clusters were determined. After division of the regions into three clusters, we can see the following cluster membership for the first factor (Fig.2).

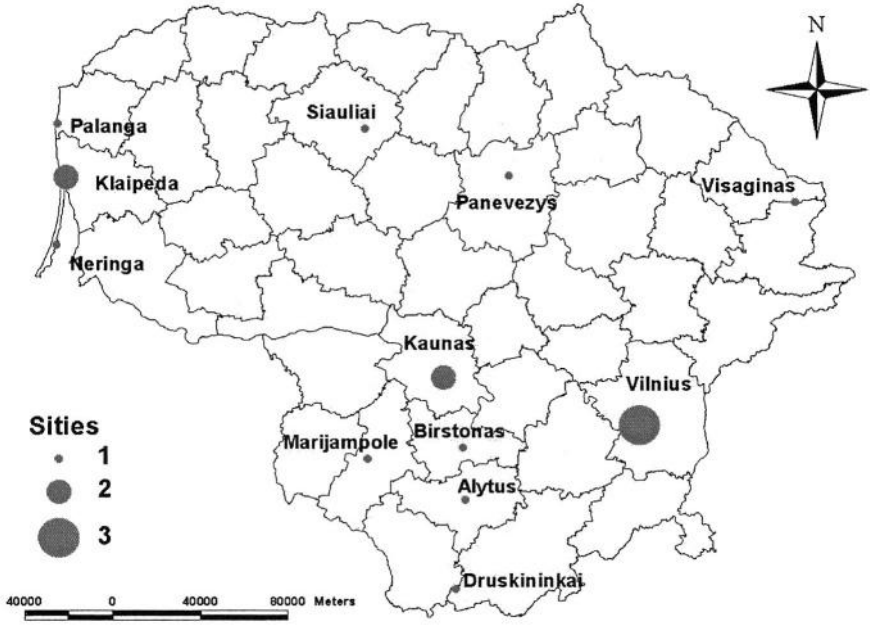

Fig. 2. Rank of the towns in 2001 for the first factor.

Comparing the results, received using the methods of factor and cluster analysis, we can conclude that the information presented by the means of factor scores (Fig. 2) is very compressed. In one diagram we can present a development of group of towns during the same period. The diagrams, presented by the means of GIS are more spectacular and apparent, but the amount of information presented is much smaller. The situation of one year can be presented in one diagram.

5 Conclusions

The objective of the research was to generate a set of underlying attributes (factors) that capture the development and evaluation potency of the cities and regions and to find the most suitable method for presenting this information. Factor analysis techniques enabled us to reduce the number of measured indicators from 35 to 16. Consistent with the findings of other studies, the factor analysis method identified three important latent factors, reflecting 1) the growth of economy and improving life conditions; 2) cultural life and tourism, 3) ecological situation and human impact on the environment in the towns.

Using the factor scores to rank the development of towns, we found that the growth of economy tend to concentrate in separate towns and determine their perspective development. This tendency disagrees with the attitudes of sustainable development, which carry the main objective to improve quality of life all over the country not excluding separate territories.

The diagrams established by the method of agglomerative hierarchical clustering and presented by the means of GIS are more spectacular and apparent, but the amount of information presented is much smaller and more purposeful. The required information on some particular country or towns is gathered and put into the database, which should be placed on the Internet. Decision-makers get information about specific issues and it facilitates the decision making process. Local Government institutions are the main users of GIS (geographic information system) and databases of these institutions are connected to it. Therefore, it enables to analyze the spatial information and supports the decision-making for urban and regional development.

References

1. Berndt E.R.: The practice of econometrics. Classic and contemporary. Reading, MA: Addison-Wesley (1990)
2. Bühl A. and Zöfel P.: SPSS Version 10. Einführung in die moderne Dateanalyse uner Widows. München, Addison-Wesley (2000)
3. Burinskiene, M., Rudzkiene, V.: Multiple Regression Analysis for Recognition of Significant Factors for Sustainable Development strategies. International Journal of Strategic Property Management. Vol.7, No3, (2003) 144-153.
4. Cattell R.B.: The scree test for the number of factors. Multivariate Behavior Research 1: (1966) 245-276.
5. Counties of Lithuania: Economic and Social development. Department of Statistics of Lithuania Vilnius (2002)
6. Danilov–Daniljan, V.I., Losev K.S.: Ecological Challenge and sustainable development, 416. Moscow, Progress–Tradition, (In Russian) (2000)
7. Juškevicius P, Vitkauskas A.: Urban development in Lithuania, Town planning and architecture Nr. 2(25) (2001) 55-61p. (In Lithuanian)
8. A.Kaklauskas, E.Zavadskas.: Web-based decision support Vilnius, Technika (2002) 110-201 (In Lithuanian)
9. Schmidt-Thome Kaisa, Bengs Christer.: ESDP and Spatial Planning and development in the Baltic Countries. Stockholm, Nordregio, 89. Nordregio Report 1999:2 (1999)

What Have We Learned from the TANGO Arena for Regional Cooperation Around e-Government in Southern Sweden?

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Abstract. The TANGO e-government arena is a project in Southern Sweden, funded by the Innovative Actions of the European Regional Development Fund. The project is now nearing its end, and we are thus at the stage of reflectively reviewing what has actually been accomplished and how this relates to the original goals of the project. In July 2002, when the project began, the aim was to establish cooperation between the public sector, private enterprise and university-based research in designing public e-services. In cooperating around development of new, integrated services, catering to various categories of users as well as to a growing diversity of mobile technologies, we have aimed towards establishing feedback channels between practice and theory, between use and design, and between different academic disciplines where we see a need to synchronize the models and methods we work with. Our research questions have focused on exploring and managing multi-perspectivity as a resource for design. In this paper we look at how we organized our cooperation around these goals, and attempt to address those basic summing-up-the-project questions; How well have we succeeded? What have we learned in the process?

1 Introduction

This is a work-in-progress paper about our experiences of interdisciplinary and inter-organizational cooperation in developing a regional arena for research and development in the area of e-government. The authors are involved in research and teaching at two different departments at Blekinge Institute of Technology (BIT), a university in Southern Sweden with a profile in applied IT. There have been other researchers, and other departments at BIT, involved in developing the e-government arena; all together we represent seven different scientific disciplines: business administration, telecommunications, computer science, techno-science, informatics and human work science, and spatial planning.

Although we represent different research traditions and approaches, we share the belief that it is crucial for design and development of technology to be grounded in an understanding of *actual, everyday use of technology.* In cooperating within the arena for e-government around design and development of new public services, many of

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them integrated and catering to various categories of users as well as to a growing diversity of mobile technologies, we have aimed towards establishing long-term mutual feedback channels between practice and theory, between use and design, and between different academic disciplines, where we see a growing need to synchronize the models and methods we work with. [1]

Our shared research questions are, given this background, pragmatic but not trivial; we have been focusing on exploring and managing multi-perspectivity as a resource for design of e-government. In this paper, which is partly based on an article presented at the EGOV03 conference in Prague in September 2003, [2] we briefly describe how we have organized our cooperation, some of the dimensions of multi-perspectivity that we have been working with, and how we have gone about it. The TANGO project stretches from July 2002 to April 2004. The paper we presented in Prague was written during the first half of the project. Today, the project is nearing its end, and we are at the stage where some basic summing-up questions need to be addressed; How well have we actually succeeded? What have we learned in the process?

1.1 Background – Developing a Case for Multi-perspectivity

During the period 2000-2002, four of the authors[1] have developed interdisciplinary research cooperation around design of IT in the area of e-government, mainly within the framework of the DitA project *(Design of IT in Use – supportive technologies for services to the citizens,* funded by the Swedish Agency for Innovation Systems, VINNOVA[2]. Although coming from different disciplines, we share an interest in the Scandinavian Tradition of Participatory Design and evolutionary systems design. The DitA project focused on computer support for front office employees in one-stop shops and the integration of municipal intranet applications with public service provision via the Internet.

It was during this research cooperation that we discovered, on the one hand, the rich complexity of on-going design activities that are part of emerging e-government technologies and work practices, and, on the other hand, how combining perspectives from different disciplines helped us to seriously challenge our own assumptions and develop new understandings of IT in use and the implications these might have for design and development of IT. [3], [4]

2 Thematic Arenas Nourish Growth Opportunities – TANGO

During the autumn of 2002, the DitA project was phased into a new, up-starting project, the TANGO e-government arena. This is one of five arenas within TANGO (*Thematic Arenas Nourish Growth Opportunities*)[3], a regional project partially financed by Innovative Actions of the European Regional Development Fund (ERDF)[4]. The region, in this case, consists of the two southernmost counties in Sweden, Skåne and Blekinge.

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[1] Yvonne Dittrich, Sara Eriksén, Annelie Ekelin and Christina Hansson.

[2] Project leader Sara Eriksén.

[3] See http://www.k.lst.se/tango2/engindex.htm

[4] Innovative Actions is basically a European risk capital program for developing regional innovation systems. See http://europa.eu.int/comm/regional_policy/innovation/index_en.htm

The themes of the TANGO arenas are - besides e-government - wireless communication, intelligent transport systems, engineering mechanics and renewal of the food industry. The first three of these have been run by Blekinge Institute of Technology, while the last two have been run by UNIVA AB[5], a subsidiary of LUAB, the Lund University holding company. Within each thematic arena, the ambition has been to establish concrete, problem-based and development-oriented cooperation between the public sector, private enterprise and university-based research. Each arena has had its own project organization and ways of working. A follow-up of the entire TANGO project is being carried out during the spring of 2004, through which experiences from the five arenas will be compared.

2.1 Coordinating Different Rhythms and Rationales

The TANGO arenas have been co-funded by ERDF for a period of roughly two years. During this time, the aim has been to run several specific, short-term research and development projects together with different municipalities and companies on each arena. On the e-government arena, three different research and development projects, chosen, rigged and owned by three different municipalities in the region, have been run more or less in parallel during 6-12 months.

Thus, as researchers, we have been forced to 'dance to a faster rhythm' on the TANGO arenas than we are used to, and to keep pace with external partners in real life design projects. Paradoxically, this collectively enforced rhythm has helped us researchers step beyond our own disciplinary boundaries and find ways to cooperate between departments, not only in the short-term problem-oriented projects, but also around building a platform for long-term multi- and interdisciplinary e-government research. [5]

Some of the most intricate footwork of the entire TANGO initiative, however, has been of a slower nature, involving the detailed paperwork[6] required of projects funded by ERDF, as interpreted by the administrative office for European funding of the county administrative board in Blekinge.

Juggling these different rhythms and rationales – of multi- and interdisciplinary research, of design and development of actual e-services for citizens, and of the cumbersome administration of regional arenas – such that all involved partners feel motivated to continue actively participating, has proved to be an art in itself.

2.2 Focus and Concrete Results of the TANGO e-Government Arena R&D Projects

Three research and development projects have been run within the framework of the TANGO e-government arena. One of these projects, originally planned to last 9 months, was extended to a total of 12 months. The other two projects were shorter, each lasting 6 months.

The aim of the largest and longest lasting of these projects was the design, development and implementation of an Internet-based dialogue forum for enhancing the consultation process around the municipal comprehensive plan. [11] In Sweden, this

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[5] See http://www.univa.lu.se

[6] Here referred to as 'paperwork', whether partially digitalized or not.

consultation process is compulsory. The partners in this project were Ronneby municipality (primarily the information office and the spatial planning office), a software company specializing in developing web-based applications, and researchers from the disciplines spatial planning, computer science, informatics, human work science and techno-science studies. The project resulted in a running application, designed with the active participation of municipal employees from the spatial planning office, who were involved in the design process via workshops, mockups and prototyping, and citizens of the municipality, who were involved via focus groups. The actual consultation process around the comprehensive plan, and the input received from citizens via the new dialogue forum as compared to input gathered through more traditional forms of consultation, are currently being evaluated by the researchers from spatial planning. (Report forthcoming during the autumn of 2004)

One of the two 6 month projects focused on developing a running prototype of an Internet-based messaging service for parents of children in elementary school. The e-service was intended to simplify the contacting of different involved parties when a child becomes ill and a parent needs to stay home from work to take care of the sick child. This project was owned by Sölvesborg municipality (more specifically, the public service one-stop shop). The other partners in the project were a small software company and researchers from computer science, business administration, informatics, human work science and telecommunications. The project resulted in system specifications and a mock-up (a simple first version of a prototype). These were used in the ensuing procurement process. The original plan was that the municipality and the involved researchers would continue cooperating around the design and implementation of the actual e-service in a follow-up project, together with whatever IT company made the best offer for developing the application. However, the public sector procurement legislation proved more complicated than expected. The proposed e-service has not yet been developed and implemented. As a result of experiences from this project, the researchers from business administration and informatics are currently taking a closer look at public service procurement processes and how and why legislation and current practice appear to prevent small and medium-sized enterprise (SME:s) in the ICT sector from gaining access to e-government as a potential marketplace.

The second of the two 6 month projects focused on developing an Internet-based system for the management of absence reporting at upper secondary school. The aim was to develop an application whereby mobile phones and pocket pc:s could be used to access and update the central student administration system. The partners in this project were Karlskrona municipality (primarily the upper secondary school af Chapman) and bachelor-level students from business administration, software engineering and the *people, computers and work* educational program at BIT where human work science and computer science are combined in educating future system designers. This project resulted in system specifications and a prototype[7].

[7] It also resulted in three bachellor's theses, one presented within each educational program, and each one representing a different disciplinary perspective on the design and development process in the project and its outcome.

3 Co-constructing e-Government

3.1 A Simple Figure of Thought for Discussing Co-construction of e-Services

Our starting-point in cooperating across various organizational and disciplinary boundaries within the TANGO e-government arena has been e-government understood as co-construction. In order to link theory and practice, and enhance mutual learning, in discussions between disciplines and across organizational boundaries, we have used a simple figure of on-going design-oriented interactions (fig.1) to highlight shifting foci on relationships of co-development of services, citizenship and technology. The figure, albeit simple, helps explicate concrete examples of this on-going everyday co-development, presented from the different perspectives that we, as researchers from different disciplines and traditions, and practitioners from different organizations and groups, represent in the project. In this way, we have been able to explore and discuss working relations of technology production and use that we see as central to what is actually making e-government happen - or not happen. [6] The main challenge in this area, as we see it, concerns making visible, and developing supportive infrastructures for, the continuing local adaptation, development and design in use of integrated IT and public services. [7]

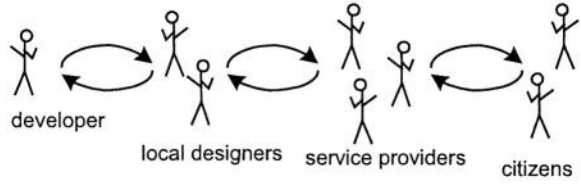

Fig. 1. A simple figure of on-going design-oriented interactions in co-development of e-govemment.

3.2 Exploring 'Shared' Concepts and What They Imply for Design of e-Services

Another way to deliberately make use of multi-perspectivity as a resource for theory-building within the e-government arena, is by exploring - in depth, and using concrete examples from our projects - shared concepts of relevance for design and development of e-services. Accountability and accessibility are two such concepts that we have been working with together. Accountability in an ethnomethodological sense, taken seriously as an issue for design of e-services, may drastically change both the way we understand information and communication in organizations and society, and the way we design technology to support it. [8], [9], [10] At the same time, accountability and accessibility in telecommunications research rely heavily on mathematical models for optimization, yet are beginning to spill over into tentative discussions about users' experiences of e-services, and how much users need, or want, to know about the infrastructure in use.

We believe there is much to be gained from confronting and further exploring these differences in 'shared' concepts, as a way of understanding more about each others' perspectives and how they differ and yet, to some extent, overlap. By understanding more about the respective disciplines we are coming from and how they

relate to design practice, we believe we will be able to more effectively join forces and break new ground in the concrete design of public e-services.

During the Tango project, we have shared monthly literature seminars, which have also been part of Ph D courses for Ph D students from our different research groups. At these seminars, we have discussed research papers from the different disciplines that have highlighted accountability and accessibility issues. In parallel with this, we have worked together in real-life, municipal ICT development projects where these concepts have been addressed as concrete design issues. Finally, besides shared literature seminars and interdisciplinary cooperation in real-life projects, we have written a number of research papers and reports together. This is an accomplishment in itself, when you have the aim to retain the integrity and professionalism of each discipline and yet achieve new insights through the interdisciplinary character of the cooperation.

3.3 Quality of Service and User Issues in the Network of Excellence Euro-NGI

One of the results of the interdisciplinary cooperation within the TANGO project is that we are now developing further interdisciplinary cooperation at BIT around the concept of quality of service, which is part of the focus of the European Network-of-Excellence Euro-NGI (Next Generation Internet). The telecommunications researchers at BIT are part of Euro-NGI and have been given main responsibility for user and use issues in this network. They themselves claim that this is a result of the sensibility to these issues that they have developed within the TANGO project, and they have thus offered us other researchers a part in the Euro-NGI cooperation, including the opportunity of writing joint research papers and having travel expenses covered for attending some of the network workshops. These are workshops with a technical focus and depth that most of us non-telecommunication researchers would most probably not have considered writing for or attending, had it not been for our being especially invited in this way. On the other hand, we will continue challenging what concepts such as 'quality of service' actually stand for in concrete e-service design, thus bringing the aim and ambition of finding constructive ways of managing multi-perspectivity with us into this future cooperation.

3.4 Realities of ICT Design for the Public Sector

The realities of co-constructing e-government are about more and other issues than how to achieve interdisciplinary cooperation in research work, however. In the short-term, real-life development projects run within the framework of the TANGO e-government arena, we have among other things encountered some of the problems private enterprises in the ICT business come up against in addressing the public sector as a potential market.

A small ICT firm that had done extensive charting, defining and specifying of the needs within the R&D project for the municipality Sölvesborg, and designed a prototype of a future application to meet these needs, was not allowed to give a bid in the actual procurement process because of current legislation on public sector procurement. One of the consequences of this is that Participatory Design according to the Scandinavian approach, which ideally aims for potential users participating in the

design process from the very beginning, is made practically impossible. Furthermore, even if they are wise enough to avoid taking on initial design work before they know if they will get the job of designing the actual application, SME:s in the ICT business are discouraged from making bids concerning e-government development because they do not have the routines and resources to manage the extensive paperwork (whether digitalized or not) around the public sector procurement process.

Time is another issue. Actual on-going everyday work practice in the public sector follows other time lines, and has other mile stones, than visionary e-government projects, and all too seldom do these lines meet and entangle in constructive ways. [11]

4 What Have We Learned?

The interdisciplinary research cooperation within the TANGO e-government arena has been challenging, but also inspiring and conductive to rethinking the conceptualizing work practices of our own research. To quote Lave and Wenger, in *Situated Learning* [12];

> *'Until recently, the notion of a concept was viewed as something for which clarity, precision, simplicity and maximum definition seemed commendable. We have tried, in reflective consonance with our theoretical perspective, to reconceive it in interconnected, relational terms.'* (Lave & Wenger, 1991:s.121)

Working across organizational and disciplinary boundaries takes time, energy and patience, and does not automatically lead to fame and great wealth. Scientific publications presented at international e-government conferences do not necessarily impress or help municipalities and SME:s in the ICT business who are trying to develop e-services in short-term real-life projects. So there is a multidimensional tension in settings such as the TANGO e-government arena, where so many different actors and interests meet in joint projects. We put quite a bit of effort into developing structures to help us manage the chaos of stepping beyond our respective home grounds. On the other hand, by moving out into unfamiliar territory, and exploring alternative perspectives to our own, we feel we are gaining a richer understanding of what co-constructing e-government is – or could be.

Perhaps the best measure of whether the TANGO e-government arena has been successful or not is to put the question whether the various actors involved would do it again, if given the chance. The answer may be found in the continuation and extension of the interdisciplinary research cooperation as described above, within the framework of the NoE Euro-NGI, and the continued cooperation with a number of municipalities and ICT companies in the region around research and development projects – short-term and real-life – in the area of e-government.

We have briefly sketched some of the ambitions, ideas and explorative methods with which we have been working within the TANGO e-government arena. We have touched on some of the problems we have come across and some of the issues we think are important for continued and future research and development in the area of e-government. Our experiences so far of multi- and interdisciplinary research grounded in real-life projects in this area have been challenging and inspiring, and we are currently continuing in this direction.

References

1. Dittrich, Y., Eriksén, S.: Situated Innovation. Exploring new forms of co-operation in innovation and design between researchers, user-groups and ICT providers. Paper presented at the Nordic R&D Conference on University and Society Cooperation, Ronneby, May 2003.
2. Eriksén, S., Dittrich, Y., Fiedler, M., Aurell, M.: It Takes More Than Two... Developing a TANGO Arena for Regional Cooperation around E-government. In: Traunmüller, R. (ed.), Electronic Government. Second International Conference, EGOV 2003, Prague, Czech Republic, September 2003, Proceedings. LNCS 2739, pp.472-77, 2003. Springer Verlag.
3. Dittrich, Y., Eriksén, S., Hansson, C: PD in the Wild; Evolving Practices of Design in Use. In: Proceedings from PDC'2002, Malmö, Sweden, June 2002, pp.124-134.
4. Ekelin, A.: Working with the Fogbow. Design and reconfiguration of services and participation in eGovernment. Licentiate thesis, Blekinge Institute of Technology, Sweden, January 2003. http://www.iar.bth.se/forskning/arbv/licuppsatser/licekelin.pdf
5. Dittrich, Y., Eriksén, S., Wessels, B.: From Knowledge Transfer to Situated Innovation. Cultivating spaces for co-operation in innovation and design between academics, user-groups and ICT providers. Paper presented at the conference Innovations in Europe: Dynamics, Institutions and Values, Roskilde, Danmark, May 2003.
6. Suchman, L.: Working Relations of Technology Production and Use. In: Journal of Computer Supported Cooperative Work 1994 (2), pp.21-39.
7. Dittrich, Y., Ekelin, A., Elovaara, P., Eriksén, S., Hansson, C.: Making e-Government Happen. Everyday co-development of services, citizenship and technology. In: Sprague, Jr., R.H. (ed.): Proceedings of the Thirty-Sixth Annual Hawaii International Conference on System Sciences, HICSS-36, Hawaii, January 2003.
8. Dourish, P.: Where the Action is. The Foundations of Embodied Interaction. MIT Press, Cambridge, MA, USA, 2001.
9. Eriksén, S.: Designing for Accountability. In: Berthelsen, O., Bødker, S., Kuutti, K. (eds.), NordiCHI 2002 Proceedings of the Second Nordic Conference on Human-Computer Interaction, October 19th-23th 2002, Århus, Denmark, pp.177-186.
10. Ekelin, E., et al. (2004): A Small Project about Big Issues. Paper submitted to the Participatory Design conference PDC'2004 to be held in Toronto, Canada, July 2004.
11. Lave, J., Wenger, E.: Situated Learning. Legitimate peripheral participation. Cambridge, Cambridge University Press, 1991.

The Diffusion of e-Services in Danish Municipalities

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Abstract. Among the European countries Denmark is ranked high with respect to on-line services. This paper presents a preliminary, exploratory analysis of variables supporting the diffusion of eServices in Danish municipalities. The objective of the study is to perform an explorative search for explanatory variables, which make municipalities adopt eServices, and specifically to gain an understanding of why some municipalities embrace eServices more extensively than others. Based on an analysis of quantitative data it is found that urbanization, population density, educational level of citizens, and increase in employment in the municipality appears to be the most significant explanatory factors supporting a high level of eService adoption.

1 Introduction

According to a recent study prepared by Cap Gemini Ernst & Young [1] for the European Commission Denmark is ranked as number one among eighteen European countries with respect to being "Fully available online". The parameter "Fully available online", was defined as the public sector institutions' capability to offer complete electronic case handling. The same study reports that Denmark is ranked as number two, only surpassed by Sweden, with respect to "Online sophistication" of electronic services offered to citizens and businesses. The Cap Gemini Ernst & Young-study presents a picture of the state-of-the-art with respect to the level of electronic service offered at the national level and it indicates that Denmark provides a relatively high level of electronic services to its citizens and businesses. One initiative which contributes to the high ranking is the NetCitizen [NetCitizen.dk the English equivalent of the Danish "NetBorger.dk"] self service portal.

The NetCitizen initiative has been on-line since the beginning of year 2000. During its first four years of existence it has increased the number of services available for citizens. By December 2003 a total of 32 electronic services (eServices)[1] were available for citizens. These services vary in degree of interactivity and sophistication. Some offer information while others provide more interactive services such as calcu-

[1] This number is based on number of services listed on the start-page for each municipality at the NetCitizen.dk portal. Some of the listed links represent several services at the deeper levels.

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lation of pensions or payment of debts. A number of studies have discussed the nature of eServices and have provided extensive categorizations of eServices, see for example [2] and [3].

In the present study of the diffusion of eServices in Danish municipalities focus is shifted from the attributes of the innovation and thereby also the particularities of the eServices provided by NetCitizen. The present focus of this study is municipalities as adopting units and an identification of parameters possibly explaining what make municipalities adopt electronic services. It has been argued that "one cannot understand policymaking unless one can explain the process through which governments adopt new programs" [4]. The objective of the present study is to perform an explorative search for explanatory variables, which make municipalities adopt eServices, and specifically to try to understand why some municipalities embrace eServices more extensively than others.

The remainder of this paper is organized as follows. In the next section theories used to analyze the diffusion of innovations in public sector institutions are presented. Thereafter follows a section, which outlines the variables included in the study of diffusion of eServices among Danish municipalities. The subsequent section presents the research method. The penultimate section outlines the results of the quantitative analysis of possible explanatory variables of the diffusion of eServices in the municipalities. The paper ends with a presentation of the results of this preliminary, exploratory analysis and some reflections of the implications of the results.

2 Adoption and Diffusion of e-Services in Public Sector Institutions

Given that other considerations than profit typically drive public institutions to adopt innovations other variables than those traditionally studied in the adoption of innovations among individuals [5] or among organizations [6] should be included. Public services are contrary to private services either offered universally to all or provided to specific eligible groups such as disabled or elderly. Public services have to be accessible for those living in rural and remote areas as well as those living in urban areas and most importantly they are not based on a citizens' capability or willingness to pay [7]. Incentives for public sector institutions to adopt innovations are thus driven by other considerations than those normally related to organizations.

Though there might be competition among municipalities to adopt innovations the incentive is dual: to achieve competitive advantage and to avoid being disadvantaged. Berry and Berry [4] illustrate this situation by the following examples: municipalities may decrease welfare benefits to match the levels of their neighbours to avoid being a welfare magnet for the poor, or municipalities may adopt economic development incentive programs already present in other states to prevent an exodus of businesses from the area. Another argument, which drives the diffusion process, is that most elected officials would like to stay in office for another term. Therefore, public pressure to adopt a popular policy programme might influence the adoption of innovations which voters favor.

In their review of dominant theories of government innovation in the public policy literature Berry and Berry [4] claim to have found two dominant forms of explanation for the adoption of a new program of a state[2]: internal determinants and diffusion models. Explanations driven by internal determinants models focus on internal conditions of the adopting unit. Factors related to political, economic or social characteristics in the municipality explain a given adoption behavior. Diffusion models in contrast are driven by the inspiration from peers. According to this view municipalities imitate other municipalities, which have already adopted a given innovation. Diffusion of innovations therefore happen due to emulation of politicians [8].

In this first phase of search for explanatory variables for the diffusion of eServices among Danish municipalities focus is on the internal determinants leading to adoption. The study focuses thus on different characteristics of the adopting unit. In the following section the variables studied are presented in detail.

3 Empirical Model: Variables and Measurement

In order to identify possible patterns of adoption and reasons for the different levels of adoption of the NetCitizen eServices by the 271 municipalities in Denmark a number of variables were included in an exploratory analysis of adoption patterns.

When studying internal determinants for diffusion of innovations the traditional approach is to measure how early a programme or policy has been adopted by a given unit compared to other units [4]. In the case of adoption of the NetCitizen eServices a slightly different approach was chosen. The dependent variable of the study is defined as the level of adoption of services from the NetCitizen portal[3]. Just by browsing through a few municipality sites at the NetCitizen portal it is obvious that there is a significant variation in the number of services the 271 Danish municipalities offer their citizens. Of the 32 different services provided by December 2003 by NetCitizen the by far largest municipality in Denmark, Copenhagen, only offered 9 services from the NetCitizen portal to its citizens whereas three municipalities offered 28 different services from the portal to their citizens.

Previous studies of the diffusion of policy initiatives have suggested two overall groups of explanatory variables: political and demographical [9; 8]. In this study the overall groups are expanded to four groups of explanatory variables: political, demographical, geographical, and economic. It should, however, be noted that the study is exploratory in nature and as a consequence hypotheses for testing have not been clearly formulated.

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[2] Berry and Berry base their study on American research and refer to state level not municipality level. It should be stressed that there are important differences between American states and Danish municipalities e.g. with respect to size and even more importantly governance. However, there are also similarities especially due to the significance of elected representatives and their maneuverability due to voters' judgment at the end of the councilor's term.

[3] It has to be stressed that NetCitizen.dk is not the only provider of eServices. Some municipalities have chosen to develop their own eService solutions or they have subscribed to alternative off-the-shelf applications. However, KMD the provider of the NetCitizen.dk portal is by far the largest eService solution provider among Danish municipalities.

3.1 Political Explanatory Variables

Two overall variables related to the political characteristics of the municipality were included in the dataset: political affiliation of elected representatives and voter turnout. Voter turnout is used as a measure of the political involvement of citizens. Citizens' involvement in political processes can be used as an indicator in the sense that elected representatives might feel pressure to adopt eServices, which can ease the life of their voters. It is therefore expected that municipalities with a high voter turnout tend to adopt more eServices. The variable representing political affiliation of elected representatives is related to the political affiliation of the council members. As pointed out by McNeal et al. [8] political factors are not straight forward with respect to adoption of innovations. In the Danish political scene social democrat-left wing parties tend to argue in favour of administrative reforms to support improved citizen participation. Liberal-conservative parties on the other hand tend to be in favour of reducing the costs of administration thereby implicitly focusing on efficiency. In the analysis of political affiliation, political affiliation was categorized as social democrat-left wing and liberal-conservative. The variable, political affiliation is split into a number of subgroups: party affiliation of the mayor, first vice-mayor and second vice-mayor and gender of these three groups. Finally, the party affiliation of all members of the council was included in the search for explanatory variables.

3.2 Demographical Explanatory Variables

The adoption-rate of Internet is high in Denmark. According to Statistics Denmark (www.dst.dk) about eighty percent of the population had access to the Internet at home or at work by mid-2003. A larger share of citizens with higher education has access to the Internet compared to citizens with a relatively lower level of education. In the age-group 16 to 59 years the adoption rate varies from 87 to 95 percent, whereas only one out of two persons in the age-group +60 has adopted Internet. Given that Internet access and in particular use of the Internet is a prerequisite for using eServices it is found prudent to look at the age and the educational level of the population in the different municipalities. It could be expected that decision-makers would take into consideration if their citizens are among the population typically well represented in the Internet or not. In order to explore this proposition the impact of age distribution and educational level of the municipality's inhabitants were included in the analysis of the level of adoption of eServices of a given municipality.

3.3 Geographical Explanatory Variables

Urbanization has been suggested to be a possible explanatory variable for adoption of innovations [8; 9]. With respect to the adoption of eServices variables related to area of municipality was included. Given that municipalities with large areas/ distances must be expected to have more logistic challenges in servicing their citizens, access to services via Internet might be a solution worth pursuing. Furthermore, it is found plausible that the population density of a municipality influence the incentive to adopt eServices. Given that sparsely populated areas require the same services as heavily populated areas but that sparsely populated areas have fewer inhabitants to cover the

expenses, a low population density could therefore be expected to favour eService adoption. The third and final geographical variable included in the dataset is related to the metropolitan, rural or urban status of the municipality.

3.4 Economical Explanatory Variables

Slack resources are an important factor when innovations are adopted [10]. The economic resources were measured as the relative wealth of the municipality. Two variables were used to measure economic resources: growth in employment and tax level. The variable employment growth was measured as number of full-time employed workers during the period 1997-2002. Employment growth was defined by calculating the municipality's share of the total employment in Denmark for each year and by calculating the average employment growth for each municipality for the period 1997-2002. This variable is based on the assumption that growth in employment in a region attracts investment and tax payers, which again contribute the resources of the region. The second economic variable tax level indicates the relative level of expenses of a municipality compared to its income.

4 Data Collection

The number of eServices provided by the 271 Danish municipalities to its citizens was gathered from the NetCitizen eService portal. The procedure followed was to use the entry to the portal available to citizens. Data from the individual site of each municipality in the portal was registered separately. All data from the NetCitizen portal were gathered from the portal during December 2003. Data related to political affiliation of the mayor, first vice-mayor, second vice-mayor and the council members were collected from the Handbook of Municipalities year 2002 [11]. The gender of the mayor, first vice-mayor, and second vice-mayor, voters turnout, municipal tax rate, and the area and population size of the municipality were also collected from the same source. The remaining data concerning socio-economic status and age distribution of citizens from each municipality were obtained from Statistics Denmark (www.dst.dk).

5 Results

In the following results from bivariate relationships between number of eServices offered and the political, demographical, geographical, and economic variables are presented.

6 Discussion and Conclusion

The exploratory search for explanatory variables supporting the adoption of eServices provided by the NetCitizen portal in Danish municipalities resulted in four statistical significant variables.

Table 1. Bivariate analysis of number of eServices by categorical variables.

Variable	Statistics	DF	Value	Probability
Mayor's gender	MHC	1	2.2886	0.1303
First vice mayor's gender	MHC	1	0.5731	0.4490
Second vice mayor's gender	MHC	1	3.1488	0.0760
Urbanization, 3 categories: metropolitan, urban, rural	Chi-square	4	8.8329	0.0654
Urbanization, 2 categories: urban, rural	MHC	1	7.1060	0.0077**
Percentage of citizens with higher education. 3 categories: 1-14, 15-19, 20+	Chi-square	4	12.0365	0.0171*
City council's party affiliation, 3 categories: left, right, other	Chi-square	4	2.0442	0.7276
Mayor's political affiliation. 3 categories: social democrat and left-wing, liberal and conservative, all other	Chi-square	4	5.2177	0.2657
City council's majority 3 categories: social democrat and left wing, liberal and conservative, all other	Chi-square	4	1.5446	0.8187
Percentage of elderly in the municipality, 3 categories: more, average, fewer	Chi-square	4	6.5853	0.1595
Employment increase, 3 categories: fewer, average, more	Chi-square	4	11.2516	0.0239*

Legend: * = p<= 0.050; ** = p<= 0.010; *** = p<= 0.001

Table 2. Bivariate analysis of eServices by three quantitative variables.

Variable	Statistics	DF	Chi-Square	Probability
Voters turnout	Kruskal-Wallis tests	2	0.2821	0.8685
Taxation level	Kruskal-Wallis tests	2	1.0737	0.5846
Population density	Kruskal-Wallis tests	2	7.5673	0.0227*

Legend: * = p<= 0.050; ** = p<= 0.010; *** = p<= 0.001

It was found that the higher population density the more eServices a given municipality provides (p = 0.0227). The same trend is also reflected in the bivariate analysis of number of eServices by urbanization, where the MHC test shows a highly significant relationship (p = 0.0077). What is surprising is, that when including the metropols in the analysis the statistical significance is reduced (p = 0.0654). This indicates that municipalities with larger cities, but not metropols, are eager to adopt eServices from the NetCitizen portal. This result contradicts the assumption that long distances to public service institutions would stimulate the adoption of eServices.

Another finding from the statistical analysis is that the longer the formal education the population has in a given municipality the more eServices are provided (p = 0.0171). This could indicate that decision-makers consider if the citizens living in the municipality actually are among the most represented Internet users as identified by

Statistics Denmark. If this line of thought is pursued then considerations related to efficiency might drive the adoption of eServices in the Danish municipalities. There could be an expectation that there is a return on investment given that a larger number of users will use the eServices provided. Thereby reducing the requirements for staff available in offices.

The fourth variable, which turned out to be statistically significant in the analysis was growth in employment during the period 1997-2002 ($p = 0.0239$). One interpretation of this result is that municipalities, which have experienced growth in employment has achieved more slack resources, which generally have been found to stimulate adoption of innovations [10]. Another interpretation is that growth in employment means that the municipality has more citizens engaged in active employment who demand various public services. In order to attract and especially keep employees (and in particular tax payers) an increased level of services is therefore crucial. Given that most public offices have opening hours similar to the working hours eServices might be the best solution if employees are to stay in the municipality.

The exploratory search has indicated that other factors than direct pressure from voters influence the decision to adopt eServices. The variable voters turnout was not found to have any statistical significance in relation to level of eService adoption. One reason for this result might be that the last election for offices at municipality level took place in year 2001. The NetCitizen initiative was still in its infancy by that time and voters might not have been aware of the possible convenience of eServices.

The other political variable, political affiliation, which was included in the analysis, was similarly found not to bear any statistical significance when related to level of eService adoption. This trend that political ideology does not determine adoption of innovations at the public sector level corresponds to findings by McNeal [8] and Walker [9]. A recent study of eService adoption in Switzerland [12] confirms the same trend.

One issue, which should be taken into consideration in the context of the politicians and their influence on technology adoption, is their interest in the matter. With direct reference to Aristotle Jæger points to the distribution of responsibilities between politicians and employees/ civil servants as defined by the Greek philosophers [13]. It is a distribution where politics are above practical matters. Adoption of technology is according to this view something, which is left to employees not politicians. Therefore, attitude of the head of the IT-department in the municipality could turn out to be a determining factor for adoption of eServices. The works of Rogers [5] supports this type of argumentation. According to Rogers the role of opinion leaders and change agents are crucial for the diffusion of innovations in any social system. Among other issues their role in the adoption process should be explored in future research.

The results of the exploratory study of the adoption of eServices from the NetCitizen portal point towards the conclusion that demographic, geographic, and economic variables rather than political variables stimulate the diffusion of innovations in Danish municipalities. However, there are also indications of that other explanatory factors should be included to give a more adequate picture of the motivations for adoption of eServices from the NetCitizen portal in Danish municipalities.

References

1. Cap Gemini Ernst & Young. Online Availability of Public Services: How is Europe Progressing? Report prepared for European Commission DG Information Society. 2003.
2. Stamoulis, D. and Gouscos, D., "Revisiting Public Information Management for Effective e-government Services," Information Management & Computer Security, vol. 9, no. 4, pp. 146, 2001.
3. Layne, K. and Lee, J., "Developing Fully Functional E-government: A Four Stage Model," Government Information Quarterly, vol. 18 pp. 122-136, 2001.
4. Berry, F. S. and Berry, W. D., "Innovation and Diffusion Models in Policy Researceh," in Sabatier, P. A. (ed.) Theories of the Policy Process Oxford: Westview Press, 1999, pp. 169-200.
5. Rogers, E. M., Diffusion of Innovations, Fourth ed. The Free Press, 1995.
6. Tornatzky, L. G. and Fleischer, M., The Process of Technological Innovation Lexington Books, 1990.
7. Teicher, J. and Hughes, O., "E-government: A Route to Public Sector Quality," Managing Service Quality, vol. 12, no. 6, pp. 384, 2002.
8. McNeal, R. S., Tolbert, C. J., Mossberger, K., and Dotterweich, L. J., "Innovating in Digital Government in the American States," Social Science Quarterly, vol. 84, no. 1, pp. 52, 2003.
9. Walker, J. L., "The Diffusion of Innovations among the American States," The American Political Science Review, vol. 63, no. 3, pp. 880-899, 1969.
10. Downs, G. W. and Mohr, L. B., "Conceptual Issues in the Study of Innovation," Administrative Science Quarterly, vol. 21, no. December, pp. 700-714, 1976.
11. Mostrup, Kommunalhåndbogen 2002 Denmark: Eniro, 2002.
12. Schedler, K., "Local and Regional Public Management Reforms in Switzerland," Public Administration Review, vol. 81, no. 2, pp. 325-344, 2003.
13. Jæger, B., Digitale visioner – teknologien i politikerrollen [Digital visions – technology in the role of politicians] in "Roller der rykker – Politikere og administratorer mellem hierarki og netværk", Jurist- og Økonomforbundets Forlag, Copenhagen, 2003.

Economies of Scale in e-Government: Time for Evidence

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Abstract. The presence of economies of scale has been often taken for granted in the discussion of many eGovernment implementation issues. This paper discusses this assumption by showing that empirical evidence in favor of economies of scale may be considered context dependent. Although the analysis carried out does not lead to discard the presence of economies of scale in the provision of eGovernment services, it casts a new light on the concept of one-stop-shopping portals as well as providing some insights for future research.

1 Introduction

In March 2000, the European Council met in Lisbon and set the following goal: "Europe will have to become the most competitive and dynamic knowledge economy by 2010". A bold statement that has been followed by the creation of a series of action plans labeled eEurope laying out the intermediate steps necessary to the meet the 2010 deadline.

The eEurope action plans heretofore published have placed a considerable amount of attention on eGovernment related objectives. This suggests that the implementation of eGovernment plays a strategic role in the achievement of the Lisbon target and thus in the future of Europe.

The two main factors that contribute to eGoverment's strategic importance are the following: firstly, the indirect positive impacts that the implementation of eGovernment has on both citizens and firms in terms of technology adoption and usage. In this respect, eGovernment may be considered as a complementary innovation to eCommerce. In Europe, Government consumption amounts to about 20% of the gross domestic product. This makes it the single biggest consumer whose behavioural patterns may exert a significant impact on the economic system. The switch to an online model of government procurement, for instance, may act as a catalyst by encouraging a large number of enterprises to adapt in order not to loose what may be a significant part of their business.

Secondly, the implementation of eGovernment is expected to lead to an increase in efficiency which should both alleviate the pressure caused by a decrease in the number of taxpayers due to aging populations, as well as increase expectations in terms of service quality.

Part of the expected efficiency gains mentioned above was assumed to be associated with the alleged presence of economies of scale. As a matter of fact, the literature

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points out that municipality size is an important factor in the implementation of electronic service delivery [9]. This has led the research community to accept the concept of one-stop-shopping portals since they may function as demand aggregators among municipalities, thus creating bigger virtual front offices. As sensible and intuitive as it may be, the assumption of economies of scale still requires some empirical evidence to be provided. This paper will question the economies of scale assumption and will seek evidence of its presence.

2 Objectives

The objective of this paper is to investigate the possible efficiency gains that may be enjoyed in the provision of eGovernment services to a large number of customers. In particular, empirical evidence of the presence of economies of scale in the implementation of e-Government at the municipal level will be researched.

Given the high geographical localization of the sample used for this analysis (Piedmont, Italy), the ultimate goal of the paper is not to provide a final answer on the existence of economies of scale in e-Government, but rather to stimulate some discussion on its context dependency.

The results obtained will also be used to cast a new light on the concept of one-stop-shopping portals, suggesting that both its advantages as well as a possible hybrid solution should be further investigated.

3 Methodology

The data used for the purposes of this paper was generated by a survey conducted in the context of a project sponsored by the European Commission and named Regional-IST (www.regional-ist.org).

The project was carried out by an international network of regional official observatories whose mission is to support Regional Governments in the policy design process by periodically monitoring the diffusion of technology among public administrations, citizens and enterprises.

The analysis was carried out on the data collected by the observatory in Piedmont (Italy). The unit of analysis of the survey was the municipality.

The sample frame was extracted from a population made up of the 1206 Piedmont Region's municipalities.

The population distribution was known and looked as follows:

Table 1. Population and Sample Distribution.

Stratum number	Municipality size (Inhabitants)	Population Distribution	Sample Distribution
1	<10.000	1144	238
2	10-500.000	61	36
3	>500.000	1	1
	Total	1206	275

The sample was built by adopting a differentiated probability approach in order to over represent the last two strata. The stratification variable is municipality size in terms of number of inhabitants. Stratification thresholds were chosen in order to: isolate the main city and allow a proportional distribution among strata in most of the regions that took part to the Regional IST project (i.e. Piedmont, Catalonia, Baden-Württemberg).

The sample frame was set at 600 units and the redemption rate was 45.8%. Thus, the final sample size was 275 units.

As per data collection, the first contact with municipalities was made by CATI (Computer Aided Telephone Interviews), while data were collected through a written questionnaire.

4 Problem Layout

Three factors were considered while looking for evidence of economies of scale: eGovernment related costs, website complexity and municipality size.

E-Government activities are cross sectional in nature, and thus, their related costs are difficult to isolate and measure objectively. As a consequence, in order to proceed as rigorously as possible, for the purposes of this study a definition provided by the European Commission[1] was adopted:

> *"E-Government is defined as the use of information and communication technologies in public administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies"*

This definition was used as a starting point for defining the variable utilized to measure the costs generated by the eGovernment related activities. Municipalities were asked to specify their annual expenditure on Information and Communication Technologies (ICT). This value was the aggregation of a number of cost items:

1. Hardware
2. Software
3. Connectivity
4. ICT related consultancy and training.

As per the measurement of website complexity, the European Commission guidelines[2] were adopted. Five stages of online sophistication were in used to rate the services:

- Stage 0: Service not available online
- Stage 1: Information
- Stage 2: One way interaction (downloadable forms)
- Stage 3: Two way interaction (possibility to fill in forms online)
- Stage 4: Transaction (full electronic case handling)

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[1] "The role of eGovernment for Europe's Future" European Commission 2003.

[2] CAP Gemini "Online Availability of Public Services: How is Europe Progressing?" European Commission DG Info-Society 2003.

Municipalities were asked to assign a score from 0 to 4 to a set of services identified at EU level as having priority. Website complexity was then measured by computing the average level of sophistication.

Finally, regarding municipality size, two options were considered: number of inhabitants and number of civil servants. In order to avoid an arbitrary choice, two separate analyses were run using both variables. The results obtained did not differ. This paper presents only the results obtained using the number of civil servants employed, but a similar analysis could be carried out using the number of inhabitants.

5 Analysis

The following production function was used to describe the empirical relationship between input and output:

$$y = \alpha x^{\beta} \tag{1}$$

where:

"y" is the municipality annual ICT expenditure;
"α" is a multiplication factor;
"x" is the number of civil servants employed in the municipality;
"β" is the parameter of the function allowing the presence of economies of scale to be identified. If the parameter's value is less than one, this means that economies of scale are present.

In order to compute the value of the parameter β, logarithms were used to transform formula (1) into an additive linear function:

$$\log (y) = \log (\alpha) + \beta \log (x) \tag{2}$$

In the graph below, the logarithm of the annual ICT expenditures of all the municipalities in the sample was plotted against the logarithm of the number of civil servants working in each municipality. The line in the middle represents the line of best fit while the outer lines are the 95% confidence intervals. As it may be noticed, the coefficient of the trend line is less then 1 ($\beta = 0.89$) and thus reveals the presence of economies of scale.

From the first analysis carried out, it may be concluded that the annual ICT expenditure per civil servant tends to diminish as the municipality size increases. However this result reveals to be a Pyrrhic victory if municipalities without a website are excluded from the calculation. In fact, the regression run only on municipalities with a website provides a β whose value is not below 1 with a 95% confidence level. This suggests that the presence of a website (regardless of its complexity level) seems to create inefficiencies and thus diseconomies of scale.

Another component was introduced in the analysis in order to further explore the impact that the presence of a website may have on municipal ICT expenditures. Websites were classified according to their level of complexity and divided into two groups (L and H). Websites with an average level of sophistication lower than 1 were put in the L group, while more complex websites (with an average sophistication level greater than 1) fell in the H group.

The analysis carried out on these two subsets of the population showed that municipalities with less complex websites (L group) enjoy the presence of economies of

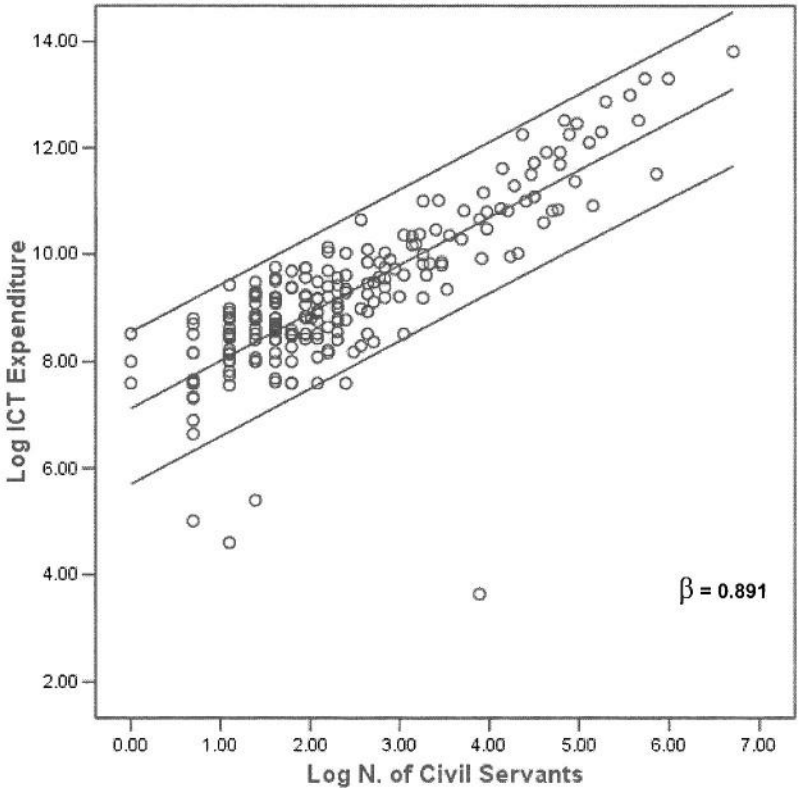

Fig. 1. Logarithm of ICT Annual Expenditure against the Logarithm of Number of Civil Servants.

scale (β=0.762). However, the analysis revealed the presence of diseconomies of scale in municipalities that have a more complex website (β=1.029).

6 Conclusions

The first conclusion that may be drawn from the analysis described above is that economies of scale in eGovernment at the municipal level should not be taken for granted, since their presence seems to be context dependent.

In the analysis carried out, for instance, although the presence of economies of scale may not be discarded, the supporting evidence is not extremely strong. The implementation of complex websites that allow a high degree of interaction with the citizenry, in fact, seems to foster the creation of inefficiencies.

A possible explanation to these findings may be that, at this early stage of eGovernment implementation, a municipality that has implemented a more sophisticated web interface covers a pioneering role. Thus, the presence of economies of experience should also be taken in due account. In this respect, the theme of reuse and experience sharing plays an important role in contributing to the reduction of the inefficiencies found.

This simple empirical exercise also suggests that it may be worth reconsidering the concept of one-stop-shopping portals in light of these findings, in order to better understand to what extent they may lead to the creation of more efficient and effective systems. In particular, it could be interesting to investigate the possible presence of minimum aggregation threshold (or a critical mass) that may be necessary to reach in order to enjoy the presence of economies of scale. Moreover, different levels of aggregation/collaborations should be explored as a solution that, in addition to allowing the attainment of efficiencies, also takes in due account the importance of local idiosyncrasies, identified by the literature as being a crucial factor in a successful implementation of public e-services [2].

As a caveat, it must be added that the study presented in this paper adopted a cost based approach. As such, it may not be considered exhaustive, since no provision was made for value creating aspects. Nevertheless, given the highly intangible nature of these aspects, a cost based approach seemed to be the only viable option.

In conclusion, the results found reveal that the process of scaling up the provision of eGovernment services may turn out to be a fruitful field of research. In particular. efforts should be directed towards understanding the managerial implications that may hinder an efficient implementation and management of eGovernment systems.

References

1. Adams N., Haston S., Gillespie N., Macintosh A (2003) "Conventional and Electronic Service delivery within Public Authorities: the Issues and Lessons from the Private Sector". LNCS 2739, Springer.
2. Buckley J., (2003) "E-service quality and the public sector", Managing Service Quality, Vol. 13 Issue 6, p453, 10p
3. Cantamessa M., Ferro E., Paolucci E., (2003) "E-Government Benchmarking: A Regional Experience", Building the Knowledge Economy, Vol.1 p.604-610, IOS Press Oxford.
4. Dawe S., (2002) "The Future of e-Government" Center for Technology in Government, University at Albany.
5. Gamper J., Augsten N., (2003) "The Role of Web Services in Digital Government", LNCS 2739, Springer.
6. Grönlund A., (2000) "Managing Electronic Services: A Public Sector Perspective", ISSN 1439-9245, Springer.
7. Folz D.H., (2004), "Service Quality and Benchmarking the Performance of Municipal Services", Public Administration Review
8. Fowler and Fowler, (1993) "Survey Research Methods", Sage Publications.
9. Leenes R., Svensson J. "Size Matters - Electronic Service Delivery by Municipalities?" E-Government Conference 2002 Aix-en-Provence.
10. Traunmüller, R., Lenk, K., (1996) "New Public Management and Enabling Technologies", In Proceedings of the XIV. IFIP World Computer Congress, Chapman & Hall, London, pp 11-18
11. Traunmüller, R., Wimmer, M., (2001) "Electronic Business Invading the Public Sector: Considerations on Change and Design", IEEE.
12. West D.M., (2004) "E-Government and the Transformation of Service Delivery and Citizen Attitudes" Public Administration Review Volume 64 Issue 1 Page 15
13. Wimmer, M., (2000) "Moving towards a holistic approach to design socio-technical systems", (IDIMT), Zadov, Czech Republic, 2000, pp 111 – 124.
14. "The role of eGovernment for Europe's Future" European Commission 2003
15. CAP Gemini "Online Availability of Public Services: How is Europe Progressing" European Commission DG Info-Society 2003

State of the Art in e-Gov Research – A Survey

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Abstract. This paper assesses the maturity of the eGovenrment (eGov) field by examining the nature of 170 papers published at three major eGov conferences using a maturity model. Papers were examined mainly for rigor, but to some extent also for relevance. It was found that theory generation and theory testing are not frequent while case stories (no theory, no structured data collection) and product descriptions (no analysis or test) are. Also, claims beyond what is reasonable given the method used are frequent. As for relevance, only a few of the cases where theories are either tested or generated concern the role and nature of government, most concern general organizational issues which could well find a place within traditional IS conferences. On the positive side, global outreach appears fairly good, as does involvement of various pertinent disciplines. It is concluded that eGov conferences need to address quality criteria, both rigor and relevance oriented ones, if the field shall develop to become a distinct research field

Introduction

After a few years of growth in the field, it is time to pause and summarize eGov (electronic government or electronic governance) research – what is it all about? The field set out in the late 1990's as a context within which to share experiences among practitioners but has over the past few years given rise to several academic conferences and specialized journals.

A scientific field is usually characterized by not just a common object of study, but also a set of theories which can be used to understand the general conditions of the field. Although the eGovernment field is certainly generating an increasing amount of research literature, it appears to run a risk of not achieving maturity, for several reasons. As for the object of study, government is made up of a huge number of disparate organizations and processes. It is not apparent what a small village in France and the US federal government share in terms of process rationalization potential. The fields in which government agencies work also differ considerably, from road construction to social welfare to schools to railroads to defence. eGovernment hopes range from process rationalization to better democracy. With eGovernment emerging as a research "field", it is likely that experts from different trades would take their pet view into eGovernment studies leading to the field becoming a microcosm containing almost anything there is in research while not addressing the field as a whole.

This paper sets out to examine the state of the art in eGov research today. To what extent is it already a research field? This would mean more that "putting IT into government", it would require, apart from rigorous research, some theories distinguishing it form other fields, such as Information systems (IS).

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Research Questions

The basic question asked in this paper is, what is the eGov field like in terms of what constitutes a scientific fields? This is operationalized by questions concerning rigor and relevance, with an emphasis on the former.

Relevance: To what extent is the eGov field distinct from other fields? This could be assessed by investigating what are the questions asked – what (kind of) theories are used, or sought in an inductive manner? If eGov is indeed a specific field, at least some of these issues and theories would be different.

Rigor: Depending on the maturity of the field, the balance among methods used would likely change over time from case stories to more of methodologically sound examination of relevant issues, be they related to technological quality, user understanding, extent and qualities of use, or other. A mature eGov field would also involve many disciplines, certainly public administration and other fields specializing in government, not only IT-related disciplines by example from e g the HCI field.

Maturity could be measured by a longitudinal study – comparison with the past – or by comparison with some other field, such as the IS one. In this paper we do neither. As the purpose is not comparison but only to raise a discussion about the future of the field, we focus on eGov conferences of 2003 only, and measure maturity according to the following rather intuitive model. The model is based on the assumption that research fields mature over time passing through (but never completely leaving!) roughly the following phases:

Philosophical ("What will the world be like when everyone has a computer?"). As there are no or few theories in the field and empirical data is uncertain as the object of study is changing rapidly, studies will at this stage be mainly speculation based on philosophy, properties of technology, world view, etc.

Anecdotal case stories ("Ma, look what I found"). At this stage there is an increasing amount of data, but there are still no clear focus in the field so studies focus on "emerging" features, which may be anything but are usually grounded in factors like the researchers field of origin, personal interest, and commercial focus of the IT development. Focus is still on exploration, finding new exciting traits of the development. The researcher is an Amerigo Vespucci finding new land.

Clustering (grouping according to similarities among cases). At this stage cases abound and people start looking for similarities. The new continent is found physically, now we try to understand life on it.

Theory creating (similarities more strictly modelled). When similarities are found, people start looking for more stable relationships, models and theories so as to more credibly inform further research, product development and organizational remodelling.

Theory testing (using theories found by inductive methods or borrowed from other fields pertinent to government and/or IT). This stage would generally be expected to appear slightly after stage 4, as theory creating is usually qualitative and builds on smaller but richer data sets than theory testing and hence is more suitable to early stages of development where radical changes are about), but thereafter they continue in parallel.

Although vitality in a field probably requires that even mature fields contain some component of each of the above "stages", we propose that a new, immature, field would contain more of the early stages while a mature field would contain more of the latter ones.

Method

Although eGov related papers are beginning to appear in journals, the bulk of them appear in conference proceedings. As eGov started as a practitioner field, most conferences so far are practitioner-oriented, e g conferences arranged by G8, Telecities, and national associations of municipalities. Other conferences invite academic papers but try to attract a mixed audience. This includes DEXA EGOV (www.dexa.org) and European Conference on e-Government (ECEG). Yet other conferences, or parts thereof, focus on research knowledge exchange only. This includes IFIP WG 8 (annual conferences since more than a decade on several eGov themes), HICSS (with eGov-related minitracks since 3 years), as well as other major conferences such as ECIS, IFIP3E, and the Bled eCommerce conference having in the past few years added eGov sections.

For this paper a selection of conferences was made that included both of the latter kinds of conferences (academic and mixed) but excluded the practitioner-only ones. A further criterion was the conference be rather big, hence excluding specialized academic associations however interesting. We wanted to track eGov mainstream as of today. The final choice was:

DEXA eGOV – in its 3rd year, comprehensive coverage of Europe, including the eastern part. Also comparatively good international coverage, including Asia and Latin America. Academic but with a stated mission to reach also practitioners.

HICSS – a traditional IS conference focusing on academics. Global coverage, but within the IS field.

ECEG – In its 4th year. More academic than DEXA, but still with a strong focus on practitioner relevance. Also more limited in geographical scope than DEXA, by history a focus on UK and north-west Europe (but this is changing)

This study covers only conferences held in 2003. A total of 170 papers were studied, 94 from DEXA, 25 from HICSS, and 51 from ECEG.

To assess rigor and relevance, the following categories were used:

- **Rigor:** Research type, Method, Claim, Number of pages, Number of references.
- **Relevance:** Focus unit, Target audience, Institution, Discipline, Collaborative, Country.

The categories were designed so as to involve a minimum of interpretation. Both category definitions and interpretation were "generous". As my hypothesis was that the eGov field is indeed immature, I wanted to avoid this bias to guide my interpretation, and so a generous approach was necessary. To check my coding, 25 randomly selected papers were coded by five independent reviewers (five papers each). In all cases but one where there were discrepancies (15 %), the control coders were harsher – they required more data or more stringent use of theory than I did. Category definitions:

Research type

Category	Description
Descriptive	Describes a phenomenon in its appearance without any use of theory
Philosophical	Reflects upon a phenomenon without data or reference to any theory
Theoretical	Reflects upon a phenomenon based on some theory but without empirical data or with only anecdotal and particular such
Theory generating	Attempts to analyse/interpret quantitative or qualitative data in a systematic manner for the purpose of model building.
Theory testing	Attempts to test a theory using quantitative or qualitative data in a systematic manner, i.e. not just strict theory testing

Method. The categories used are a mix of the whish to keep the number as low as possible, to include any quantitative and qualitative method while being specific enough to not hide the fact that sometimes very specific methods are used. The latter is the reason for including GT as a separate item. The former motivates including both quantitative and qualitative methods under the category "interpretative". "Product description" was not preconceived but emerged as necessary.

Category	Description
Argument	Logical argument but not based on any particular theory or relating explicitly or by clear implication to any theory
Case story	Tells about a case but as opposed to a case study there is no strict data collection method. Usually own experiences or anecdotal evidence
Etnography	Any attempt to understand actions by systematic observation and interpretation
Experiment	Field experiments included
GT	Grounded theory
Interpretative	Any kind of more strictly performed data collection than "case story" but not necessarily strictly explained or spelled-out method for interpretation. A case study belongs here, but also more limited studies where qualitative or quantitative data is analysed.
Literature study	Only documents used, be they scientific, policy documents or other. Not necessarily strict method or even explicitly labelled as literature study
Product description	IT product, method, or similar, described by the manufacturer
Survey	This covers also qualitative overviews of several documents or cases
Unclear	Not even the widely defined categories above fail to capture the method

Focus unit employed largely categories used to define other fields, such as HCI, CSCW, and IS: Individual, Group, Method, and Organization. I added "Society", as government is not just any organization, and eGov research should consider not just internal efficiency but also societal role.

Target audience concerns whether results explicitly or implicitly primarily aim at guiding "researchers" or "practitioners". When both target groups are mentioned classification is based on whether advice given fall within the domain of city officials' work or that of researchers.

Claim concerns what validity authors claim for their results
Normative = The paper claims generality beyond case.
Descriptive = claims validity but not generality. He authors claim to have described the situation correctly and/or credibly.
Lessons = only claims anecdotal value, e.g. "we learned that we need a champion and we weren't prepared for that"
Ongoing = research is not completed and the paper does not make any claim as to the validity or scope of the findings, not even in principle.

In cases when the claim was not explicitly stated, it was often very clearly implied by the way findings were formulated. When the claims were not possible to discern, the paper was classified as ongoing.

Findings

Research type. Descriptive papers dominate. It appears clear that much of the philosophical hype surrounding both e-government and e-democracy during the period in the mid-1990s has disappeared, as only 3 % of the papers were of that nature, and at the more researcher-oriented conference, HICSS, there were no such papers at all. In 2003, philosophy has been replaced by theoretical arguments (15 %) and a growing amount of theory creation and theory testing, although not so much at the conferences trying to attract not just researchers but also practitioners.

	DEXA 03		HICSS 03		ECEG 03		Total	
Descriptive	57	61%	6	24%	27	53%	90	53%
Philosophical	3	3%	0	0%	2	4%	5	3%
Theoretical	12	13%	5	20%	9	18%	26	15%
Theory generating	12	13%	12	48%	7	14%	31	18%
Theory testing	10	11%	2	8%	6	12%	18	11%

The use of theory is much higher at HICSS, reflecting the more academic focus. Given the largely quantitative tradition in (US) IS one might have expected a higher figure for "theory testing". The mere 8 % at HICSS may reflect that the field is new and there are not that many theories to test. It might, however, also reflect the fact that IS research concerned with case studies to a large extent has to be **qualitative given** the often complex situations involved, and in a new field there is likely a dominant stream of case study research to explore emerging features.

The high score for descriptive papers at DEXA and ECEG can probably be explained by the practitioner focus. A closer read revealed that many, especially at DEXA, describe methods and computer applications in a straightforwardly introductory rather than analytical manner.

Method. There are big differences among the conferences. 25 % of the total number of papers are case stories (no attempt to interpret data) and another 21 % are arguments (no data). At HICSS, however, data are "interpreted" in 32 % of the papers, meaning use of either qualitative (mainly) or quantitative methods.

	DEXA 03		HICSS 03		ECEG 03		Total	
Argument	19	20%	6	24%	11	22%	36	21%
Case story	32	34%	2	8%	8	16%	42	25%
ethnography	0	0%	1	4%	0	0%	1	1%
Experiment	4	4%	1	4%	2	4%	7	4%
GT	0	0%	2	8%	0	0%	2	1%
Interpretative	11	12%	8	32%	5	10%	24	14%
Literature study	10	11%	1	4%	13	25%	24	14%
Product description	13	14%	3	12%	6	12%	22	13%
Survey	5	5%	1	4%	6	12%	12	7%

13 % of the papers are product descriptions describing a method or some software without analysis or test.

The top score of 34 % for "case stories" at DEXA may reflect the practitioner focus. It could also support the hypothesis that eGov is a new field inviting first curiosity among researchers to explore a new field: "what is it all about". This is, however, contradicted by the HICSS low score of only 8 %. On the other hand, the "new field" hypothesis is supported by the very low scores on methods often used in IS research in other fields, including surveys, ethnography, grounded theory and (field) experiments. In most cases the "interpretive" cases used very little and not very precise data, stemming from national surveys and limited empirical studies.

The high number of literature studies at ECEG should also be noted. This is an indication that the field is moving from initial anecdotal stories.

Focus unit. There is still a strong focus on IT, especially at DEXA. Although there is a strong focus on organization and method, it is interesting to note the very weak interest in society. Government is more seen as an organization than as a specific instrument in society. That is, the internal operations are considered more important than its role. This appears a clear indicator of the immaturity of the field, as "organization" and "method" are strong focal points in IS research in general. A mature e-government would focus more on studying the specifics of government. This said, some such discussions are indeed found under the labels of organization and method, but the bulk of the papers take a traditional view on both topics.

	DEXA 03		HICSS 03		ECEG 03		Total	
Individual	6	6%	7	28%	3	6%	16	9%
Group	0	0%		0%		0%	0	0%
Organization	20	21%	8	32%	20	39%	48	28%
Society	12	13%	2	8%	6	12%	20	12%
Method	25	27%		0%	16	31%	41	24%
IT	31	33%	8	32%	6	12%	45	26%

Target audience. Although totally there is equal focus on practitioners and researchers, there are great differences among conferences. While DEXA is strongly focussed on practitioners, HICSS has an equally strong focus on researchers.

	DEXA 03		HICSS 03		ECEG 03		Total	
Practitioners	52	55%	3	12%	8	16%	63	37%
Researchers	28	30%	15	60%	25	49%	68	40%
Unclear	14	15%	7	28%	18	35%	39	23%

The figures are a bit vague, as target audience often had to be inferred. Still the overall impression is that the figures are reasonably correct as there are other indicators. One is the number of pages – shorter papers would indicate a practitioner focus. We found 29 % being short (<5p), 23 % long (10+p), and 47 % medium length (6-9p), supporting the impression that the target is 50/50 researchers and practitioners.

A further indicator is the number of references, where a low number would indicate a practitioner focus. Again, the difference among the conferences is apparent. While 35 % of the DEXA papers had 5 or less references, 88 % of the HICSS ones and 80 % of the ECEG ones had 9 or more, often up to 25. Also, HICSS papers typically referenced academic literature while DEXA ones often referenced organization or product web pages. The high number for ECEG reflects the high number of literature studies. Taken together, these three criteria clearly indicate a different focus of the conferences in terms of intended audience.

Research origin. The affiliation of the first author is overwhelmingly a university at all conferences (83 %). Companies and governments are represented equally little. DEXA is the only conference with some representation from NGOs (1 %).

Looking at co-authors, the picture remains the same. Despite slightly higher figures for HICSS, the picture is rather consistent across conferences – around 1/5 of the papers were collaborative (involving more than one institution), and many of these involved no practitioners but researchers from more than one university or more than one discipline within the same university. In fact, only 11 papers involved at least one practitioner and one researcher (6 at DEXA, 2 at ECEG, and 3 at HICSS).

From what disciplines do eGov researchers come? Judged by first author and ordered by size, the 170 papers studied here came from Informatics (45), Computer science and related (20), Public administration and social studies (19), Business administration (17), Law (12), Government professional (4), and Library sciences (2). There seems to be no bias towards technology-focused disciplines. This conclusion, however, should be cautioned. First, in 50 papers discipline was not stated. Second, depending on where you put the Informatics discipline the balance changes dramatically. Assuming half of the Informatics papers to be on each side (reasonable both given the nature of the IS discipline and my impression from having read the papers) we get a fairly "social" score with 62 papers on the social side and 44 on the technical.

A final factor indicating the (im)maturity of a research field is the credibility of the claims. To investigate this, we matched the categories "research type", "method" and "claim". A reasonable combination would be, for instance that a "descriptive" type implemented by an "argument" would result in modest claims. We found 49 dubious claims, equivalent to 29 % of the papers. There were several combinations, the largest being descriptive case story resulting in normative claims (11 cases) and theoretical argument ending by normative claims. In both cases, researchers overestimate their own experience and judgement to the detriment of method.

Geographical distribution. It appears eGovernment conferences reach a fairly wide audience in terms of global reach, with reat variety. DEXA gathered researchers from30 countries, as compared to 9 for HICSS. While HICSS included people from Western Europe, USA and the Pacific, DEXA also included Latin America, Asia Russia and Eastern Europe. ECEG included authors from 15 countries, with no developing country or East Europe one represented, and 23 papers from the UK.

Conclusions

We set out to assess the maturity of the eGov field as a research area. The conclusion is that the field is indeed immature, because theory generation and theory testing are not frequent, case stories (no theory, no data) and product descriptions (no analysis or test) are frequent, dubious claims (beyond what is reasonable given the method used) are frequent, appear in 29 % of the papers, and only a few of the cases where theories are either tested or generated concern the role and nature of government, most concerns general organizational issues which could well find a place within traditional IS conferences.

This said, there are important differences among conferences on the above points, and the findings from the HICSS conference, rooted in the IS field, at least gives some indication as to our immaturity hypothesis that in comparison the IS field is substantially more prone to combine theory and data systematically. I believe that for egovernment/nance to develop to a distinct research field there is a need to consider the role of each conference. As for relevance, somewhat alarming may be that only 11 papers (of 170) involved shared authorship involving government practitioners.

On the positive side there are contributions from a number of disciplines, both social science ones and technically oriented, and international outreach beyond the North Atlantic shores is good if not truly global

References

1. Bannister, F., Remenyi, D. (2003) 3rd European Conference on e-Government. Trinity College, Dublin, Ireland, 3-4 July, 2003. ISBN 0-9544577-1-4
2. Proceedings of the 36th Hawaii International Conference on System Sciences 2003. IEEE
3. Traunmüller, R. (2003) Electronic government. Second International Conference, EGOV 2003, Prague, Czech Republic, September 2003. Springer Lecture Notes in Computer Science.

A Social Shaping Perspective on an e-Governmental System(ic) Failure

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Abstract. The paper that follows is concerned with the communities of interest (or actor networks) and communities of practice that articulate the delivery of e-government services, and with the discourse formations that shape the delivery of e-government services in the UK. The approach adopted within this paper is based on historical reconstruction and discourse analysis. This suggests that the delivery of an integrated and accountable e-government apparatus is a non-trivial objective for system developers, and that the overall complexity of such a development has been, and is grossly underestimated.

Introduction

The technical complexity of large scale integration of new and legacy components is acknowledged by developers, but they appear blind to 'discursive complexity', or the management of issues that emerge when new rhetorical formations replace the legacy rhetorics that have shaped investment. It is well-known that systems implementation is indeterminate (there is always a time-lag between the articulation of a design and its realisation, in a working system), and many project methodologies accommodate this by adopting iterative design techniques. But iteration, and indeterminacy are not acceptable rhetorical principles for public sector investment, where systems are presented as 'solutions' to tricky problem. Governments are traditionally elected to control or minimise risk, not to say that they do not know how things will turn out. There is thus a dissonance between the discourse of policy-making for e-government, and the discourse of systems design.

Social Shaping as a Methodological Framework

The investigation draws upon a sociotechnical study of indeterminacy and systems implementation. In the UK, pertinent work has been undertaken by, for example, Williams and his colleagues [1] working in the Social Science Research Centre in Edinburgh. Much interpretive systems research considers the human-technology assemblage after installation. It draws on observations of work that has been re-shaped or re-directed as humans accommodate the constraints of system formats and architecture. This process of accommodation may be protracted or continuous. In some cases, users may try to stabilize their social order by minimizing their interactions with the system. In other cases, enthusiastic managers may de-stabilise the social order by enforcing system-led innovations at a pace that accelerates the pace of change beyond

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what is tolerable. Historically, systems engineering has been based on formal models of objects and relationships that have been purged of contextual connotations: the systems that result are inevitably compromised in the workplace, in a process of 'participative implementation', or implicit or explicit configuration. Where design rationale has been parsimonious, and specifications and models are too narrowly defined, the divergence between system and context (where those who interact with the system make sense of their work) may be a source of stress.

The socio-technical approach outlined here embraces a number of concepts that are relevant to the investigation of e-government systems. These include 'innofusion' (an iterative cycle of supply and use); 'learning by struggling' or 'social learning' (that leads to 'negotiated' or 'emergent' outcomes); 'configurational technology' (the assemblage that results when components designed elsewhere 'imprinted with different assumptions, categories and divisions of labour', must be fitted to local circumstances); and 'socio-technical constituencies' (or the competing communities of interest who much reach closure if technology is to be stable in organisational terms). Analysts who take this approach may also be sensitive to paradoxes of design and implementation. These are evident in the tension between stability (standards, common expectations) and instability (dynamics of new technological opportunities and user requirements). In addition, the urge to make things manageable may lead developers to 'black box' some elements of design and reduce local knowledge while recognizing that 'sticky' problems are treated/solved with local knowledge which thus needs to be maintained.

Fleck (with Howells), a member of this group, has proposed the concept of the 'technology complex'; a multi-faceted framework for analyzing the complex factors that may be observed in the ongoing work of configuration (the de facto customisation in practice of new and existing components). He has described both organizational communities of practice in this context (that shape technology at work) and communities of interest, that shape pre-implementation policy-making and decision-making [2]. The discourse of organizational communities defines a common agenda, but may also be a source of competitive strength where social capital or social network effects come into play. The messages from an interest group within the organisation have more weight if they resonate with those of more powerful external allies. For example, many large corporate contracts are awarded not on the basis of requirements analysis, but on the basis of industry ecology, a phenomenon that is replicated in the world of e-government. A good example of this is the ten-year study of the implementaton of traffic policy in the city of Aalborg by Flyvbjerg [3].

But the distinction between the two types ('interest' and 'practice') of community is important. The rhetoric (or discourse that defines) an 'interest' community will tend to simplify the issues involved in systems implementation, and downplay risk by emphasising the track record of those who share the rhetoric. This discourse is what the public (or external audience) will hear. The discourse of a 'practice' community will, in contrast, focus on the difficulties of implementation, on ways of working around infeasible features, and on informal education in these processes for newcomers to a workplace. This process is well analysed in studies of 'articulation' or 'invisible' work [4]. The audience for this discourse is internal, though containment may be leaky, as apologetic 'officers' may share the 'work-around' with clients. By focusing on and analysing such rhetorical dissonance in interest and practice groups involved in e-government applications, investigations may provide insight into a complex set of domain trends.

The SQA Story – A Public Account of Discourse Dynamics

In the case study that follows, we tell the story of a public agency implementation of a computer system called the Awards Process System. Our account tracks events that as far as 10 August 2000, when the agency, the Scottish Qualifications Authority (SQA) sent out incorrect or incomplete examination results (or in some cases did not send out results data at all) to 16,748 candidates. This was deemed to be something of a national disgrace in a country that prided itself on the quality of its educational system, and led to resignations, litigation, four governmental inquiries, not to mention considerable adverse publicity. We also cover the aftermath, focusing on a number of disparate rhetorics.

The story begins in 1996 when a new national qualification for Scotland was developed, the Higher Still award[1]. This was intended to augment rather than replace the existing qualifications framework, and was intended to represent the merging of academic and vocational qualifications. There were two consequences of this development that are significant to our discussion. The first was that the development was beset with difficulties, which led to the Scottish Executive setting up, and chairing, the Higher Still Development Group to address ongoing problems in moving towards implementing the new award across Scotland. The second consequence was that it was decided that in tandem with the introduction of the Higher Still award, that a new agency – the Scottish Qualifications Authority (SQA) – would be set up to replace the two existing national examination award bodies in Scotland, the Scottish Examinations Board (SEB) and the Scottish Vocational Education Council. The SQA came into being on 1st August 1997 as a non-Departmental Public Body. The root of the problems with the 2000 examinations are traced back to this point [5], where senior management of the SQA 'failed' in the management and organisation of the newly merged authority.

Within the first couple of years following the instantiation of the SQA a number of things happened that would affect the future outcome in August 2000. Firstly, almost half of the SEB's experienced examination officers left on early retirement packages, and hence a considerable amount of specialist knowledge was lost to the SQA. Secondly, a very experienced Director of Operations retired and not replaced, followed soon after by the Head of Operations. Responsibility for the area of operations now fell under the Director of Awards, one of seven business units that this person oversaw. Finally, despite the fact that one of the working legacy IT systems that came with the merger had been developed to handle the Higher Still qualification, it was decided by the soon to retire Director of Operations that a completely new I.T. system should be developed and installed. This new system became known as the Awards Processing System (APS). As a part of the formal project management procedures required in public body IT projects, a Project Board was set up to oversee the specification and implementation of the APS project. The Board met for the first time in November 1997, with the first software scheduled for delivery in September 1998. One aspect of this decision was that the decision to develop a new system was not discussed, according to reports, with bodies responsible for developing the new qualification. This meant that the decision to develop a new system was taken before the

[1] Traditionally in Scotland, the norm has been that secondary level students attempt the Standard Grade awards at approx. 16 years of age, and Higher Grade awards at 17 years.

qualification process had been finalised. As noted subsequently by the Director of Awards, the software for the APS project "had to be specified and written for business processes not yet in place" [6] The proposed APS system would be the largest system of its type in the UK. Despite this, the schedule seemed rather optimistic; the software build was to begin in July 1998, with the first software release planned for September 1998. It was proposed that the APS system would first be used to handle the issuing of some examination certificates in December 1999.

By July 1999 major difficulties in user testing were minuted. Concerns that arose in October 1999 at the Scottish executive were met with assurances by the SQA in October and November 1999 that the reported anomalies were 'caused by a computer error' [7] but were of limited significance. On 28 September 1999 it was noted at a meeting involving the SQA that there were concerns about the high volumes of data that assessment centres were supposed to be able to supply to the SQA. While the SQA did not acknowledge any sense of problems with the assessment process, in March 2000, national press reports suggested that the IT systems used by schools to transmit data to the SQA were not working properly. While later that month SQA meeting minutes note that software to process marks was still being developed, and that staff were working very long hours, there was no suggestion that there would be any problem with the way in which awards would be made in the coming summer.

In fact, the plan to utilise the APS system to process some results in December 1999 had to be abandoned because it became evident to the SQA that the system would not work. Instead they reverted to an earlier system, the Record of Education and Training (RET) system, used by SCOTVEC, one of the institutions merged to form the SQA in 1997. This incident was not recorded as having been acknowledged as a matter of concern by the management or board of the organisation.

Nonetheless, further reports of software problems between the SQA and the award centres appeared in the national press once again. This article quoted a senior manager of the SQA stating that the examination and award process would run smoothly, a view backed up in a letter to the Scottish Executive on 6 April [8]. On 24 May 2000, the APS project board noted that there may indeed be apparent problems ahead in the processing of results by the SQA given that the necessary software for APS still had not arrived, more than two years later than specified Not only was the delay in implementing APS meaning that the time to process an estimated 4 million pieces of data (permutations of candidates and courses) was getting considerably shorter but there was no contingency plan should the software either not be implemented, or should it fail to work as expected once implemented [9].

Communications between the Scottish Executive and the SQA are reported as indicating that there was no official hint of a problem with the publication of national assessment results until 26 June 2000, when a phone call with a senior official at the SQA revealed that substantial volumes of assessment data was missing from the SQA's database, and 22,000 examination papers had not been allocated to markers (although elsewhere it is reported that in fact the true figure was 65,000). Both of these points were consequences of previous initiatives. In the case of the data, the new qualification required much greater amounts of assessment recording by schools and colleges, and this data then had to be transmitted to the SQA using technology with which there were evident problems. The non-allocation of papers to markers arose as a result of delay in recruiting markers because of uncertainty about numbers required for the new qualification, coupled with a reduction in people (teachers primarily) wishing to be markers because of reductions in the financial rewards for marking.

Nonetheless, on 28 June, an SQA representative insisted during a radio broadcast that the results would be delivered on time. Further press reports of 'serious computer problems' the next day were met with SQA insistence that any marking problems had been contained [10]. During July 2000 it is reported that the Scottish Executive and the SQA were in frequent contact discussing aspects such as contingency planning, should there be any problems, and the evident lack of management information given that the SQA could not say whether or not data was missing, nor even what data had been received.

The first admission of problems by the SQA are said to have come on 31 July 2000 when it was suggested that the publication of results may be postponed. The next day, it is reported that the SQA decided not to delay results, although it would be another 3 days until they had management information about the number of students for whom results may be missing or incomplete. By 4 August, the SQA reported that about 1% of results may have errors in the, which would affect over 1000 candidates. The Scottish Executive proposed that an independent review be instigated, although this was not well received by the SQA, it is reported, because of fears that the public image of the SQA may be harmed. Instead, the SQA suggested that their internal auditors, Price Waterhouse Coopers, conduct a review.

Either way, on 8 August, the central University applications handling service (UCAS) which formed the basis for the awarding of University places to the vast majority of applicants, had not received the results it was expecting. The SQA issued results on 9 August, although when many did not turn up with candidates on 10 August, the SQA initially argued that this was a problem with the Royal Mail delivery process. Later that same day, apparently following questioning from the Scottish Executive, the SQA admitted that in fact some results had not been issued. Intense media coverage followed, although initially it was thought that the number of students affected ranged into the hundreds, not thousands. It was not until October 2000 that the final figure of 16,748 candidates (or 2.7% of the results) had been affected.

Some Organizational Consequences of Discourse Dissonance

Three consequences of discourse dissonance may be identified from the public accounts from which the above historical investigation has been constructed. These are

- Elitism (and its concomitant, design inertia)
- Resistance (in the form of demoticisation, or local language to describe technology at work)
- Speciation (in the form of local variants of practice that may compromise interoperability)

The phenomenon of elitism may be explained by the brief analysis offered above, which implies that the ecology of communities of interest is likely to be shaped by social network effects. This means that there are likely to be a few very strong players who have links to most of the networks in the relevant field. This is manifest in the small and oligopolistic market that has developed for e-government service implementation, where repeated contracts are awarded to large corporate developers whose previous contracts have not been delivered to budget, on time or to a performance standard that satisfies agreed criteria. Elitism was also evident in the selection of members of the 'watchdog' committee for the SQA project; this comprised members

of the Edinburgh establishment many of whom had no experience of systems work. The 'winning' discourse among competing rhetorics of interest will draw its strength by association with proven players, who can offer 'integrated off-the-shelf solutions' in the form of implementation plus training that are cheaper than those involved in detailed local user requirement analysis[2].

This explains the second trend of resistance through demoticisation, or the development of local discourse to justify and accommodate variants of 'official' designs. The vested interests of corporate suppliers often support minimal modification to existing product, rather than accommodation of deeply observed local practice. This, in turn, leads to practice work-arounds, that may compromise the investment in training that accompanies development. Work-arounds can minimise the effort needed to adapt to change (which may in the interests of clients (citizens or extra-departmental colleagues) and so on) as much as co-workers. But work-arounds imply a level of intimacy and stability in staff (the conditions that obtain in a community of practice) which may not be present where there is high turnover and little social capital, and where discrepant understanding may be source of tension. This was evident in schools in the case of the SQA, where overworked and concerned teachers developed somewhat desperate if ingenious 'fixes' to escalating problems.

Where local registers develop to support local practice, it may be difficult to design integrating ontologies for joined-up systems, or interoperability, and a form of 'speciation' may develop as happened with the SQA and the various educational centres, and other bodies that did not feel that they could rely upon the electronic services. Internal speciation in organizations is common: there are many instances, for example, in the UK National Health Service of incompatibilities in patient clinical records held across departments. In 'non-e' practice, 'bridging' comments are often written on traditional paper records to align different specialist interpretations (and thus different classification systems). This practice, in spite of the best efforts of designers, is difficult to re-produce in the contexts of e-services.

Some Political Consequences of Discourse Dissonance

Our historical account has been developed from a number of public data sources. These sources comprised newspaper and other journalistic (e.g. computer press) records, the reports of the four official inquiries referred to previously, the Scottish parliamentary records, and the minutes of the inquiries (where available) that purported to record the proceedings and evidence presented. While the data draws our attention to an apparent disparity between institutional discourse for internal consumption and discourse for external consumption, the account does nonetheless lack insights to discourse arising through the more private, localised, institutionally based interactions.

Rhetorical dissonance is reflected in this case amongst interest groups that were supposed to be cooperating. However, this rhetorical dissonance can be better understood when we consider the communities of interest and communities of practice. The

[2] User requirements analysis is an atavistic presence, however, in most of the approved methodologies for e-government systems development and design (it is, for example, a staple component of UK public sector (Prince) and EC 5th and 6th Framework projects).

community of interest within the SQA was the lead project 'controllers', for whom a key element became the control of public discourse. At the same time, a community of practice within the institution, as well as amongst networked educational institutions were privately raising concerns about the systems being developed. Some of these concerns 'leaked out' to the media, but nonetheless, the dominant rhetoric of the 'interest' community held sway.

What we see at the SQA is both conflicting discourse over time (the before/after views), and also conflicting discourse amongst communities of interest (particularly in the 'before' period). What is particularly interesting is the (unsurprising) tendency for the 'public rhetoric' of the controlling/primary constituency to dominate, suggesting that there were no problems – although as would later be seen, the private discourse (as evidenced in documentary records) displayed a different level of awareness, namely that there were problems.

A social shaping perspective draws out the interrelationships of what took place – the web of relations; it also draws our attention to the inseparability, or mutual constitution, of the sociotechnical, where each, often imperceptibly, shapes the other. The interplay of such trends and discourse dynamics has major consequences. The perceived rewards for failure in the form of renewed systems contracts to a perceived 'elite' are a source of cynicism in the public. Demoticisation also breeds cynicism, both as an indication that the original designers of systems were 'off the mark', and because of inefficiencies in meeting clients' demands. Experienced government officers, competent under the terms of a previous policy regime, may find themselves deskilled by the demands of developers[3]. Speciation is bewildering for clients, who are required to provide again and again what seems to be identical information, to what they perceive as a unified department. A systematic and comprehensive investigation of the discourse dynamics of e-government is thus in the public interest.

References

1. Williams, R.: The social shaping of technology. In : Dutton, William H. (eds.): Society on the line:
2. Information politics in the digital age. Oxford University Press, Oxford (1999) 41-3
3. Fleck, J. and Howells, J.: Technology, the Technology Complex and the Paradox of Technological Determinism. Technology Analysis & Strategic Management. 13 (4) (2001) 523-532
4. Flyvbjerg, B.: Rationality and power. University of Chicago Press, Chicago (1998)
5. Gerson, E., and Star, S.: Analyzing due process in the workplace. ACM Transactions on Office Systems 4(3) (1986) 257-270
6. Scottish Parliament. Education, Culture and Sport Committee, Report on the Scottish Qualifications Agency. Edinburgh (2000)
7. Scottish Parliament. Education, Culture and Sport Committee Report on the Scottish Qualifications Agency, 31 October. Edinburgh (2000) sec. 126

[3] Research carried out in August and November 2002 by the UK government's Local and Regional Government Research Unit, the Implementing Local e-Government survey found that many authorities lacked planning skills [11]. The report said 72 per cent of local authorities reported that their officers and members needed training. "[They] are most likely to lack skills relating to strategic issues and project management, as opposed to more technical skills." A whole new layer of intermediation has emerged.

8. Scottish Executive. Education Department. Final Report on the Scottish Qualifications Agency, 31 October. Edinburgh (2000) p.25
9. Scottish Executive. Education Department. Final Report on the Scottish Qualifications Agency, 31 October. Edinburgh (2000) p. 27
10. Scottish Parliament. Education, Culture and Sport Committee, Report on the Scottish Qualifications Agency. Edinburgh (2000) Annexe 1, sec. 1.4
11. 10.Scottish Executive. Education Department. Final Report on the Scottish Qualifications Agency, 31 October. Edinburgh (2000) p. 29
12. Office of the Deputy Prime Minister. Local and Regional Government Research Unit, Implementing Local e-Government. London (2002)

Rules, Norms, and Individual Preferences for Action: An Institutional Framework to Understand the Dynamics of e-Government Evolution

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Abstract. Recently national, state, and local governments from many countries have been attempting to reform their administrative structure, processes, and regulatory frameworks. E-government can be seen as a powerful approach for government administrative reform. The dynamics and evolution of e-government is a complex process resulting from strategic behavior, development of rules and standards, and appropriation of those rules and standards by the international community. The purpose of this paper is to present a theoretical and analytical framework that explains how this e-government evolution has taken place. Based on a literature review about the study of rules and principles from both institutional and principal-agent theories, a dynamic feedback-rich model is developed and a number of lessons are presented and discussed.

1 Introduction

Currently public officials, citizens, and academics are talking about e-government and its impact on society and government performance. Most people are interested in receiving better services from government, and some think information technologies (IT) are at least part of the improvements necessary. However a consensus does not seem to exist with respect to defining or characterizing electronic government.

The academic literature contains at least three different approaches for understanding electronic government [6]. The first view creates a concrete definition containing the main characteristics of what electronic government is or should be. A second approach lists the different variants or applications of electronic government as a way to clarify this concept. A third conceptual approach develops an evolutionary argument in which an electronic government is defined by referring to the different stages that exist in its development. This type of vision maintains the assumption that there is an evolution towards electronic government. This work investigates the dynamics of e-government evolution by understanding the mechanisms that influence rule evolution in organizations over time as a function of endogenously generated pressures.

For e-government, standards and rules are developed through a process of interpretation, adaptation, and implementation. First, actions of several governments over

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time condition what is interpreted and understood as being an effective and useful e-government. This interpretation becomes a history of success in this area. Second, lessons from history are adapted into standards and rules about what e-government should be; these are incorporated into the repertoire of information technology features that government organizations accept and use to develop their own web pages and electronic services. Third, actors in the system select and implement new rules and standards from the existing repertoire; when used by other actors, these become part of the expected minimum features for effective e-government. Therefore understanding the changing nature of the norms and rules in e-government can generate insights concerning the evolution of initiatives in this sector. An evolutionary model centered in the nature of the rules of e-government can provide knowledge about expected specific behaviors and explain the existence of today's e-government initiatives.

2 The Evolution of e-Government

There are different ways to understand the evolution of electronic government. Some authors have adopted what can be called the evolutionary approach [7, 14]. They considered that there are certain e-government stages, from developing a web page to the integration of government systems behind the web interface. Therefore the evolution of electronic government can be understood as the dynamics of rules and standards from one stage to the following (e.g., from interactive presence to transactional presence). Several endogenous pressures exist that drive governmental behavior towards compliance with certain minimum standards (rules about what e-government should be). These pressures create dynamic behaviors that push governments to move from one stage to the other.

The different stages are as follows: (1) *Initial Presence.* These sites normally work solely as a source of public information, presenting static data about the government; (2) *Extended Presence.* Citizens can have access to dynamic and specialized information that is updated through a great number of official sites. Generally, the governments use simple interaction forms such as "searching machines" or electronic mail; (3) *Interactive Presence.* A national or statewide portal normally serves as the initial page. Greater interaction occurs between citizens and the different governmental agencies. It is possible for the user to have access to information according to her/his interests and necessities; (4) *Transactional Presence.* The portal allows users to personalize it and has a type of unique window that practically takes them to all the governmental services in their interest areas. Access is organized according to people's needs instead of governmental functions or structure; (5) *Vertical Integration.* This consists of the physical and/or virtual integration of governmental organizations from the different levels of government that serve similar clients or have responsibility for a common function; and (6) *Horizontal Integration.* To accomplish this kind of integration it is necessary to cross organizational boundaries and develop an integral vision of the government as a whole.

It is clear from the descriptions above that each of the different stages represents the addition of several rules and standards related to what e-government is expected to be in a certain governmental community. The different stages are presented as the right path to follow to develop a fully integrated e-government (as it is now con-

ceived). It is very important to emphasize that these stages are different for different communities of governments. For example, in the United States of America, many local governments are attempting to go from the initial or extended presence stages to a more transactional stage. However other local governments are still trying to establish their first web page containing the basic information they want to provide to citizens and business organizations. Therefore, this paper is not talking about a general or global dynamic of e-government, but about an analytical approach for understanding the evolution of e-government in specific contexts and governmental communities (e.g. states, urban counties, large cities, etc.).

3 The Approach

We used the system dynamics approach to study the evolution of e-Government because it provides a way to explore feedback-rich systems in which the nature of the relationships among the elements creates circular causality. System dynamics allows the researcher to investigate the effect of changes in one variable on other variables over time. System dynamics is a computer-aided approach to policy analysis and design that applies to dynamic problems arising in complex social, managerial, economic, or ecological systems [12]. Dynamic systems are characterized by interdependence, mutual interaction, information feedback, and circular causality. The aim of a system dynamics modeling intervention is to generate structurally-based explanations of the behavioral evolution of the phenomenon under investigation to generate insights that will allow the finding of leverage points of intervention.

4 Understanding the Dynamics of e-Government Evolution

We propose that e-Government dynamics can be understood using an endogenous view based on the notion that observed behavior conditions the system of rules present in an organization, which in turn conditions the responses individual actors have to the system of rules [2]. Over time, e-Government presence becomes the norm and eventually an operational standard that can become a legal requirement (a new rule of how government services should be provided). In Figure 1 we present a model in which performance measurement is a function of the government's actions and the performance measurement mechanism in use. To improve the measured performance of the government, it is necessary that either the government changes its actions or that the performance measurement mechanism itself changes.

The measured performance influences people's perception of added value that when compared with the people's goal for added value allows the people (the principal in this model) to perceive a gap in the performance of the government. The perception of this gap will create pressures to meet the predetermined goals and will change governmental actions. This cycle (cycle L1 in figure 1), generates what Argyris and Schön [1] call single-loop learning, which also can be understood as an external motivation loop for the government at any given point in time. A similar loop (L2) is present on the government's side (the agent in this model). L2 (associated with the governments' actions) represents an internal motivation loop for the government. This cycle would act as a driver in the pursuit of additional e-government initiatives and capabilities.

Governmental perception of gaps in performance also influences the perceptions of how to meet the goals by means of how to use (and sometimes misuse) the performance measurement system changing the way the rules of the game are interpreted and used. This cycle (L4) is akin to Argyris and Schön's [1] double loop learning concept. L3 represents a similar cycle on the people's side.

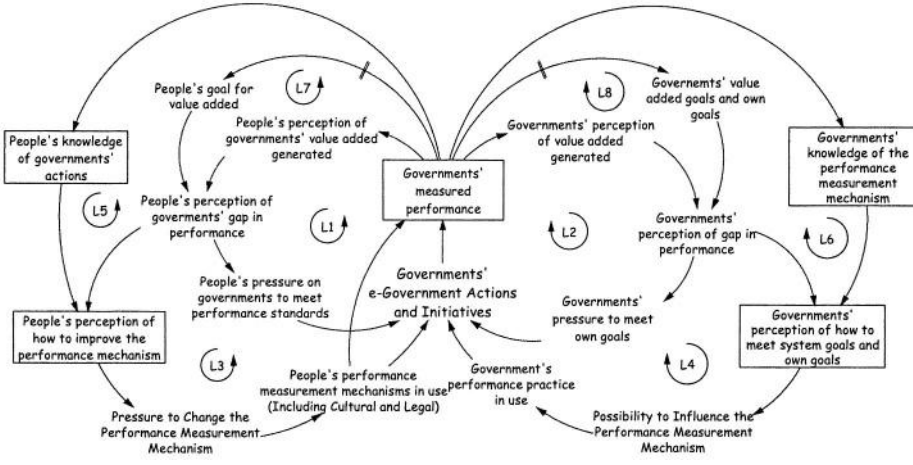

Fig. 1. Dynamics of e-Government Evolution.

An expansion to Argyris and Schön's [1] concept of double-loop learning is presented in our model and articulated via loops L5 and L6. The distinction relates to the main sources of learning in the double-loop mechanism. The expansion presents a difference between double-loop learning cycles based on behavioral knowledge as opposed to cycles based on structural knowledge. L5 captures the opportunity for the governments to redefine the way in which they follow the performance measurement rules based on a deeper knowledge (structural) of the mechanism itself, not only on knowledge of the deviations from their own goals (L3).

In addition, the historical level of performance influences the way in which the goals of both the people and the government behave so as to adjust goals on both the people's side and the government's side (L7 and L8). Adjustment in goals has been documented in the system dynamics literature [13] as moving goals mechanisms, in the organizational and decision-making literature as adaptive goals, and in the economic literature as the ratchet effect. This assumption is key to the model because it allows for the possibility of sliding goals that, over time, become new norms and standards of operation (or even new expectations as to what governments should do). This affects the way in which e-government initiatives behave in general, because if previous initiatives become 'the normal way to operate governments', these can become the standard way to do it over time.

According to our model, we can expect governments to design and implement new initiatives simply to comply with a normalization process and not necessarily to try to fulfill their purpose of generating improvement mechanisms within the government to benefit the people. In the best-case scenario, these normalization processes would be aligned with improvement mechanisms, and the overall effect would be to get more

added value for the people (efficiency and effectiveness in government activities). However, even if this were the case, it would happen for the wrong reasons (normalization processes) and could lead to a total disaster if the new initiatives in place result in significantly decreased value being added for the people.

The model presents an endogenous theory of the change of e-government initiatives with actions based on learning mechanisms present on both the people and governmental sides as to how to evaluate and use the performance measurement mechanisms of governmental activities. Governments may decide to provide (or suspend) e-government services either as a way to improve the added value to the people or as a means to be perceived as a better provider (or agent) of public services.

5 Final Comments

In the case of e-government, initially it was important to have an electronic presence. Every government needed to develop websites to provide information to citizens and organizations. The performance standard was based on providing information through electronic web pages. Competition between government entities as well as the mimic effects [11] among different levels of government and governments from different countries pushed them to adopt new standards and rules as to what a government web page should contain. These forces coupled with the endogenous mechanisms took e-government to the next stage and the ones thereafter. Following this argument, the evolution of e-government is related to citizen expectations and demands, responses of government officials to these demands, and the reactions of the people to those responses.

Additionally, the observed changes are linked to the political competition and government multi-layered mechanisms attempting to accomplish their own interests and goals (learning about what to do and how to do it) and to the competition between governments in different countries. Citizens and politicians can be seen as the principals of public servants [9] who can learn the wrong lessons about what is better (especially when comparing local activity with international activity) and encourage the wrong types of behaviors. Comparison of the endogenous dynamics between citizens and governments, between governments at different levels (e.g. local, state, federal, etc. as another principal-agent relationship), and governments in different places (countries), will help shed light on the multiplying effects and dynamics of these different sources of change.

The development of the different stages of e-government is not homogenous. According to Giddens [5, p. 245], "if the social life is contingent, all social change is conjunctural. That is to say, it depends upon conjunctions of circumstances and events that may differ in nature according to variations of context, where context (as always) involves the reflexive monitoring by agents involved of the conditions in which they 'make history'." Many local governments in developing and developed countries are struggling to have at least a formal presence on the Internet. On the other hand, national governments from developed countries are competing for transactional portals with many services and personalization features. Understanding the way in which rules, norms, and individual preferences for action evolve over time can be a powerful framework to understand the dynamics of e-government evolution.

References

1. Argyris, C., Schön, D.A.: Organizational Learning II: Theory, Method, and Practice. Addison-Wesley Publishing Company, New York (1996)
2. Courty, P., Marschke, G.: Measuring Government Performance: Lessons from a Federal Job-Training Program. The American Economic Review 87 (1997) 383–388
3. Ensminger, J., Knight, J.: Changing Social Norms: Common Property, Bridewealth, and Clan Exogamy. Current Anthropology 38 (1997) 1–24
4. Feldman, M. S.: Organizational Routines as a Source of Continuous Change. Organization Science 11(6) (2000) 611-629
5. Giddens, A.: The Constitution of Society: Outline of the Theory of Structuration. University of California Press, Berkeley (1984)
6. Gil-García, J. R., Luna-Reyes, L.F.: Towards a Definition of Electronic Government: A Comparative Review. In: Mendez-Vilas, A., et al. (eds.): Techno-legal Aspects of the Information Society and New Economy: An Overview. Formatex. Badajoz, Spain (2003)
7. Layne, K., Lee, J.: Developing fully functional E-government: A four stage model. Government Information Quarterly 18 (2001) 122–136
8. March, J. G., M. Schulz, M., Zhou. X.: The Dynamics of Rules: Change in Written Organizational Codes. Stanford University Press. Stanford (2000)
9. Moe, T. M.: The New Economics of Organization. American Journal of Political Science. 28 (1984) 739-777
10. OReilly, C., Chatman, J.: Culture as social control: Corporations, cults, and commitment. Research in Organizational Behavior 18 (1996) 157-200
11. Powell, W. W., DiMaggio, P.J. (eds.): The New Institutionalism in Organizational Analysis. The University of Chicago Press. Chicago (1991)
12. Richardson, G. P.: System Dynamics. In: Gass, S.I., Harris, C.M. (eds.): Encyclopedia of Operations Research and Management Science. Kluwer Academic Publishers. Boston (1996) 656-660
13. Sterman, J. D.: Business Dynamics: Systems Thinking and Modeling for a Complex World. Irwin McGraw-Hill. Boston (2000)
14. UN and ASPA: Benchmarking E-government: A Global Perspective. United Nations Division of Public Economics and Public Administration and the American Society for Public Administration. New York (2002)

Reduction of the Administrative Burden: An e-Government Perspective

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Abstract. The introduction of e-Government thus far has been largely focused on improving service delivery and governmental back office integration. Nevertheless the State of Affairs in e-Government in Europe shows a growing mismatch between supply and demand in e-Services to the public. The current focus on the reduction of the administrative burden however has opened up new perspectives in the development of e-Government. In this paper we present an overview of the political and technological issues that dominate the discussion on the reduction of administrative burden. We will furthermore explain some critical success factors in this process. As an illustration we will refer to the approach followed in the Dutch e-Government Programme.

1 Introduction

The European Institute of Public Administrations (EIPA) [3] describes in a recent study of the State of Affairs in eGovernment in Europe that a growing mismatch between supply and demand in eServices exists. Only few governmental portals support full transactional communication and the majority of so-calles 'best practices' (see e.g. the *e*Europe Awards for *e*Government winners and honorable mentions in 2003 [4]) concern information delivery, domain oriented one-way transactions (governmental service delivery on tax, customs, jobs, social security) and/or re-use of governmental data.

Our recent study on data reporting strategies shows that the main motivators for eGovernment innovation are improvement of the *efficiency of the governmental back office processes* and *improvement of the services delivery towards businesses* [1]. A new promising motivator for eGovernment innovation is getting a more and more attention in discussions within the Dutch and other European governments: the reduction of the administrative burden for businesses. This development must be positioned within Europe the political attention of the issue of the administrative burden is part of the broader discussion on 'better law making', 'European Governance' and simplification of regulations (e.g. European Commission, COM (2002) 275). Already every new EU-regulation has to be assessed on regulation costs. The Mandelkern Group who advise the European Commission on better regulations, found that all Member States have now recognized the importance of addressing the need for pruning of accumulated regulations, procedures and formalities that have built up over many years [5]. But although this report dates from 2001 most member states have only recently begun to take concrete actions along the lines recommended by the EU and

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more particularly the OECD. In this paper we will discuss the theme of reduction of the administrative burden and its relationship with ICT. We will look at the success factors of this new eGovernment motivator. In the next paragraph we will introduce a framework build upon some underlying concepts regarding administrative costs. Based on that framework, we will discuss the possible contributions of the ICT instruments. We will illustrate our framework with some practical examples from the related Dutch *e*Government programme. We finally will conclude with a discussion on an emerging eGovernment perspective.

2 The Administrative Burden

2.1 The Governmental Perspective: Administrative Costs

The fact that businesses are active within a social constitutional state with its many public goals explains to a considerable extent why compliance with so many regulations is required [6]. Governmental organizations regulate the behaviour of business to have them contribute to (or not harm) the achievement of public goals. This governments' regulatory power is based upon administrative laws. The obligations imposed by these regulations (e.g. environmental and safety regulations, taxes and the payment of social welfare premium) apply to the businesses' behaviour and/or their situations. Nijssen [6] calls this type of administrative regulations 'content obligations' (thus distinguishing them from juridical process-related information obligations).

In order to allow governmental organizations to check compliance with and, when necessary, enforce the material (content) obligations, businesses have to inform them on their behaviour. Nijssen mentions different aspects of information obligations between governments and businesses [6]:

- The transfer of information has a *dual character.* Governments make and communicate about laws and regulations (regarding content and information obligations). Businesses report according to these information obligations. Without regulations there are no information obligations.
- The transfer of information is always based *on a material (content) obligation* (e.g. the amount of taxes that should be paid).
- The information to be transferred is specifically stated in the related set of norms expressed in laws and regulations.
- The information transferred has *multiple functions*: it serves as input for the governmental monitoring and enforcement processes as well as input for 'calculating' the primarily legal obligations (e.g. calculating the amount of taxes that should be paid).
- There is *no monetary reimbursement* from the government for businesses for the transfer of information.
- The transfer of information is *not* within the framework of *penal law.*

2.2 The Business Perspective: A Burden

Businesses suffer from the many legal obligations enforcing them to produce, distribute and store large amounts of data. This information provision is not in the interest of

the business but merely in the interest of the government (i.e. the public administrations responsible for law enforcement). The business although paying the costs for developing and maintaining information systems and administrative procedures to fulfill their obligations perceive no or just little direct added value returns from these information providing obligations [1]. The legal obligations to provide the public administration with information are therefore considered to be an administrative burden.

The current implementation of the Business-to-Government interfaces supporting these data reporting streams adds to the burden. In [1] we gave some examples:

- slightly *similar data* have to be reported to different agencies
- reporting *frequencies* differ
- various *implementations* of the data reporting interfaces exist
- different *definitions* for the same object (e.g. salary) are used in different regulations.

These business costs e.g. sum up to approximately 3% of the Dutch Gross National Product and have a negative impact on economical growth and employment. In a relatively small country as the Netherlands in 2003 the total of administrative costs was 17.000.000.000 Euro of which 5.000.000.000 Euro was caused by just the fiscal obligations. One can easily understand why the issue of the reduction of the administrative burden has become a political issue. Finding a solution for reducing these costs without deteriorating the legal systems too much is extremely complex. As a consequence of the many inter-related regulations one could not just retract a costly information element by deleting one norm in one law without looking into related norms (other articles in the same or in other laws may refer to that specific part of the law). The relation between normative expressions in the law, the legal meaning (and purpose of these norms) and the practical consequences (including law enforcement issues and administrative costs) therefore also got academic interest. Within the field of Juridical Knowledge Management this field is called 'legal engineering'. Legal engineering is the discipline that develops methods for designing and developing normative systems (and consequently looks into legislation drafting, law enforcement etc.). A special point of attention is paid to developing a systematic approach for analyzing the sources for administrative costs and developing tools that support legislation drafters with their attempts to reduce these costs.

3 The Reduction of Administrative Costs

3.1 Measuring the Costs

An important aspect in governmental programmes aimed at reduction of administrative cost is the use of a systematic or methodical way of measuring these costs. Many Dutch programmes make use of the 'Mistral model', a model that contains the costs of different information elements that are causing the administrative burden of business [6].

According to the creators of that Mistral model administrative costs relate to the *collection, processing, storage, and distribution* of this information. The information is delivered to public administrations in the form of a message. This message of

course can have different physical implementations: a paper form, an EDI message or an e-mail. Each type of message has its own "production process" consisting out of several administrative activities. The administrative costs therefore can be determined by a function over (at least) the *number of messages* and *cost per message.* Whereas the cost per message is determined by a function over (at least) *time per activity* and *tariff.*

In the search for efficient and effective implementations supporting the transfer of the obligated information, *number of* and *cost per* message are therefore determining factors.

3.2 The Overall Approach

The problem of administrative costs resulting from legal obligations can not be solved by the sole introduction of ICT instruments. Better regulations, the synchronization of legal data definitions and the introduction of new enforcement methods, certification, licensing, etc. have to be part of the structural solutions to this problem. These measures to a large extent reduce the *number* of messages.

Looking at different European countries and initiatives [1], [7] we find that a successful overall approach for the reduction of administrative costs consists out of:

- *Political commitment* on reduction targets and plans resulting in the repeal and simplification of laws and regulations (including the implementation of European legislation). The process aiming at reducing administrative cost has many stakeholders and sometimes conflicting interests. Consequently it should be monitored by an independent organ should monitor the progress. In the Netherlands each department has measured the administrative costs caused by regulations they are enforcing. The Dutch government has committed itself to a 25% reduction objective and has recently presented reduction programmes.
- *Cooperation between public administrations and businesses* with concern to planning and execution of reduction programmes and message standardisation. In the Netherlands business are closely involved in the planning of reduction programmes. Government and business representatives jointly discuss the direction of the related ICT programme.
- *Simplification of the administrative infrastructure* by redesign of public administrations' back office processes and (related) reporting interfaces between these administrations and the businesses. In the Netherlands e.g. the ICTAL Programme (ICT en Administratieve Lastenverlichting in English ICT and Reduction of Administrative Burden) delivers the supporting generic ICT solutions as described in the next paragraph.

3.3 e-Government Instruments

Administrative costs are related to the available administrative infrastructure and its associated ICT components. The way the administrative infrastructure is implemented largely influences the *cost* of the messages that have to be exchanged. These costs are as mentioned before a function over at least the *time per activity* and its *tariff.*

From an ICT-service perspective there are three main area's in which ICT can directly contribute to the reduction of administrative costs:

1. *Information and transaction portals.* The use of information and transaction portals centralises the contacts between government and businesses and can thereby reduce *search time* for obligations and forms. The portals in general support initiating transactions. The electronic forms, sometimes partially filed, need human handlings to be completed and returned. The Spanish business portal and the Danish VIRK ("work") are successful examples. In a Dutch survey on ICT and the reduction of information obligations [2] the reduction potential of separate portals was estimated as (very) low, being somewhere between ten and fifty million Euros per year and probably even less (thus a relatively small amount compared to the 17 billion Euro of administrative costs but still substantial).
2. *Authentic data registers.* The use of authentic registers supports governmental back office integration. Data registered in these central databases are considered to contain the *identifying* attributes of an object (e.g. person, company, estate). Re-use of these data elements by governmental agencies is often obligatory, for example in the case of the Belgian KBO. This reduces the administrative burden in the case of the identifying data: *once delivered* by a company allows *many times used* by public administrations. The Dutch survey estimated the reduction potential of each register as (very) low, also less than 50 million Euros per year.
3. *Electronic data translation and transport facilities.* The use of electronic *data translation and transport facilities* simplifies the cyclic reporting of standardised messages. In most cases this is done by direct interconnection of business systems and governmental systems. "Translation" in this respect means the automatic semantic mapping of data definitions used in the business administrations to the defined message structure. "Transport" means the distribution of the message to the governmental system using an electronic network, thus eliminating human handling and reducing handling *time and tariff* per message. The specific implementation of these facilities varies and with it the reduction potential. The Dutch survey estimated the reduction potential of some of the facilities as very high, being circa more than 500 million Euros per year.

A growing number of successful examples in the first two areas exist, while in the Nordic countries also systems supporting the last area are being developed [1]. Within the Dutch ICTAL Programme the above mentioned areas are currently being implemented. Within all three areas first releases of ICT applications were implemented in the first quarter of 2004.

4 A New e-Government Perspective?

While the governments' focus is shifting towards integrated services, knowledge management and good governance, technology is no longer a major issue. This development of *Integrated Government* [4] focuses on designing a (cost) effective the legal framework, administrative processes and chain management approach.

The political desire to reduce administrative costs has definitely been stimulating for further developing eGovernment. In this conclusive paragraph we will elaborate on three important change drivers. These drivers have been and still are important for the Dutch ICTAL programme and for the governmental renovation programmes in Norway and Denmark that follow a similar integrated strategy as the one in the Netherlands.

Shifting from means orientation towards a goal orientation

The reduction of the administrative burden is a major political issue and the proper use of ICT can help to achieve this political aims. Consequently eGovernment is seen as a means to help realise political goals instead of being a goal in itself. eGovernment solutions of course have to fit the legal systems they are part of and contribute to the public administrations' (re)design but above all they should help to reduce administrative costs. This enlarges the pressure on the administrations to deliver practical solutions but also mobilizes support for eGovernment initiatives.

Shifting focus from governmental processes towards business processes (internal versus external focus oriented)

Instead of merely automating existing (paper oriented) governmental processes and services the governments focus has shifted towards the added value delivered in relation to business processes. The results of many joint business-government studies on administrative costs reduction initiatives point in the same direction: take the business (system) as starting point and try to synchronise with the business' processes and systems. Several Dutch governmental organisations using annual reporting figures have therefore decided to base their joint project on electronics reporting on IRS (International Reporting Standards) and XBRL market standards.

Shifting from point solutions and isolated e-services towards generic standards and facilities

In the Netherlands the majority of the business-to-government interfaces are supported by paper forms and via websites and web forms. A growing number of repeating, standardised, transactions and messages are being supported by automated interconnection. But, implementation and adaptation are harsh, partly caused by lack of interoperability standards. A result of the closer business-government cooperation on the reduction topic has been the establishment of the ICTAL Programme. Both business and governmental organizations are committed to the use of the generic facilities and standards implemented by the Programme. This creates a basis for the establishment of one central reporting Gateway, investments in standards by software developers and joint development of message standards.

However some fundamental issues regarding the directions for an effective eGovernment strategy are still unsolved:

- Will businesses be *seduced or obliged* to implement the ICT instruments developed by the government to reduce the administrative burden? If obligation is needed, why then is the cost reduction possibility for business not persuasive enough? This practical issue points to a theoretical question regarding the relation between the macro quantification of administrative costs (as e.g. expressed in the Mistral model) and the micro decision of a particular business man that needs to invest in a solution first in order to reduce administrative costs later.
- What can be the role of (private) *intermediary parties* in the reduction of administrative costs? In some OECD countries these parties have a regulated status within the data reporting domain. In the Netherlands implementation efforts from governmental organizations tend to shift from individual companies to large intermediary data processing "hubs".

Further research on European experiences should provide us with answers to these questions and consequently help to find smart solutions for smart governance.

References

1. Arendsen, R., Van Engers, T.M., An Empirical Study on Law Enforcement and Data Reporting Strategies, in: Proceedings of E-Government Workshop in conjunction with JURIX 2003, Palmirani, M. et al., Universitatsverlag Rudolf Trauner, December 2003.
2. Boog, J.J., Reductie administratieve lasten door ICT, EIM Onderzoek voor Bedrijf en Beleid, Zoetermeer, 2001.
3. EIPA, The eEurope Awards for eGovernment – 2003, www.e-europaawards.org
4. Leitner, C., *e*Government in Europe: The State of Affairs, *e*Europe Awards 2003, Eipascope 2003/3, www.eipa.nl.
5. Mandelkern D, Mandelkern Group on Better Regulations, Final Report, Brussels, November 2001
6. Nijssen, A.F.M., *Dansen met de Octopus,* (English Summary) Een bestuurskundige visie op informatieverplichtingen van het bedrijfsleven in de sociale rechtsstaat, Uitgeverij Eburon, Delft, 2003.
7. Zijden, H. van der, Eindrapport "ICT en Administratieve lasten", Ministerie van Economische Zaken, Den Haag, november 1998.

An Unsuccessful G2G Endeavor in Brazil

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Abstract. The scope of this paper is to analyze the main obstacles that resulted in the deployment of an unsuccessful G2G (Government to Government) enterprise in Brazil due to user resistance to Information Systems. In order to achieve this, case study explanatory methodology along with interpretative research based on a recent real-life case was adopted, namely the digital link between the Brazilian Central Bank and the Federal Senate. Some findings are drawn with respect to the importance of adequately managing the change associated with an endeavor such as the one analyzed in order to assist policy makers and public administrators in dealing with this new field of knowledge.

1 Introduction

Since the beginning of the 1980s, a movement was fomented by academics and executives to use Information Technology (IT) not only as a tool for processing data more rapidly, but also as a powerful strategic weapon. The need to use IT as an enabler to reformulate old processes, rather than simply automate existing practices was perceived by these academics and executives (see, for instance, [2] and [5]).

As Internet technology became more readily available, the reformulation of productive processes in the public area became a reality, leading all levels of government to strive for greater efficiency, efficacy and accountability in their relationship with citizens [7].

Within this context, this article was elaborated in order to establish some lessons learnt from the unsuccessful implementation of an e-government initiative, based on the digital linkage between two different public agencies, so as to streamline their workflows, create more transparency between the agencies and assist civil servants more effectively and at reduced cost.

In order to fulfill the goal of this work, a case study is conducted examining an inter-organizational system (IOS) between the Brazilian Central Bank and the Federal Senate, known as BacenSenado. The detailed study of this case with its unsuccessful outcome enabled the researcher to isolate the factors involved in the failure of an endeavor of this nature.

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2 Case Study[1]

For a series of reasons, Brazil applied for and received a loan from the International Monetary Fund (IMF) in 1999. After a memorandum of understanding was signed, this agreement had to be approved by the Brazilian Senate in order to ensure compliance with the Brazilian Federal Constitution. The Central Bank realized that greater transparency would be guaranteed if the Senate, namely the organ in charge of controlling the Central Bank's acts and procedures, were able to monitor compliance with the agreement at all times.

After due analysis, during which several alternatives were studied, it was realized that an inter-organizational system between the Senate and the Central Bank (Bacen-Senado) would be ideal. It was decided that Internet technology would be used to build a website granting restricted access, with the same security features adopted by the Central Bank. Consequently, only senators would have permission to access this website instead of using e-mail, as the transmission of e-mails was not considered a secure channel. All necessary information about the agreement would be posted in timely fashion for access by the Brazilian Senate on this website.

Since the information transmitted was of a highly confidential nature, security was a critical issue in the process of collaboration between these two public organizations. Besides access controlled by password, the system featured a 40-bit digital certificate. However, these controls were not considered sufficient to ensure that the system would not be prey to hackers and crackers, so new features were introduced. One of them was to restrict access to the website, such that it would only be possible to access the system from the Federal Senate building itself.

Another security feature adopted was to grant permission to access the site exclusively to senators. This meant that it would not be possible for the senator to assign an assistant to access to the information. Hence, the process was designed in such a way that only the senators had access to the site.

During the first three months after its deployment, it was recorded that more than 90% of all senators accessed the system at least once. However, with the passing of time, a marked decrease in the use of the system by the senators was detected. Over the course of the last three years, the Central Bank has updated the information on the website, though there has not been a single access by any senator.

3 Understanding the Causes of Resistance

By using the User Resistance Theory to Information Systems [3], [4] and an interpretative approach [6], it is possible to understand the reasons that led this G2G enterprise to fall short of its main objectives.

3.1 User-Determined Resistance

Although the G2G system was developed with a user-friendly interface and based on well-known technology, G2G processes demand a new *modus-operandl* that most of

[1] For further details on this case, see Cavalcanti-Neto [1].

the staff in public agencies is not acquainted with. Therefore, training strategies related to the use of the system are necessary, in order to communicate the benefits of this new workflow. Moreover, specific training events that allow greater collaboration among public agencies lead to a better understanding of the system, not to mention the possibility of upgrading it with feedback from the trainees. These training sessions are also important for disseminating and sharing the knowledge associated with processes involving public agencies, so as to make it possible to develop and implement better practices. It was apparent that some senators had great difficulty using web technology, as they rarely use Information Technology appliances in their daily activities and do not feel any need to use it, as their assistants are responsible for dealing with IT. In the BacenSenado case, it became obvious that the G2G process was implemented without thinking of the necessary skills needed by the senators, and consequently, the training initiatives required. It then became clear that only a few senators had the basic instrumental skills necessary to grasp the G2G process. Furthermore, as the best practices associated with the implementation of a G2G project might be was not clearly established, most senators failed to perceive any utility in using the system, as they didn't see it as a valuable tool for enhancing their daily operations and their reputation in society.

3.2 System-Determined Resistance

Security is a key factor in a G2G project, as the harm caused by flaws in the new processes deployed can damage not only the public agencies involved, but also society as a whole. However, it must be stressed that the security solution adopted should comply with the characteristics associated with the way access will be conducted by the public agency. The access issue should deal with the fundamental fact that those who will take part in the process must have the ability to do so wherever they may be located. A G2G process must incorporate a high level of security, but this should not hamper the use of the system in a significant way. Consequently, security must be established in such a way as to allow the process to be flexible and permit the coexistence of different *modus operandi* within the same organization. In its attempt to increase the level of security, BacenSenado limited the possibility of access, as senators could only log on from the Senate. Moreover, the restriction that only senators could use the system – and not their assistants – was unnecessary and inappropriate to the way work is conducted in the Federal Senate. G2G systems impact the processes of these organizations, obliging them to innovate, redesign or be more flexible (see [2] and [5]). Unfortunately, the system under analysis here lacked the necessary flexibility to deal with the peculiarities of the Senate's processes.

3.3 Interaction Theory

a) The Socio-Technical Variant

All existing information systems were traditionally accessed by the senators' assistants, even those dealing with personal information, such as bank accounts, etc. This arises from the senators' ingrained conviction that their only obligations are to make decisions and to cultivate political links. Any behind-the-scenes work required to achieve these ends is traditionally carried out by their staff. The Central Bank's rec-

ommendation that senators should not give their passwords to their staff was duly adhered to by all of them, as legal formality is also part of the culture of the Senate.

So, the BacenSenado case focuses on the distribution of responsibility for organizational tasks across various roles and on the work-related communication and coordination around the division of labor. It ascribes a division of roles and responsibilities at variance with existing ones; structuring patterns of interaction that are at odds with the prevailing organizational culture.

b) The Political Variant

The obligation of the senators to deal personally with the G2G process was seen as being beneath their standing in the culture of the Senate. This arises from the senators' ingrained belief that their only obligations are to make decisions and to cultivate political links. Their staff is traditionally in charge of all the back-office activities needed by the senators to accomplish their actual duties. So, resistance is explained here as a product of the interaction of system design features with the intra-organizational distribution of power and status, defined both objectively, in terms of vertical power and status dimensions, and subjectively, in terms of symbolism.

References

1. Cavalcanti-Neto A. A. (2002). "Fatores Relevantes na Construção de Processos *Government-to-Government* no Banco Central do Brasil", Unpublished Master Thesis, Brazilian School of Public and Business Administration, Getulio Vargas Foundation.
2. Davenport T.H. & Short J.E. (1990). "The New Industrial Engineering: Information Technology and Business Process Redesign", *Sloan Management Review,* Summer, pp. 11-27.
3. Kling R. (1980). " Social Analyses of Computing: Theoretical perspectives in recent empirical research", *Comput. Surv.* 12,1, pp. 61-110.
4. Markus L.M. (1983). "Power, Politics and MIS Implementation", *Communications of the ACM,* v 26, No. 3, pp. 430-444, June.
5. Venkatraman N. (1994). "IT – Enabled Business Transformation: From Automation to Business Scope Redefinition", *Sloan Management Review,* Cambridge, pp. 73-87, v 35, No. 2, winter.
6. Walsham, Geoff, "The Emergence of Interpretivism in IS Research", *Information Systems Research,* Vol. 6, No. 4, December 1995, pp. 376-394.
7. Zweers K & Planqué K. (2001) – "Electronic Government. From a Organizational Based Perspective Towards a Client Oriented Approach", In: *Designing E-Government,* Prins J.E.J. (ed.), Kluwer Law International, p. 92.

An International Trade Negotiation Framework for e-Government*

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Abstract. International trade negotiations among national governments and organizations are usually arduous and complicated. We propose a framework that supports government to government negotiation. With this framework, governments can keep track of previous negotiations using a database of negotiation records in an electronic platform. Moreover, the framework supports searching, sharing and learning past negotiation records as well as the ability to conduct negotiations on a variety of resources, products and services.

1 Introduction

International trade not only brings trading countries substantial economic gains from specialization and more efficient resource allocation, but also the adoption of new technologies, leading to higher productivity [1].

Generally, the traditional notion of a *negotiation* can be understood as the process toward a final agreement on one or more matters of common interest to different parties. Global trade negotiations are arduous and complicated as they cover all manner of goods and services. Moreover, countries often erect trade barriers over time for a variety of reasons: to protect local industries, to protect special interests and to provide stable employment. So governments negotiating with one another must find means to reduce these barriers. Finally, as the negotiations can span many years and different governments in power, agreements and sub-agreements are often cumbersome to keep track of [2].

In this paper we describe a framework that helps automate government to government negotiations, helps decide on what negotiation conditions to use,

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tracks agreements in time and provides decision support. With this framework, governments and organizations can conduct and keep track of previous negotiations using a database of negotiation records in an electronic, easy to use platform. Furthermore, the framework supports searching, sharing and learning past negotiation records as well as the ability to conduct negotiations on a variety of resources, products and services. Building background knowledge about previous agreements and classifying this knowledge according to the type of trade involved, the conditions, the country, or other parameters, is valuable in promoting international trade.

2 Negotiation Scenarios and Negotiation Protocols

During a traditional trade negotiation process, a government usually has the following *requirements.* Before the negotiation, it wants to find those past negotiations related to the current negotiation from all the negotiation history it keeps locally. This is usually a manual process sensitive to human judgement as to what document is relevant and to human lapses as to being able to collect all the necessary documents, which may be distributed among different sectors, physical areas and nations. Moreover, a government also wants to see any additional related negotiation history kept by the other governments involved. This history is often in different terms and susceptible to epistemological barriers.

Once all information has been gathered, a government is interested in finding useful rules hidden in these resources to help it decide the negotiation strategy it will use. After choosing the appropriate strategy, all negotiation parties must find a common time, place and mechanism to start and conduct the negotiation. This is a costly process, both in terms of time and money. Providing a trusted electronic platform to conduct this negotiation would facilitate differences in time, language and ability to access previous conditions, and would reduce the overall cost in terms of lost time. The system as we describe below would enable all or most negotiation stages to be processed automatically and act as assistants to the people involved in a physical meeting.

Generally there are two categories of negotiations in international trade agreements among governments. In the following, we will describe them and discuss the related negotiation protocol needed in each:

The first category is *bilateral negotiations.* An example for this case might be when two governments are trying to lower the barriers such as tariffs or quotas on the agriculture products exported to the other country, or when they are processing a large government purchase from each other.

The traditional bilateral negotiation protocol in this application has four primitives: Call for Proposals (CFP), Proposal (or Counter-Proposal), Accept and Reject. A party sends a CFP to the other party, which announces the start of negotiation. Then, both parties continuously send proposals and counter proposals to each other until one of them accepts the offer proposed by the other or one rejects continuing with the negotiation.

The second category is *multilateral negotiations.* An example of this case is when there are three or more governments that are trying to reach a trade agreement enabling free trade in the affiliated countries. This kind of negotiation is popular in World Trade Organization (WTO) negotiations [3].

Multilateral negotiations can be conducted bilaterally, which means that every two parties can conduct a bilateral negotiation and reach an agreement, then all these bilateral agreements are merged to form the group agreement. Generally, these bilateral negotiations can be conducted asynchronously. However it is necessary to conduct all the bilateral negotiations simultaneously if there is a dependence in two conditions proposed in different negotiations. For example, suppose government A wishes to ensure that its tariff on government B's electronic products is the same as its tariff on electronic products it imports from country C [1]. Therefore, government A need to make sure that the condition variable (tariff on products from B) in its negotiation with government B is always the same with the condition variable (tariff on products from C) in its negotiation with government C. Moreover, sometimes parties may want to use majority rules in multilateral negotiations, which means if most governments are not satisfied with government A's performance in negotiations, they can give a warning to urge it to make satisfactory concessions or even drive it out of the final group agreement if it still fails to make any concession. In [4], we introduce a new negotiation model for reaching a group consensus in multiparty negotiations using majority rules. This model and the traditional bilateral negotiation protocol are used in our system.

3 Proposed Framework

There are four components in our system: the *negotiation component,* the *sharing component,* the *searching component* and the *learning component.* The details of each component are provided later in this section. We now use a simple example to illustrate how the whole framework works.

Assume the United States government wants to reach an agreement with Germany on an automobile trade issue. To prepare for such a negotiation, the United States government searches its *negotiation digital library* through the *searching component* (see figure 1) to retrieve all those past negotiation histories which relate to the German government or which relate to the automobile market. Further, the United States wants to see whether there are any other governments that have had any negotiations conducted with Germany on automobiles in the past several years. So the government uses the *sharing component* and finds that France just had such a related negotiation history or behavior. However, France would like to share this negotiation information with the United States only if the United States agrees to share its experience of negotiating with China on electronic products. After a series of bargaining steps, the United States and France finally reach an agreement on how to share the information of these negotiation history.

[1] This is a way of expressing Most Favored Nation clause.

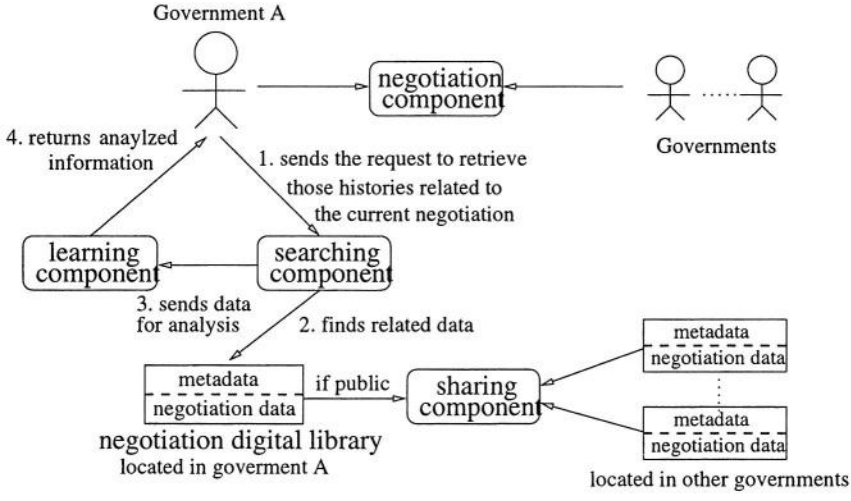

Fig. 1. The framework for trade negotiations among governments.

Once the United States has obtained all negotiation history data related to Germany and automobile products (both originally from its negotiation digital library and from other governments), it sends these data to the *learning component* for data analysis. The *learning component* helps find that using an aggressive negotiation strategy to negotiate with the German government usually gets better negotiation results. After getting this useful information from past experience, the United States government starts a formal negotiation with the German government. This negotiation can be conducted by human beings or negotiation agents, and is supported by an electronic platform through the *negotiation component.*

When the negotiation ends, the United States keeps all the negotiation records in its *negotiation digital library.* This negotiation now becomes a reference for the government when it has future negotiations with Germany on similar issues, and may also help other governments if United States shares this information with them.

3.1 Negotiation Component (SCENS)

Governments can choose to conduct negotiations either in person or using our negotiation component SCENS [5,6] (Secure/Semantic Content Exchange System).

SCENS is a three-layer web service based negotiation system. Layer 1 behaves as a traditional web-based negotiation support system for human beings. It provides some negotiation agents, which are actually user customizable utility functions. With this layer, we have a uniform platform for global negotiations among governments and international organizations.

Each government or organization can register into the system and find its negotiation party (or parties). Using a friendly interface, users can enter their negotiation conditions and start a negotiation. Meanwhile, while the negotiation is going on, and if the negotiation parties want this, negotiation agents can analyze the negotiation process as negotiation assistants by suggesting a reasonable negotiation behavior (*i.e.,* accept, decline or give a new counteroffer).

Layer 2 of SCENS provides support for complete negotiation strategy customization by users. In Layer 2, governments can have their own negotiation agents implementing any negotiation strategies. The negotiation agents, which are treated as web service consumers and run on the client side, conduct negotiation with other negotiation agents or human beings through web services.

Layer 3 of SCENS provides an open automated negotiation environment, which could allow governments to pass all the negotiation tasks to their agents and have agents complete the whole negotiation process on their behalf. In this layer, we use NOODLE (Negotiation OntOlogy Description LanguagE) [7], a language for creating negotiation ontologies (formal representations of domain knowledge) and marking up information, which allows agents to acquire knowledge about how to conduct negotiations. This knowledge includes negotiation protocols, negotiation proposals and conditions, *etc.* Agents communicating with Layer 3 can be used in any negotiation activities given the proper negotiation ontology. (In Layer 2, in contrast, the knowledge about negotiation rules is actually hard-coded into the agents.)

So from layer 1 to layer 3, SCENS provides various choices to government users, from the lowest level of providing an electronic platform to the highest level of supporting automated negotiations.

3.2 Negotiation Digital Library and Sharing Component

We envision that each government has a negotiation digital library where it maintains and updates all its past negotiation history (including those negotiations that failed to reach a deal). A metadata framework [8] is used to construct this library. Except for the original negotiation records, metadata descriptions (higher level descriptions of negotiation processes) are also stored. After each negotiation ends, metadata is extracted from the negotiation record. Then the government decides whether the original negotiation record is private or public. If it is private, then it will always be kept in the local digital library together with the corresponding metadata. If it is public, the government can add an appropriate usage policy to it. This usage policy can vary according to a variety of factors: the time of the agreement, the product, the parties involved, the sharing conditions, the laws involved and other factors. All the public metadata with a related usage policy are put onto the sharing component and can be browsed by other governments.

When another government is interested in accessing the public original negotiation records a government provides, they can negotiate about the conditions on access to this information. This type of negotiation is mainly used for sharing existing information or generated information from previous negotiations.

It becomes a valuable commodity that can also be leveraged. In other words, a country or government that has undergone a lot of negotiations and has maintained a good record using SCENS has higher leverage than a country that just enters the game. This is used as incentive for governments to want to become part of this process. Built-in services such as these are important incentives for using SCENS and are also ways to build trust among governments. The original record is kept private until an agreement is reached on how to share the information.

3.3 Searching Component

The searching component helps users find those negotiation histories that relate to the current ongoing negotiation. Negotiation records are usually stored in text documents, so traditional search methods use text-based retrieval by matching the metadata with the query. These methods are relatively simple to implement and easy to use. However, there are two problems which can lead to poor retrieval accuracy. One is that different people (who may be in different countries) may use different words in metadata description, and the other is that people who know little about the domain can not always specify the most appropriate keywords for the query.

To address these two problems, we introduce an ontology based retrieval method in [9]. In ontology-based retrieval, both metadata and retrieval queries are represented by XML files based on a shared ontology that encodes semantic annotations. By extracting combined concept entity, fundamental semantic units can be extracted for both. Based on sets of combined concept entities, we compare the semantic similarity between stored data and a retrieval query. Compared with other approaches, ontology-based retrieval provides better standardization of information descriptions and potentially allows understanding of semantic content.

3.4 Learning Component

The learning component is in charge of finding useful rules and information in these retrieved negotiation histories. With the negotiation strategy pool framework we introduce in [7, 10], we can incorporate a higher level artificial intelligence into the basic traditional negotiation strategies. This higher level intelligence has the following two parts that are used to enable users to be more flexible and robust in negotiations.

A neural network helps the user choose a best fit negotiation strategy that generally works well (decided by the user satisfactory ratio) in similar negotiation environments (*e.g.*, similar negotiation conditions, preferences and constraints). Moreover, since in each negotiation process the strategy is potentially different and is subject to revision, it is more difficult for the other agents to deduce or reason out the strategy than it would be when using, instead, a uniform negotiation strategy.

The second part is a multidimensional data mining technique that is used to find those inter-transaction association rules hidden inside the negotiation histories. An example of such a rule is that *if Germany offers a 10% concession on the tariff, one needs to give a 5% concession as a response.* Such rules are good references to the users and might be incorporated into the negotiation strategy.

4 Conclusion

We have presented a new e-negotiation framework for international government to government trade negotiations. This framework supports governments in (a) searching the past negotiation records, (b) finding useful information by learning from past negotiation experience, (c) sharing the negotiation records among different governments and (d) conducting an e-negotiation or even have agents complete all negotiations.

References

1. http://www.cid.harvard.edu/cidtrade/issues/general.htm
   Last visited on 05/30/2004.
2. http://www.dti.gov.uk/ewt/development.htm. Last visited on 05/30/2004.
3. http://www.wto.org. Last visited on 05/30/2004.
4. Sheng Zhang, Fillia Makedon, and Lin Ai. A model for multiparty negotiation with majority rules. To appear in International Conference on Electronic Commerce and Web Technologies (EC-WEB), 2004.
5. Song Ye, Fillia Makedon, Tilmann Steinberg, Li Shen, James Ford, Yuhang Wang, Yan Zhao, and Sarantos Kapidakis. SCENS: A system for the mediated sharing of sensitive information. In *proceeding of the third ACM/IEEE-CS joint conference on Digital libraries (JCDL),* pages 263–265, 2003.
6. Fillia Makedon, Song Ye, and Yan Zhao. On the design and implementation of a web-based negotiation system. In *proceeding of the 9th Panhellenic Conference on Informatics (PCI),* pages 46–57, 2003.
7. Fillia Makedon, Song Ye, Sheng Zhang, James Ford, Li Shen, and Sarantos Kapidakis. Data brokers: Building collections through automated negotiation. In *proceeding of Hellenic Conference on Artificial Intelligence (SETN), LNCS 3025 Springer,* pages 13–22, 2004.
8. Fillia Makedon, James Ford, Li Shen, Tilmann Steinberg, Andrew Saykin, Heather Wishart, and Sarantos Kapadakis. MetaDL: A digital library of metadata for sensitive or complex research data. In *proceeding of European Conference on Digital Libraries (ECDL),* pages 374–389, 2002.
9. Wei Zheng, Yi Ouyang, James Ford, and Fillia Makedon. Ontology-based image retrieval. In *proceedings of WSEAS MMACTEE-WAMUS-NOLASC,* 2003.
10. Sheng Zhang, Song Ye, Fillia Makedon, and James Ford. A hybrid negotiation strategy mechanism in an automated negotiation system. In *proceeding of ACM Conference on Electronic Commerce (EC),* pages 256–257, 2004.

A Web-Based System for Supporting Structured Collaboration in the Public Sector

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Abstract. The development of effective public policies and programs concerning the big problems of modern societies is an increasingly complex task. The social problems today are multidimensional and their solution requires close collaboration among various Public Organizations from many regions or even countries. Each individual organization involved possesses pieces of information, experience, knowledge and competence about the problem. Their values, interests and expectations are often different, or even conflicting, and have to be taken into account. Similar hold for the 'high level functions' of the Public Administration, such as decision making towards the development of legislation. This paper presents a web-based system that supports collaborative activities in the above setting. Through a well-structured discourse graph, the system facilitates the wide participation and collaboration of the Public Organizations involved in the solution of social problem and provides a series of knowledge management and argumentative decision making features. The use of the system is described through a detailed example concerning a debate about state vs. non-state universities, which has recently started in Greece.

1 Introduction

Information and Communication Technologies (ICTs) have a huge potential for supporting and transforming the full range of contemporary Public Administration activities concerning the design, production and delivery of public services [4, 5, 9]. However, e-Government today is mainly focused on e-transactions, i.e. on offering citizens and enterprises the capability to perform electronically their transactions with the Public Administration (e.g., declarations, applications, etc.). The ICT-enabled innovation in this area is limited, mainly to the development of 'virtual public agencies' or 'one-stop e-Government', i.e. of single access points to many related electronic transactions and services, which are usually required in a particular life event or by a particular target group (of citizens or enterprises) and offered (or managed) by several different Public Organizations [9, 10, 17].

It is therefore necessary to exploit to a much larger extent the huge innovation potential of ICTs and enrich the concept of e-Government [10, 11, 12]. In particular, e-Government should be directed not only to e-transactions, but also to more critical

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'high level functions' of Public Administration, such as: (i) the design, implementation, monitoring and evaluation of public policies, programs and services, (ii) the development of legislation, and (iii) the high level decision-making concerning difficult and complex social problems, granting licenses and permissions with high social impact, etc. These high level functions are of critical importance for the Public Administration and the society; at the same time, they are highly difficult and complex since they usually require close collaboration among many Public Organizations (POs), and very often the participation of citizens, enterprises and their associations as well.

In particular, the development of effective public policies, programs and services concerning the big and complex problems of modern societies is becoming more and more difficult. The social problems today are multidimensional and cross many regions or states. Also, the continuously growing international economic cooperation and interdependence gives rise to new complex problems of international nature. The forthcoming enlargement of the European Union with new member states will give rise to many complex international problems and issues. It is widely argued that the development of effective public policies and programs for such big and complex problems requires close collaboration among many POs from many regions or even countries (e.g. central governments, regions, prefectures, municipalities, local development organizations, employment organizations, social security organizations, education organizations, environment organizations, etc.). Each of these POs possesses small – but valuable – pieces of information, experience, knowledge and competence about the problem. In addition, there often exist differences among their values, interests and expectations. It is thus necessary to properly handle all these diverse but valuable pieces of information, experience, knowledge and competence, as well as their different values, interests and expectations. Effective and efficient collaboration may be a remedy to this problem. However, geographical distance and time/budget limitations do not allow this collaboration to be close enough, resulting in the design of suboptimal and ineffective public policies and programs, which are developed without the required wide participation of all competent and knowledgeable parties.

Similar hold for the development of legislation, for the decision making concerning difficult and complex social problems, and also for granting licenses and permissions with high social impact; a high level of participation and collaboration is required, but very often this cannot be achieved due to distance, time and budget limitations. Therefore, it is of critical importance to exploit the capabilities of modern ICTs for supporting and facilitating the required wide participation, argumentative discourse, interaction, synthesis and, in general, collaboration required for the abovementioned high level functions of Public Administration.

At the same time, one of the most important advantages of any organization in today's political, economic, social and technological environment is its ability to leverage and utilize its knowledge [14]. Such knowledge resides in an evolving set of assets including the employees, the structure, the culture and the processes of the organization. Of these, employee knowledge, and particularly tacit knowledge is identified as the dominant one, which is decisive at all mental levels and has to be fully exploited [13]. Such an exploitation refers to the transformation of tacit knowledge to codified information, which is considered as a core process for economic activity and development [1]. For the above reasons, we argue that it is necessary to adopt a knowledge-based decision-making view in the development of technologies for supporting collaboration [6]. According to this view, decisions should be considered as

pieces of descriptive or procedural knowledge referring to an action commitment. In such a way, the decision making process is able to produce new knowledge, such as evidence justifying or challenging an alternative or practices to be followed or avoided after the evaluation of a decision, thus providing a refined understanding of the problem

This paper presents a web-based system that supports the structured collaboration required in the Public Sector and meets all the above requirements. Our approach allows for distributed and asynchronous collaboration and aims at aiding the involved POs by providing a series of argumentation, decision making and knowledge management features.

2 An e-Collaboration Framework

The representation and facilitation of argumentative discourses in diverse collaborative settings have been the subject of interest for quite a long time. Many interesting systems have been developed so far, based on alternative models of argumentation structuring. Generally speaking, such systems aim at structuring group decision-making processes and helping group members in reaching a shared understanding of the issue by supporting knowledge elicitation, knowledge sharing and knowledge construction. Moreover, they exploit intranet or internet technologies to connect decision-makers in a way that encourages dialogue and stimulate the exchange of tacit knowledge. Representative systems falling in this category are Questmap [2], QOC [16], Sibyl [8], Zeno [3], Hermes [7] and Compendium [15].

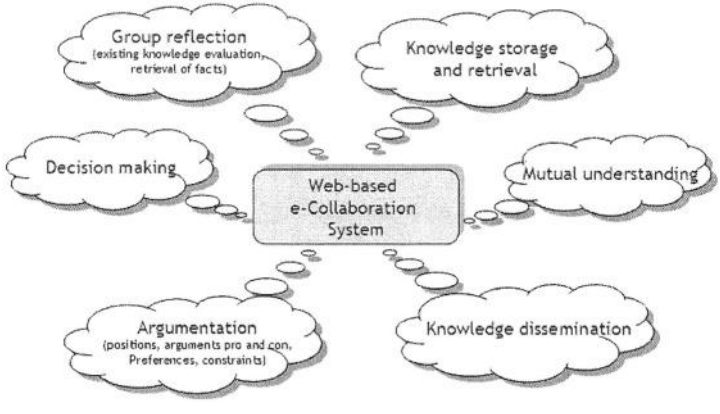

Fig. 1. Activities supported in our e-Collaboration framework.

The e-Collaboration framework proposed in this paper extends the one conceived in the Hermes system by providing additional knowledge management and decision-making features (see Figure 1). Discourses about complex problems in the Public Sector are considered as social processes and, as such, they result in the formation of groups whose knowledge is clustered around specific views of the problem. Following an integrated approach, we have developed a web-based system that provides POs engaged in such a discourse with the appropriate means to collaborate towards the

solution of the underlying issues. In addition to providing a platform for group reflection and capturing of organizational memory, our approach augments teamwork in terms of knowledge elicitation, sharing and construction, thus enhancing the quality of the overall process. This is due to its structured language for conversation and its mechanism for evaluation of alternatives. Taking into account the input provided by the individual POs, the system constructs an illustrative discourse-based knowledge graph that is composed of the ideas expressed so far, as well as their supporting documents. Moreover, through the integrated decision support mechanisms, discussants are continuously informed about the status of each discourse item asserted so far and further contemplate on them according to their beliefs and interests on the outcome of the discussion. In addition, our framework leverages group sense-making and mutual understanding through the collaborative identification and evaluation of diverse opinions.

Our web-based system provides a shared workspace for storing and retrieving the messages and documents of the participants, using a widely accepted document format (i.e. XML). The system's knowledge base maintains all these items, which may be considered, appropriately processed and transformed, or even re-used in future discussions. Storage of documents and messages being asserted in an ongoing discussion takes place in an automatic way, that is upon their insertion in the knowledge graph. On the other hand, retrieval of knowledge is performed through appropriate interfaces, which aid users explore the contents of the knowledge base and exploit previously stored or generated knowledge for their current needs. In such a way, our approach builds a 'collective memory' of the Public Sector community.

The basic discourse elements in our system are *issues, alternatives, positions,* and *preferences.* More specifically, issues correspond to problems to be solved, decisions to be made, or goals to be achieved. They are brought up by users representing a PO and are open to dispute (the root entity of a discourse-based knowledge graph has to be an issue). For each issue, the users may propose alternatives (i.e. solutions to the problem under consideration) that correspond to potential choices. Nested issues, in cases where some alternatives need to be grouped together, are also allowed. Positions are asserted in order to support the selection of a specific course of action (alternative), or avert the users' interest from it by expressing some objection. A position may also refer to another (previously asserted) position, thus arguing in favor or against it. Finally, preferences provide individuals with a qualitative way to weigh reasons for and against the selection of a certain course of action. A preference is a tuple of the form *[position, relation, position],* where the relation can be *'more important than'* or *'of equal importance to'* or *'less important than'*. The use of preferences results to the assignment of various levels of importance to the alternatives in hand. Like the other discourse elements, they are subject to further argumentative discussion.

3 An Example Case of Use

This section presents the features and functionalities of the proposed system through an illustrative example. An intensive debate has recently started in Greece concerning the establishment (or not) of 'non-state universities'. So far in Greece, all universities are 'state' ones, which have been established and are being supervised by the Ministry

of National Education. Also, according to the Greek Constitutional Law, the higher education should be provided only by the State, and not by any private-sector enterprises. In order to change the current situation, it has been recently proposed that initially new 'state universities' should be established, not by the Ministry of Education, but by other Public Sector Organizations, such as the big Municipalities, the Chamber of Commerce, the Church, etc. It has been also proposed that the Constitutional Law should be amended, so that it will allow higher education to be provided by private-sector enterprises as well. After such an amendment, new 'non-state universities', either 'non-profit' or even 'profit-making' ones, could be established.

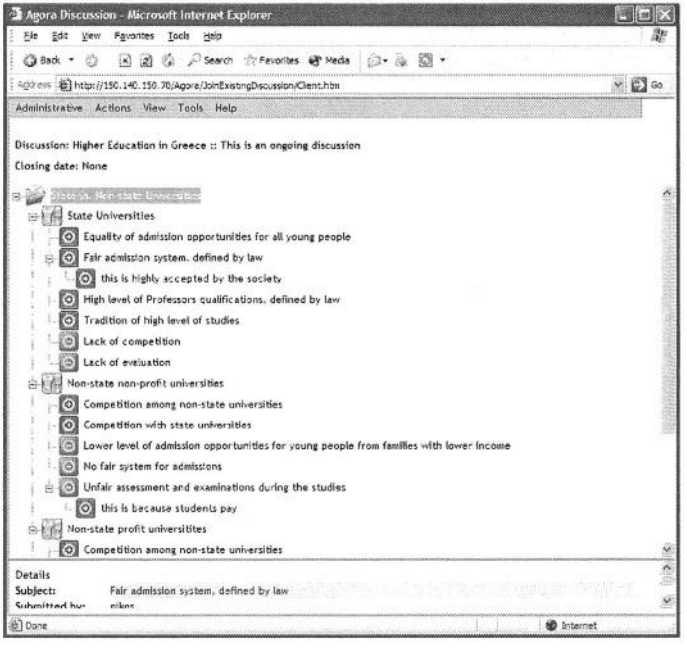

Fig. 2. An instance of the discourse-based knowledge graph.

In the instance depicted in Figure 2, six users (i.e., representatives from the Ministry of National Education and Religious Affairs, two state universities, the National Pedagogical Institute, and two secondary education schools) have been participating so far in the related discourse. Each of them possesses some information, experience and knowledge about the problem. As shown, our approach maps the overall collaborative process to a discourse-based knowledge graph with a hierarchical structure. Each entry in the graph corresponds to an argumentation element. Each such element is accompanied by an icon that indicates the element type. There are also icons for folding/unfolding purposes, thus enabling users to concentrate on a specific graph's part; this is particularly useful in graphs of considerable length and complexity. Each entry in the graph may contain the username of the user who submitted it and the date of submission (alternative forms in the appearance of each entry can be obtained through options provided under the *View* menu). The lower pane of the window provides more details about a selected entry of the discussion graph (users can select an entry by clicking on it).

In our case, the overall issue under discussion is "State vs. Non-state Universities", while three alternatives (namely "State Universities", "Non-state non-profit universities" and "Non-state profit universities") have been asserted so far. The users may argue about them by expressing positions speaking in favor or against them. For instance, "Equality of admission opportunities for all young people" is a position that argues in favor of the first alternative, while "Lower level of admission opportunities for young people from families with lower income" is a position that argues against the second one. All graph entries are subject to additional (multi-level) argumentation. For instance, "this is highly accepted by the society" has been asserted by a user to further validate the "Fair admission system, defined by law" position.

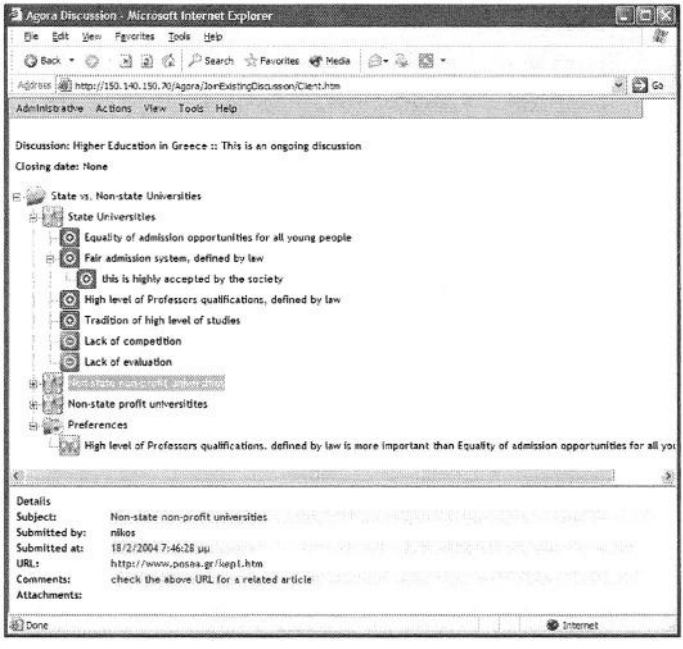

Fig. 3. A second graph instance.

As noted in the previous section, users may also assert preferences about the already expressed positions. In the instance shown in Figure 3 (compared to the instance shown in Figure 2, all items asserted so far under the second and third alternatives are now folded), a user has expressed his opinion about the relative importance between the level of professors' qualifications (see position "High level of Professors qualifications, defined by law") and the equal opportunities in admission to universities (see position "Equality of admission opportunities for all young people") through the preference "High level of Professors qualifications, defined by law *is more important than* Equality of admission opportunities for all young people". Figure 3 also shows the full information provided in the lower pane of the basic interface of the system. This comprises details about the user who submitted the selected argumentation element, its submission date, any comments that the user may had inserted, as well as links to related web pages and documents that the user may have uploaded to the system in order to justify this element and aid his/her peers in their contemplation.

Further to the argumentation-based structuring of a discourse, the system integrates a reasoning mechanism that determines the appropriate labeling for each entry of the discussion graph, the aim being to keep users aware of the discourse status. More specifically, the positions and preferences of a graph have an *activation label* indicating their current status (they can be active or inactive). This label is calculated according to the argumentation underneath and the type of evidence specified for them. Activation in our system is a recursive procedure; a change of the activation label of an element is propagated upwards in the discussion graph. Depending on the status of positions and preferences, the mechanism goes through a scoring procedure for the alternatives of the issue. This procedure takes into account the active arguments in favor and against each alternative, as well as their relative scores, as extracted from the preferences asserted so far (due to space limitations, it is not possible to describe this procedure here; the same holds for the argumentation's formal dialectics applied in the reasoning mechanism – for details, see [7]). At each discussion instance, the system informs users about what is the most prominent (according to the underlying argumentation) alternative solution. In the instances shown in Figures 2 and 3, "State Universities" is the better justified solution (it is shown in bold characters). However, this may change upon the type of the future argumentation. In other words, each time an alternative is affected during the discussion, the issue it belongs to is updated, since another alternative solution may be indicated by the system.

The system also integrates e-mailing and electronic messaging features (options provided under the *Tools* menu) to further facilitate the communication among users before one asserts an argumentation element in the graph. The insertion of all types of entries in the graph is performed through appropriately designed interfaces (these are deployed upon the user's selection under the *Actions* menu).

4 Conclusions

A preliminary evaluation of the system described in this paper has already been made by the six users who participated in the argumentative discussion illustrated in the previous section. The results of this evaluation are positive and encouraging: the functionalities of the system were found to be complete, correct, user-friendly and well-integrated. These results advocate that the proposed system can offer an effective and user-friendly electronic space for G2G structured multi-participative argumentation on complex Public Sector problems and collaborative knowledge creation. In this sense, it can improve the quality and reduce the cost of the collaborative activities required for the critical 'high level functions' of Public Administration.

In particular, the system can effectively support the collaboration required for the design, implementation, monitoring and evaluation of public policies, programs and services, by first enabling all the involved POs to identify the basic problems and issues, propose alternatives and discover their advantages and disadvantages. A multi-criteria decision making approach can be then followed, in order to select the optimal alternative(s) based on the insight and understanding previously gained. The proposed system can also support the collaborative development of detailed action plans for the selected optimal alternative(s) (i.e. for each proposed action, positive or negative positions as well as preferences can be expressed by the participants, etc.). During the implementation of these actions, the proposed system can be used for the collabora-

tive monitoring of them, the identification of implementation problems and issues, and the development of alternatives for managing them. Finally, the system can be used for the collaborative evaluation of these actions by all the involved POs, and the citizens and enterprises who are their recipients. In a similar way, it can support the collaborative development of legislation and the 'high level' decision-making concerning complex social problems, granting licenses and permissions with high social impact, etc.

References

1. Cohendet, P., Steinmueller, W.E.: The Codification of Knowledge: a Conceptual and Empirical Exploration. Industrial and Corporate Change 9(2), 2000, 195-209.
2. Conklin, E.J.: Designing Organizational Memory: Preserving Intellectual Assets in a Knowledge Economy. GDSS Working Paper, 1996 (http://www.gdss.com/wp/DOM.htm).
3. Gordon, T. and Karacapilidis, N.: The Zeno Argumentation Framework. German Artificial Intelligence Journal 3, 1999, 20-29.
4. Heeks, R.: Reinventing Government in the Information Age: International Practice in IT-enabled public sector reform, Routledge, New York, 2002 (second edition).
5. Holmes, D.: eGov: eBusiness Strategies for Government, Nicholas Brealey Publishing, London, 2001.
6. Holsapple, C.W., Whinston, A.B.: Decision Support Systems: A Knowledge-Based Approach. West Publishing Company, St. Paul, MN, 1996.
7. Karacapilidis, N., Papadias, D.: Computer Supported Argumentation and Collaborative Decision Making: The HERMES system. Information Systems 26, 2001, 259-277.
8. Lee, J.: SIBYL: A Tool for Managing Group Decision Rationale. In: Proceedings of the CSCW Conference, 1990, ACM Press, New York, 79-92.
9. Leitner, Chr.: e-Government in Europe: The State of Affairs. In Proceedings of the e-Government 2003 Conference, Como, Italy, July 7-8, 2003.
10. Lenk, K.: Reform Opportunities Missed: Will the innovative potential of information systems in public administration remain dormant forever?. Information, Communication & Society 1, 1998, 163-181.
11. Lenk, K., Traunmüller, R.: Broadening the Concept of Electronic Government. In: J.E.J. Prins (ed.) Designing e-Government, Amsterdam, Kluwer, 2001, 63-74.
12. Lenk., K., Traunmüller, R.: Electronic Government: Where Are We Heading?. In: Traunmüller, R., Lenk. K. (eds) Electronic Government – Proceedings of the First International Conference EGOV2002, Aix-en-Provence, France, September 2-6, 2002, 1-9.
13. Nonaka, I.: A Dynamic Theory of Organizational Knowledge Creation. Organization Science 5(1), 1994, 14-37.
14. Prahalad, C.K., Hamel, G.: The Core Competence of the Corporation. Harvard Business Review 68(3), 1990, 79-91.
15. Selvin, A.: Compendium: Making Meetings into Knowledge Events. Proceedings of Knowledge Technologies 2001, March 4-7, Austin TX, 2001.
16. Shum, S., MacLean, A., Forder, J., Hammond, N.: Summarising the Evolution of Design Concepts within a Design Rationale Framework. In: Adjunct Proc. of InterCHI'93: ACM/IFIP Conf. on Human Factors in Computing Systems, Amsterdam, 1993, 43-44.
17. Wimmer, M.: A European perspective towards online one-stop government: the Egov project. Electronic Commerce Research and Applications 1, 2002, 92-103.

Supporting Inter-administration Cooperation: The EU-PUBLI.com Approach

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Abstract. A deeper cooperation among Public Administrations (PAs) could prevent or at least reduce the inefficient provision of complex administrative services typically suffered by individual citizens and organizations. For this aim Information and Communication Technologies (ICTs) can be adopted for the design and implementation of a cooperative architecture providing an information system in which the distributed, independent PAs participate by exchanging services each other. A technological infrastructure based on *e*-Services, which, through the interconnection at application level of the different PA information systems, could (semi-)automate complex processes and intensify the communication among PA employees, is currently under development in the IST EU-PUBLI.com project: the context and the requirements as well as the architecture are presented in this paper.

1 Introduction

Public Administration employees typically execute administrative activities or processes required to provide services to customers, including both individual citizens and organizations such as companies, private enterprises, and nonprofit organizations. These processes are often fragments of a larger whole which is identifiable through the service provided to the end customer. In complex business scenarios fragmentation of responsibilities, frequent interruptions of processes inside an administration, and the absence of cooperation among different administrations result in inefficient provision of services and execution of *macro-processes,* i.e., *sequences or aggregations of processes that have to be executed jointly in order to satisfy the request of a service from a customer* [1]. The EU-PUBLI.com project [2, 3] aims at supporting inter-administration cooperation through the definition of a Cooperative Architecture, that, besides providing the essential interconnection services (e-mail, file transfer, etc.) to administrations by supplying them with basic interoperability tools, interconnect at the application level the Information System of public administrations across

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several European countries, by bringing together the collection of distributed, autonomous systems of each administration.

In the last few years, some projects have been experimenting with different technologies, architectures and approaches to cooperation, in order to investigate the most suitable solutions to realize a Cooperative Information System (CIS). The cooperative architecture's information system consists of numerous components distributed over large and complex computer and communication networks that work together, requesting and sharing information and computing services supporting individual or collaborative human work. Various approaches have been proposed for the design and development of CIS's, e.g., schema and data integration [4] agent-based methodologies and systems [5], or business process coordination and service-based systems [6]. In the latter case, cooperation among different organizations is obtained by sharing and integrating services across networks (e.g., Internet and the Web); such services, commonly referred to as *e*-Services, are exported by different organizations as semantically well defined functionalities that allow users and applications to access and perform tasks offered by back-end business applications. According to this perspective, a cooperative process is the abstraction of a complex business process involving different organizations; each organization cooperates with the others by offering services. The cooperative process is supported by some applications that coordinate the services, through automated interfaces to be exported by the organizations, that shield internal details [7]. This last approach has been adopted in the EU-PUBLI.com project, in which a general architecture focusing on those characteristics typical of the *e*-Government context has been designed. In the following sections general requirements due to the application domain, the resulting architecture and additional consideration are further discussed.

2 Some *e*-Government Requirements

The aim of the EU-PUBLI.com project is the development of an infrastructure allowing the seamless integration of public services amongst PA employees in PA units, and the challenge of an evolutionary architecture for the integration of very large heterogeneous systems.

Compared to private enterprises, the value of such an architecture is more prominent in the PA "world" since: *(i)* PA business processes are more fragmented and PA Information Systems have a much larger number of users, *(ii)* PA ISs are tied down not only by the technological considerations regarding the legacy architecture, but also by the existing organizational structure and by legal constraints.

Towards this direction, it is fundamental to establish an overall architecture, respecting the *autonomy of the single organization:* the autonomy concerns not only the reengineering of the systems according to each organization's schedule, but also the business process reengineering of the various customer service workflow and tasks feeding the systems. The constraints imposed to an organization to cooperate with the others must be as loose as possible if the system has to work in the real world.

Moreover, the architecture should comply with other general *functional* and *non functional* requirements. As far as services, tasks or functions the system is required to perform, legal and document processing requirements have to be pointed up. In the general legal framework of the European legislation the most relevant directive to take into account are: *(i)* the Directive 99/93/EC on a Community framework for electronic signatures, and *(ii)* the Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and to the free movement of such data. The former directive, recognizing under specific conditions the legal validity of digitally signed *e*-documents, open the way to the issuing of *e*-certificate and *e*-declaration by PAs and their circulation among PA employees via ICT channels; the latter constrains the circulation and sharing of individual citizens and organizations information under the explicit authorization by the data owner. Other requirements the EU-PUBLI.com system have to comply with, refer to the existence of national legal framework fixing explicit due date for administrative services to be carried out.

On the other hand, for what concerns document processing, an efficient and effective (semi-)automation of administrative procedures requires that those documents and certificates involved in a business procedure and preexisting in a certain PA should be automatically retrieved by the system. Important requirements to support this features are then *(i)* a well-defined hierarchical structure of the *e*-documents and *e*-certification as well as *(ii)* codified mapping rules to support the "document interoperability" among different public administration systems. In these cases what often happens is that the information set of a certificate valid in a PA system is fragmented in many subsets spread into several different documents and certificates valid in another PA system, and this is especially true in cross-national scenarios.

Finally regarding non functional requirements, i.e., system qualities capturing other properties of the system, we can briefly list:

- design issues, such as the use of reusable code and/or the definition of simple activities each of which can be encoded in a different component with the aim of populating a reusable library;
- security issues addressing both the secure exchange and the long term storing of data as well as role based access policy in order to cope with unauthorized access to the overall system or specific features;
- availability issues of the overall system that should ensure minimal service levels and reliability issues relative to single transaction that should be performed ensuring the "exactly-once" property even in presence of exceptions, errors or failures.

3 The EU-PUBLI.com Architecture

Figure 1 shows the overall EU-PUBLI.com architecture; by following the *Service Oriented Architecture* (SOA) framework [8], it is designed as a peer-to-peer system, in which each organization deploys an instance of the three core components:

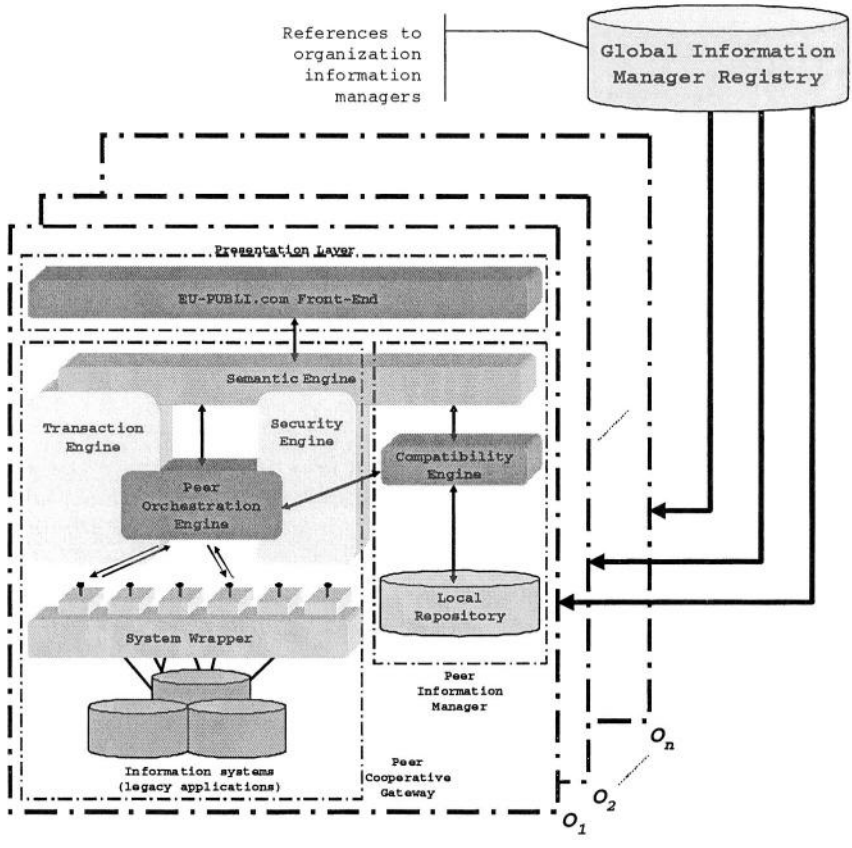

Fig. 1. EU-PUBLI.com Architecture

- **Peer Information Manager:** it represents the core of each EU-PUBLI.com peer, through which *(i)* *e*-Service schemas, *(ii)* orchestration schemas and *(iii)* instance data are stored and made accessible. On top of such a module, a component checking *compatibility for substitutability* [9] is designed; it is referred to as **Compatibility Engine;**
- **Peer Cooperative Gateway:** it represents the back-end layer of the architecture; briefly, *(i)* it exports the set of data and application services offered by a single administration through a well-defined interfaces (possibly wrapping a Legacy System), and *(ii)* it includes the *Peer Orchestration Engine* component that coordinates *e*-Services.
- **Front-End:** this component is responsible for the presentation to the end user; it represents the employees' front-end of the overall architecture.

The cooperation of different agencies is achieved by making them responsible for exporting some views of its own information system as *e*-Services; the *Peer Cooperative Gateway* sub-system represents "where" and "how" *e*-Services are

deployed; it includes the definition on how different cooperating organizations are organized and connected and how pre-existing legacy applications (Local IS in figure) can be integrated in a common cooperative process. As EU-PUBLI.com architecture is based on *e*-Services, the implementation of such a system, under development within the project consortium, is based on Web Services [8] technologies. So, each PA joining the EU-PUBLI.com network must export its functionalities as Web Services.

The *Peer Information Manager* is accessed at design-time by the cooperating agencies, in order to publish and register their *e*-Services, and to define and register the cooperative schemas with the needed mappings. The Peer Information Manager is also accessed at run-time by the Peer Orchestration Engine, in order to gain access to both *e*-Services specifications and instance data, and to update running process instance data. Moreover, in order to get the information distributed on all the organization joining the EU-PUBLI.com architecture, an additional component, named **Global Information Manager Registry,** is designed: it points to specific Peer Information Managers containing specific information. The basic technology used for the implementation of these components is UDDI [10].

The *Peer Orchestration Engine* sub-system is the responsible of coordinating all the *e*-Services involved in a cooperative process; figure 2 shows the two different layer at which the Peer Orchestration Engine works. Through "cooperative process definitions" (technically referred to as *orchestration schemas*) stored into the Peer Information Manager, it dynamically finds and links suitable *e*-Services; it accesses the Peer Information Manager during the enactment of different orchestration schemas, and interacts with the different *e*-Service instances deployed on the different cooperating organizations (steps 1 and 2). Moreover, during the orchestration of a particular business process, the Peer Orchestration Engine can pass the responsibility to enact the process to another Peer Orchestration Engine (step 3), deployed onto another administration (for example this could be needed due to some legal constraints).

The implementation of such a component is based on BPEL4WS [11], i.e., the orchestration schema is a BPEL file. In order to implement the distributed features of the architecture (not included in the BPEL specification), a specific protocol to "send" and "accept" the orchestration responsibility has been designed : from a technological point of view, the BPEL file describing the process is modified and transfered to the new Peer Orchestration Engine, that *(i)* restores the state of the computation (explicitely sent by the old peer), and *(ii)* continues the computation from the point at which the old peer has interrupted its activities. From this point, the old peer is no longer involved into the process (unless another peer pass to it the responsability for the orchestration).

In Figure 1 are also depicted the **Semantic Engine,** the **Security Engine** and the **Transaction Engine,** three specific sub-system which have been appropriately introduced in the overall architecture to support document processing, security, reliability and availability requirements as discussed in the previous section.

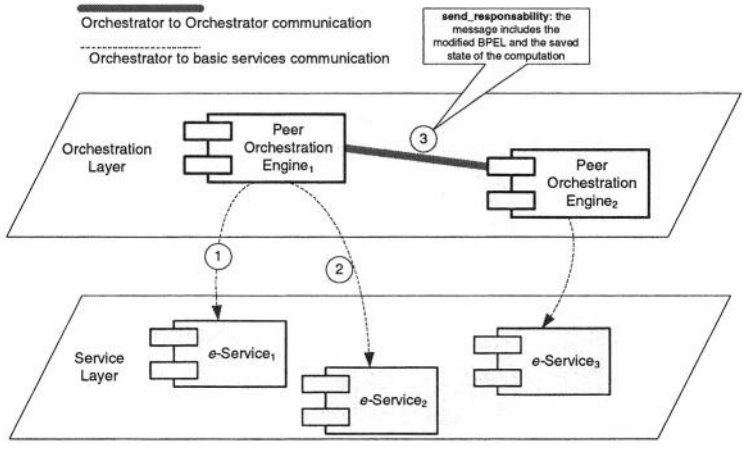

Fig. 2. Peer-2-Peer Orchestration

As EU-PUBLI.com offers B2B integration to organizations that exist in different countries, the orchestration of the processes involves also cultural and linguist aspects in the exchanged information. Therefore the existence of a component that will cope with the semantics of the exchanged information both in the presentation and the communication level is needed. The *Semantic Engine* consists of mechanisms that enable the translation and the correspondence of terms. The presentation of the information that will appear in the presentation layer (front-end system) will be translated and matched in the semantic engine before it appeared to the user. The semantic engine lays between the orchestration engine and the front-end system (as Figure 1 shows). The implementation of this component is based on OWL-S [12] and UDDI [10].

The *Transaction Engine* provides transaction and reliability features, which are mainly independent from the business domain. About the *Security Engine,* this component could validate some operations that have to be performed by other architectural elements. For example, digital signature validation precedes content document matching (performed by the Semantic Engine). About the implementation of these two components, the consortium is investigating the W3C standards for security and transactions (i.e., WS-S [13], WS-T [14] and WS-C [15]).

4 Conclusions

In this paper, we have presented the EU-PUBLI.com architecture, specifically focusing on *e*-Government service provisions based on orchestration of *e*-Services. The basic concept of our approach is the one of cooperative process, as unifying element among different inter-country agencies providing value-added services to European citizens.

The consideration and methodologies underlying this solution relies on a technological improvement approach. Compared with a business process re-engineering one, technologies can be used to (semi-)automate macro-processes through cooperative applications, thus obtaining cooperative processes. Such an approach does not necessarily require initial radical changes, neither in the macro-process structure nor in the internal processes. Each organization interfaces the others by offering specific services, independently of their realization, and therefore internal changes do not impact on the macro-process, as they are hidden by the service interfaces presented to other organizations; separate organizations are thus loosely coupled, and each can re-engineer its own processes without impacting on the cooperative process and related applications.

This strategy is very appealing in *e*-Government applications as the overall system can evolve following the modification and update occurring both in the local administration procedure and in the general legal framework, which strictly constrains the *e*-Government domain. Moreover, by avoiding the need of preventive re-engineering at organizational level, this approach offers the opportunity to design and implement a ready to use platform, which could represent a valid support for the overall performance analysis for successive and incremental business macro-process re-engineering.

An implementation of the EU-PUBLI.com system, currently under development within the project consortium, is offering the opportunity for further investigating features and limits as well as advantages and flaws due to the system and the underlying technologies adoption.

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References

1. C. Batini and M. Mecella, "Enabling Italian *e*-Government Through a Cooperative Architecture", *IEEE Computer,* vol. 34, no. 2, 2001.
2. The EU-PUBLI.com Project Website: http://www.eu-publi.com.
3. M. Contenti, A. Termini, M. Mecella, and R. Baldoni, "An *e*-Service-based Framework for Inter-administration Cooperation", in *Proceedings of the 4th IFIP International Working Conference on Knowledge Management in Electronic Government (KMGov 2003),* 2003.
4. M. Lenzerini, "Data Integration: A Theoretical Perspective", in *PODS 2002,* 2002.

5. J. Castro, M. Kolp, and J. Mylopoulos, "Towards Requirements-driven Information Systems Engineering: the Tropos Project", *Information Systems,* vol. 27, no. 6, 2002.
6. U. Dayal, M. Hsu, and R. Ladin, "Business Process Coordination: State of the Art, Trends and Open Issues", in *Proceedings of the 27th Very Large Databases Conference (VLDB 2001),* 2001.
7. M. Mecella and B. Pernici, "Building Flexible and Cooperative Applications Based on *e*-Services", Technical Report 21-2002, Dipartimento di Informatica e Sistemistica, Università di Roma "La Sapienza", Roma, Italy, 2002 (available on line at: `http://www.dis.uniromal.it/~mecella/publications/mp_techreport_212002.pdf`).
8. G. Alonso, F. Casati, H. Kuno, V. Machiraju, *Web Services: Concepts, Architectures and Applications,* Springer-Verlag, 2004.
9. M. Mecella, B. Pernici, and P. Craca, "Compatibility of *e*-Services in a Cooperative Multi-Platform Environment", in *Proceedings of the 2nd VLDB International Workshop on Technologies for* e-*Services (VLDB-TES 2001),* 2001.
10. OASIS and UDDI.org, "UDDI Version 3 Specification", `http://www.oasis-open.org/committees/uddi-spec/doc/tcspecs.htm#uddiv3`, 2003.
11. IBM and Microsoft, "Business Process Execution Language for Web Services Version 1.1", `ftp://www6.software.ibm.com/software/developer/library/ws-bpel11.pdf`, 2003.
12. W3C, "Web Ontology", `http://www.w3.org/2001/sw/WebOnt/`, 2003.
13. IBM and W3C, "Web Services Security Specification", `http://www-106.ibm.com/developerworks/webservices/library/ws-secure/`, 2002.
14. IBM and W3C, "Web Services Transaction Specification", `http://www-106.ibm.com/developerworks/webservices/library/ws-transpec/`, 2002.
15. IBM and W3C, "Web Services Coordination Specification", `http://www-106.ibm.com/developerworks/library/ws-coor/`, 2003.

Digital Building Permit Application: A Feasibility Study for a Shared Services Solution in the Netherlands

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Abstract. Realizing complete digital intake and processing of building permit applications has been a long time challenge for many governments. Especially the processing of digital drawings and plans constitutes a major obstacle. In 2004 legal barriers to communicate digitally between government and applicants have disappeared in the Netherlands. A group of local governments used the momentum to study the feasibility of a large scale introduction of the intake of digital building permit applications by using a shared services concept. The feasibility study contained technical, economical, juridical and demand site feasibility aspects. This paper reports especially on the demand site feasibility. The paper is mend to present a case study about the readiness of both applicants and local governments in the Netherlands to deal with building permit applications in a digital way.

1 Building Permits in the Netherlands

In many countries the guaranteeing of the safety, health, and durability of the constructed environment is a traditional government task. In The Netherlands the issuing of building permits is delegated to local governments. Each of the 483 Dutch municipalities has its own building permit department. Together these departments process over 120,000 building permits each year. The local departments check whether the submitted design meet the local zoning requirements and whether the construction meets the technical and environmental requirements on safety, durability, and health. Additionally, an independent committee of professionals judges whether the design fits into the existing buildings and landscape from an aesthetical point of view[1]. Permits will only be granted if the proposed design passes all three tests. Applicants have to pay a fee to the building permit departments for having their application checked. The size of the fee depends on the total estimated building costs. There are also substantial hidden costs for the applicant. Each submission has to be accompanied by a sizeable set of prescribed plans, drawings, and calculations – in six fold. An average application file can easily consist of more than sixty plans, drawings, and calculations. In most cases, envelopes won't do and the paper files are delivered at the departments counter in boxes. The extra costs for the applicant, due to extensive bureaucratic requirements, can amount up to € 10,000 per application. The current structure of work-

[1] The aesthetics committee ('welstandscommissie') is probably a typical Dutch institute. It is the committee which decides what is good and bad taste.

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ing procedures in the application chain involves several inefficient conversions from paper to digital files and vice versa. Most professional applicants design everything in CAD-software, while an increasing number of municipalities are scanning their permit files and store them into digital accessible databases. Only at the transfer moments between applicants and governments the applications, and all appendixes are converted to paper, forcing all parties to deal with unnecessary and expansive bureaucracy. A fully digital procedure seems to be an obvious improvement for both applicants and local governments. At the beginning of 2004 however no single Dutch municipality offered the possibility to file a complete electronic application. Three important causes can be mentioned. First, for individual departments the number of submitted permits is too small to justify the substantial investments in a digital counter[2]. Secondly, the building permit inspectors are used to work with drawings on a 1:100 scale. Monitors can only show a small part of the entire map. Thirdly, until January 1 2004 application forms had to be signed by hand which effectively prevent the use of fully digital applications[3].

2 The Shared Service Concept for Building Permits

The City of Rotterdam has by far the biggest building permit department in The Netherlands. Rotterdam has recently decided to digitize its application procedure. Yet even in the case of Rotterdam, the volume of permits would not be sufficient to justify investment costs[4]. The department therefore suggested establishing a shared service digital counter for the intake of building permits, to share investment costs. Somewhere in The Netherlands a hosting service organization (a.k.a. 'the central server') would be set up to receive digital applications. The front office module that facilitates the actual intake of the digital building permit applications can be integrated in the interface of websites of local governments – the applicant does not notice his application is actually being processed at the central server. When the central server receives an application a notification is sent to the relevant local department. The responsible permit inspector can access the complete application file on the central server relying only on his web browser and internet connection. Another functionality of the software is to add notes and corrections to the drawings. Working from different locations specialists can add comments to their own dedicated layers. Setting up the central server involves substantial fixed costs[5]. If a sufficient number of municipalities join the concept, the costs per application can become economical. Assuming a certain critical total of applications, the business model can be solely built on a variable base

[2] Even the biggest building departments (in the major Dutch cities) do not receive more than 2,000 to 3,000 permits a year.

[3] As from January 1, 2004 complete digital communication between government and applications is legally allowed if both parties agree upon it in advance (Wet elektronisch berichtenverkeer april 17, 2003 *(Law on Electronic Administrative Messages Exchange).*

[4] The intake of building permits is not a high volume service. On average, professional applicants file about fourteen permits a year, in five different municipalities. The average total number of permits processed by Dutch municipalities is about 780 a year, with a peak in the 250-500 range.

[5] First estimates for the initial investments arrive at about € 3.3 million, operating costs (annual base) are in the range of € 1.0 – € 1.6 million.

(pay per application). Investments by single municipalities in advance would not be necessary. The business model is especially appealing to small municipalities which can hardly afford to maintain a basic website. Due to the modular design of the central server concept, municipalities can use the service at different levels, ranging from simple intake services to advanced semi-automated processing of permits. At the basic level, the central server just receives and forwards the application to the local government. Subsequently, the server could host the files during the entire application procedure. At a third level, the server also has (web based) workflow functionalities. At the fourth and final level, services facilitate advanced ways of supervising building applications, such as automatic checks of drawings on technical requirements and generation of risk profiles based on aggregate statistical analysis. The City of Rotterdam interested several building permit departments of other major cities to conduct a feasibility study and to build a proof of concept. Additional support was obtained from two federal departments, the Ministry of Spatial Planning & Housing, and the Ministry of Interior Affairs.

3 Results from the Market Research

During the feasibility study a rough business plan for the central server concept was drawn up. Based on desk research and expert panels, investment costs and operating costs were estimated. To map the potential demand, two market surveys[6] were conducted, one aimed at professional applicants[7] and one at local building permit departments. To get a feel for the weight of administrative burden applicants were asked to the amount of time and money they spend on the current application procedure. On average it takes them about forty (extra) hours for each application. Average total costs per application are between €1,000 and €1,500 – excluding the application fee. Costs were strongly related to the estimates of the total time of the additional activities.

Digitization has made much more headway among applications than among municipalities. While almost 60% of the contractors and architects already work fully digital, only 6% of the municipalities indicated to be ready for the digital processing of applications.

The striking difference in degree of digitization is to some extent reflected in the potential willingness to make use of the new service. While 44% of the applicants indicate to make immediately use of the service, less than 20% of the municipalities will do so. Simultaneously, 6% of the applicants has no interest at all in the service, against 19% for the municipalities.

Applicants expect considerable savings from the new services. Average total savings are estimated at € 521, the arithmetic total of the sub items is again higher (€ 680). Not surprisingly, the price respondents are willing to pay for the new services is

[6] The questionnaire was both available on paper and on the Internet. 134 professional applicants and 118 local building permit departments responded to the survey. The survey was complemented with several panel discussions to gain additional qualitative information about the interview results.

[7] Only professional applicants (project developers, architects, contractors) were approached. Individual citizens usually rely on professional applicants (contractor or architect) to process the application.

Table 3. Time and Money Spent by Applicants per Item and Correlations of Cost Items with Total Time of Additional Activities (n=134).

TIME (hours)	*Ex ante consultation*	*Printing*	*Ex post consultation*	*Other*	*Total (arithmetic)*	*Total (est. applicant)*
	9.7h	7.2h	7.9h	17.0h	41.8h	40.0h
COSTS (€)		*Labor*	*Out of Pocket*	*Out-sourcing*	*Total (arithmetic)*	*Total (est. applicant)*
Weighted averages		€ 764	€ 272	€ 675(*)	€ 1326	€ 764
Correlation with Total Time of Activities		.781(**)	.578(**)	.318(**)		

* 43% outsourced the application, for the remaining 57% score for this item is zero.
** Pearson correlations: significant at the 0.01 level (2-tailed).

Table 3. Degree of Digitization for Professional Applications and Municipalities.

Degree of Digitization (%)	*Low*	*Medium*	*High*
Professional applicants	18%	23%	59%
Municipalities	76%	18%	6%

Table 3. Potential Interest in a Shared Service for Building Permits (% of population).

	Not interested	*No price increases*	*Proven added value*	*Immediately interested*	*Digitization under own control*
Applicants	6%	29%	21%	44%	n/a
Municipalities	19%	35%	24%	19%	4%

related to total expected savings but the correlation is much weaker than expected[8]. The distribution for expected savings for municipalities collapses into two groups. Almost half of the municipalities (48%) do not expect any savings from the new service, scores for the remaining 52% differ widely. Average total annual savings are about € 12.000 but there are a significant number of municipalities (7,6%) which expect to save more than € 50.000 a year. The willingness to contribute in the costs is more or less equal between applicants and the municipalities. There is a sizeable group which does not want to pay anything, a large group (MASS) which is willing to spend a modest amount per application, and smaller group (NICHE) which is willing to pay much more. The high prices in the NICHE market more than compensate for the relatively low number of potential users. However when the entrance strategy is aimed at this particular group the MASS market will probably never be opened up. The other way around NICHE users are of course willing to pay the much lower MASS prices. When combining revenues from applicants and municipalities both MASS and NICHE markets have sufficient volume to recoup the investment. In the case of municipalities, at first glance there is just a weak correlation between size and willingness to pay. This is however mainly due to the disturbing influence of the rela-

[8] Pearson correlation of 0.219 (significant at the 0.01 level, two-tailed).

tively low scores of the second-biggest category (50-100,000 inhabitants). Both expected savings and accepted maximum price per application are more than three times the average for the biggest municipalities in the sample (>100,000 inhabitants).

Table 4. Expected Annual Savings, Accepted Maximum Price per Application, Amount Transferred to Applicants (€).

	Expected annual savings	*Maximum costs per application*	*Contribution applicant per application*
Biggest municipalities	€ 33,382	€ 263	€ 24
Average	€ 10,926	€ 83	€ 31

4 Reflections on the Results

Improvements in the virtual front office are much easier and more visible than improvements in the back office. Many e-Government programs have therefore started at the front office. This has also been reflected in conceptual classification schemes which usually run from simple to advanced web services, only to arrive at back office integration in the fuzzy final 'transformation' phase. Concepts such as one stop portals and full electronic services – usually referring to the ability to pay for public services online – are seen as important stepping stones in the route to electronic perfection. The market results indicate that users are not interested in electronic services as such. They just want (in the right order) more transparent, easier, faster, safer, and cheaper services. The professional applicants put relatively little weight on unique identification and found electronic payments irrelevant altogether. The increasing demand for quality improvements in traditional services is the primary drive to develop online services, and not the other way around. The e-government development is about to reach limits when solutions do not transcend the boundaries of a single government organization. The social problem at hand and its adjoining service delivery chain should be central, not the individual organization[9]. The shared service concept is somewhere in between the traditional single organization based service and the future seamless integration centered on a specific social problem. Shared services transcend individual organizations but are still built on traditional segregated services. The initial push from single to multiple organizations is mainly driven by financial considerations. The subsequent pull from problem oriented services is mainly driven by striving for quality improvements. Somewhat ironically, in this particular case (but may be in general) those that are technological most advanced seem to realize the future potential of shared services the least. Problem (demand) oriented services are only possible when information is shared with third parties outside the traditional (supply driven) service shaft (e.g., the information gathered by building permit departments might be of live-saving importance to fire brigades). Municipalities regard the possibility to share information with third parties as one of the most important improvements of the shared building permit service yet they are the least advanced from a technological point of view. Professional applicants seem to regard the possi-

[9] Zuurmond, A. (2003), *The Neglected State: A plea for a Copernican shift in public administration,* inaugural speech at University of Leiden.

bility to share information as a threat rather than a strategic possibility. They still seem to be stuck in the traditional competitive mode. In other words, those, who can, do not see it and those who cannot, do see it. The picture should be modified for the biggest municipalities. They are technically the most advanced and seem to be the most interested in the shared service concept. Given the presumed economic advantages of increases to scale we expected that small municipalities, with their limited budgets, would be the most interested in the shared services concept. However, they are not interested in the service, neither in its presumed economic benefits in the short run nor in its strategic benefits in the long run. From a (national) policy perspective this gives an additional rationale for aiming at the NICHE strategy, next to the business economics motive. The distribution of the potential interest in the new service (Table 3) seems to follow the classical concept of the acceptance categories in the product life cycle of innovations neatly[10]. A small group of innovators and early adopters (biggest municipalities) is willing to take the risk, while a majority (MASS) intents to wait and see how the early adopters get along. While starting at the NICHE end one should already keep MASS in mind. The new service – and its strategic potential – will only be taken up by the next lowest category if the market price is not set too high. In this particular business case this might compel the federal government to subsidize the (relatively high) initial investments. It also points at the importance to constantly strive for vigorous cost reductions during the roll-out of the new service.

[10] Rogers, E.M. (1962), *Diffusion of Innovations,* New York: The Free Press.

G2G Collaboration to Support the Deployment of e-Voting in the UK: A Discussion Paper

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Abstract. In this paper we identify the high-level requirements for a G2G collaborative platform to support the deployment of e-voting in the UK context. After referring to the stakeholders involved in the deployment of e-voting projects we identify the government agents that the platform would serve. Based on the process description followed in earlier pilots we define the role of each government agent and subsequently suggest four areas of collaborative support. Accordingly we refer to aspects of knowledge sharing that the system could foster. In concluding we suggest not only the usefulness of such a collaborative system for government agents but also its prospective benefit in supporting transparency and public scrutiny of e-voting.

Introduction

The use of computer supported collaborative environments to support G2G higher-level functions, such as monitoring and evaluation of public programs has been previously suggested [6] as an evolutionary step to the existing large-scale provision of e-government transactions and services. In the UK, one of the most innovative e-government initiatives has been undertaken in the field of electronic voting. Overall 16 pilot programs have been held in May 2002 [9], and 20 more in May 2003 [2]. The deployment of pilots involved three main government agents: the Office of the Deputy Prime Minister (ODPM), the Electoral Commission (EC), and the Public Authorities (PA) in which the pilots were held. More similar pilots are programmed to take place in the May 2005 Local Authority Elections following the UK Government's policy to put *"robust systems in place for an e-enabled General Election after 2006"* [5] (p.47). The collaboration between the fore mentioned government bodies was proven to be a much more difficult task than originally expected despite the small scale of the pilots. In this paper we discuss the need for a G2G collaborative platform, which has the potential to support these agents and provide additional transparency to the e-voting process.

This paper forms part of a doctoral program concerned with the identification of the emerging constraints in re-designing the electoral process in relation to ICTs. Given the administrative constraints identified from the detailed analysis of the evaluation reports produced on each of the pilot programs by the EC and from observations and interviews undertaken in one of the 2003 pilot PAs, we present the high level requirements for a G2G collaborative system dedicated to the support, monitoring and evaluation of future e-voting schemes in the UK.

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Stakeholder Analysis

The need to identify the multiple stakeholders in relation to the deployment of sophisticated G2G collaborative e-government applications has been suggest by Scholl [10]. The deployment of e-voting in particular, due to its democratic nature, involves more agents in the process compared to other government provided processes. Fairweather and Rogerson [4], suggest seven agents involved in the deployment of electronic elections: central government, local government, those seeking election, minority groups, citizens as voters, suppliers of technological elements, systems developers. Xenakis and Macintosh [12] in their analysis of the legal issues involved identify five legally inter-related agents: voters, candidates, commercial vendors, local authorities and central government. At a more detailed level, central government organizations should be differentiated from independent government bodies like the Electoral Commission according to their role in the delivery of the process. Candidates and elected politicians should also be regarded separately from political parties, as they do not necessarily share the same views on controversial issues such as the introduction of electronic voting. Non-profit specialized organizations have also been identified in the literature mainly in relation to specialized groups of voters (e.g. providing for the disabled). All the identified stakeholders could provide inputs to the system however the system itself is addressed at the three involved government agents: central government (ODPM), local authorities (PA), and the Electoral Commission (EC). In the following section we describe the role and the responsibilities of each of these three agents as undertaken in the 2002 and 2003 pilots.

Government Agents Involved and Their Role in the Process

The ODPM was the government agent who procured and funded the pilots. Commercial suppliers who could provide e-voting systems to the PAs were previously approved by the ODPM through an organized supplier validation process. The result of that process, internal to the ODPM, provided the program with an approved list of suppliers who could in turn "join up" with PAs and apply to run an e-voting pilot. Officially however it was the PA that applied to the ODPM, suggesting their preferred commercial supplier and it remained at the discretion of the ODPM to combine PAs with commercial suppliers. After the PA applications had been submitted, the ODPM had to examine them and according to their scope, approve or reject them. Approved PAs would then be attributed commercial suppliers and the ODPM contracted the services and products of the supplier on behalf of PAs. As the results of the voting pilots were legally binding in all cases, the ODPM was also in charge of preparing a special act of law, which would allow and describe the use of e-voting technologies in the voting process. Due to the limited time scale followed PAs and commercial suppliers had to initiate some project stages for the deployment of the pilots prior to the official legislation being passed by the Parliament and the sign-off of suppliers' contracts [13]. PAs were fully responsible for the administration of the pilots, and the Returning Officer of each PA personally liable for the result of the election [11]. The fact that no administrative support was centrally provided to the PAs resulted in the PAs' dependence on commercial suppliers for specialized knowledge of the systems piloted and expert advice on how to better manage the adopted ICTs. Finally the EC

had the statutory duty to evaluate pilot schemes and report to the ODPM after the pilots had been completed. The EC based its evaluation reports on its own observations and assessments, but also sub-contracted external consultants to report on specific issues of the programs. For the 2003 pilots the ODPM also contracted the services of professional quality assurance external consultants who monitored the practices followed by PAs prior to the election event and accordingly reported to the ODPM. Therefore, the high-level responsibilities and resulting needs of each government agent were as follows:

- ODPM
  1. Procure pilot programs
  2. Fund pilot programs
  3. Validate commercial suppliers
  4. Approve/reject PA applications
  5. Combine approved PAs to approved commercial suppliers
  6. Prepare and sign-off supplier contacts
  7. Prepare legal acts and forward them to the Parliament
  8. Monitor the quality of e-electoral administration practices followed by PAs
- PAs
  1. Administrate the deployment of the pilots
  2. Co-operate with commercial suppliers to support administrative responsibilities
  3. Provide evaluation data to the EC
  4. Provide evaluation data to the ODPM
- EC
  1. Evaluate PA performance on practices followed
  2. Prepare evaluation reports
  3. Report to the ODPM

This highlights the need for better collaboration between the agents involved in the delivery of the pilots, and therefore, we discuss how a computer supported collaboration platform could support them in their inter-related activities and tasks.

Areas of Collaborative Support

Based on the overlapping needs of each government agent we identify the collaborative areas that a platform should support.

- **Design of the pilots:** In the existing process, the ODPM internally decides on the strategic targets that all pilot projects should aim at and applications are approved or rejected on the basis of their compliance to these targets. Furthermore, PAs due to their lack of expertise and specialized knowledge have to rely on commercial suppliers for the design of the suggested pilots. This fact in turn replicates the dependence of PAs on their suppliers of e-voting technologies. Although suggested in the literature as one of the final stages of G2G collaboration [7], in the presented system the project design function aims at enabling the ODPM and PAs to jointly decide the scope of an e-voting project and accordingly design the different aspects of its implementation. More government agents may be involved in this function according the need for specialized knowledge.

- **Administration of the pilots:** In the current practice PAs are not typically provided with support in their task to properly administrate the adoption of new technologies in the voting process. The administration support of the pilots aims at providing PA staff with the necessary information, past experience, gathered knowledge and if required expert advice. Part of this support can be constantly available in a documented form while additional support could be provided on the PA's request. The ODPM and the EC could provide such support through a collaborative platform while supplementary government or external agents could be introduced according to the support request.
- **Monitoring of the pilots:** Following the ODPM existing e-voting project management requirements [8], the project management function should be compatible with PRINCE II, a specific project management methodology. PRINCE II [1] involves the production of an implementation plan with specific milestones and review dates. It also identifies tasks, activities, deliverables, risks and dependencies of delivery between tasks. Tasks are allocated to the responsible agents along with the relevant resources. Accordingly this function would relate the main activities to agents, tasks to single person agents, and dependencies of delivery between agents when collaborative activities are involved. Since the provision of e-voting technology is outsourced to commercial suppliers the project monitoring function should also mirror the proper delivery of the contracted and sub-contracted task. This function would primarily serve the requirement of the ODPM for audit of the project progress. Additionally the EC would have one extra stream of information useful to the overall evaluation of the pilots.
- **Evaluation of the pilots:** Usually related to the monitoring function, in this case we isolate it, as evaluation of the pilots is undertaken by a different government agent (EC) than the monitoring of the pilots (ODPM). Although the monitoring function can also be used for evaluation purposes, the evaluation function of the platform could provide comparative analysis between similar projects, that done in real-time as well as retrospectively, after the completion of the projects.

Aspects of Knowledge Sharing

The ODPM and the EC being based in London, and the e-voting pilots taking place in PAs all over the UK, creates a set of geographically distributed agents who need to collaborate in order to provide a unique process. Additionally more PAs may be undertaking e-voting projects at the same time. This multiplicity of PA agents who must be concurrently served in different locations creates an increasing need to share knowledge and experience gained to date. Across the four identified areas of collaboration there is a need to share:

- **Information.** The e-voting pilots have resulted in the publication of a considerable number of reports by the government agents involved in the process. These reports cover the establishment and subsequent management of the whole e-voting pilots. They typically describe activities prior to e-voting taking place, necessary activities to undertake during the e-voting process and also activities relating to the close down and evaluation of the process. Examples of documents include new legal acts, tendering guidelines and training material. A collaborative G2G could allow the appropriate flow of relevant information be-

tween all government agents involved in the delivery of the pilots. This could be either as a requested service or through the pro-active provision of information.

- **Acquired Knowledge.** E-voting has been piloted in the UK since 2002; this has allowed a considerable body of experience to be built up over that time on how to conduct an e-election. This experience needs to be captured, analyzed and represented [13] so as to provide an effective online "experience archive" for PAs and other government agents with no previous experience on the field. A G2G collaborative platform could provide the potential to share such acquired knowledge in an effective way and be used not only for training staff prior to conducting new e-voting pilots but also as real-time support tool when e-voting pilots are underway.
- **Specialized Knowledge.** Considerable specialized knowledge is required to set up and manage an e-voting pilot. This involves both legal and technical knowledge. The introduction of e-voting has meant the drawing up of new legal acts which need careful examination and interpretation by all government agents involved in e-elections especially the Returning Officers. The introduction of new technology to enable the e-voting requires specialized technical knowledge to set up and operate, particularly when faults arise. This technical knowledge has typically resided with the commercial suppliers rather than with the PAs responsible for the pilots. There is an opportunity for a G2G platform to provide knowledge-based expert opinion, to support the process and conduct e-elections.

Conclusions

Sharing knowledge between different government agencies and establishing collaborations between local authorities, central government and other pubic agencies is becoming more and more important. Increasingly, knowledge of services, regulation and policy are developed by other tiers of government or government related organizations as opposed to those that need to enact them. A collaborative approach with combined knowledge sharing could be viewed as an effective way to address such issues. In this paper we have argued that the introduction of e-voting into the UK should be viewed as a collaborative activity with the need for sharing of information, acquired expertise and specialist knowledge between the involved government agencies. To date little work on such a G2G collaborative platform has been reported. A further major benefit could emerge from such work. The issue of transparency has so far, not been referred to in this paper, despite its predominant place in the spectrum of e-government issues. However we consider the levels of transparency between users of similar systems to depend on the relevant policy adopted by their administrators. Nevertheless for the case of e-voting in particular, where transparency is equivalent to the opportunity for audit, the deployment of a G2G platform as presented in this paper, would enhance the opportunity for scrutiny, or even for public scrutiny if the platform is developed as an open system for stakeholders interested in the result of the process.

References

1. Bentley, C., (2002), PRINCE2: A Practical Handbook, Butterworth-Heinemann, Oxford.
2. Electoral Commission. (2003) Local electoral pilot schemes 2003, April 2003
3. Electoral Commission. (2003b). The shape of elections to come: A strategic evaluation of the 2003 electoral pilot schemes, July 2003
4. Fairweather, B. & Rogerson, S. (2002.) Technical Options Report, De Montfort University.
5. HM Government. (2002) In the Service of Democracy - a consultation paper on a policy for electronic democracy. Published by the Office of the e-Envoy, Cabinet Office, London.
6. Lenk, K, Traunmuller, R., Broadening the Concept of Electronic Government. In:
7. J.E.J Prins (ed.) Designing e-Government, Amsterdam, Kluwer (2001) 63-74.
8. Loukis, E., Kokoloakis, S., (2003) Computer supported collaboration in the public sector: the ICTE-PAN project., in proceedings of DEXA, E- GOV 2003, Springer
9. ODPM (2002), Electoral Modernization Pilots, Statement of requirements
10. Pratchett, L. (2002) " The implementation of electronic voting in the UK " LGA Publications, the Local Government Association
11. Scholl, H.J., (2001) Applying Stakeholder Theory to E-Government: Benefits and Limits. Proceedings of the 1st IFIP conference on e-Commerce and e-Government, October 2001, Zurich, Switzerland
12. 11. Watt, B. (2002) Implementing Electronic Voting, A report addressing the legal issues by the implementation of electronic voting, University of Essex
13. Xenakis, A. & Macintosh, A. (2003). A Taxonomy of Legal Accountabilities in the UK e-voting pilots. In proceedings of DEXA, E-GOV 2003, Springer
14. Xenakis, A. and Macintosh, A. (2003b);'Using Knowledge Management to improve Transparency in E-voting'; KMGov2003, Springer

How to Modernize the People Registration Process

Experiences in the Leading e-Government Project in Germany

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Abstract. The OSCI protocol supports the secure and legally binding message exchange without media breach. International standard have been taylored to meet the requirements of european laws. Application specific layers for standardized message payload make use of the security mechanims of the underlying transport layer. The modernization of the people registration process in germany in the sense of electronic message exchange will be based completely on both layers of OSCI.
A sound standardization of message contents at the application level is a crucial factor for an successful e-Government infrastructure. In the OSCI–XMeld project, the XML schemata and the written documentation are derived in an automated way from the formal UML model.

A Common Communications Standard for e-Government

The Free Hanseatic City of Bremen was one of the prize winners of the german MEDIA@KOMM project. The main goal was to achieve secure, legally binding and trustworthy on-line transactions without media breach. The concept of an online platform, acting as an intermediary between citizens, local government and other service providers, has been developed (see [3]). This led to the OSCI standard, a two layered protocol well suited for the secure message exchange especially in the e-Government context. This protocol acts as a core component for data transfer between all involved parties.

OSCI is well suited for offering common government services over the Internet in a secure way. The application layer of the OSCI protocol is used for the standardized representation of content data. Together with the underlying transport layer, called OSCI–Transport, this allows highly automated and legally-binding transactions based on secure message exchange. In the meantime it became a mandatory standard for the federal government IT architecture of Germany [2], regulated by law by the German Ministry of the Interior.

For realization purposes within the MEDIA@KOMM project, nine life-events had been selected. Within the last years one of these, the *people registration process,* became the leading e-Government project in Germany. It is completely based on OSCI with respect to data exchange. The layer of the OSCI protocol which is specific for the people registration process is called OSCI–XMeld.

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Secure Message Exchange in the e-Government Context

OSCI–Transport is the application independent part of the OSCI protocol. It is responsible for the secure, reliable and traceable transport of content data of any kind. It is based on XML and especially the cryptographic XML components ([6]). These international standards had to be taylored to fulfill the requirements of the european laws. Signature and encryption algorithms, key-lengths and certificate formats were adapted to be compliant with the *german digital signature act.* OSCI–Transport has been checked by the "German Federal Office for secure information technologies" against ITSEC.

OSCI–Transport supports the asynchronous message exchange as well as the synchronous *request-response* scenario. For that purpose an OSCI *intermediary* holds secure "mailboxes". While this intermediary acts like an centralized message exchange point, it is unable to decrypt the message payload. End-to-end encryption can be guaranteed. The intermediary is the single access point to the public key infrastructure. OSCI–Transport is described in detail in [4].

From UML to XML: How to Standardize Message Content

Ambitious e-Government efforts depend in great extent on the seamless integration of heterogeneous legacy systems without media breach. In order to design fast, efficient and economical processes, application data interchange has to be standardized. Therefore a sound standardization of message payload is a crucial factor for an successful e-Government infrastructure.

Modern e-Government systems will be web-service oriented, implying an XML-based data interchange. Syntax and structure of XML messages have to be described using XML Schema. The requirements for the development of these schemas are the same as for the development of usual software applications: The development process has to be *fast, efficient* and *flexible.*

OSCI–XMeld is the name of the OSCI application layer for the *people registration process.* It is being developed by a group of experts from both governmental and industrial parties, all of them specialists for the people registration processes. Based on their knowledge an UML model has been designed to describe the processes, actors, structures, messages and message contents for the relevant scenarios. Additionally a database has been created, including legal requirements and data interchange conditions, e.g., a complete mapping from DSMeld (the former standard for data exchange) to OSCI–XMeld.

The OSCI–XMeld standard itself, composed of a number of XML Schema files and an accompanying documentation, is nearly completely built in an automated way from the UML model and the database using the development framework XGENERATOR. We decided to do the modeling in UML instead of direct development of XML schema.

Standardization of message exchange for the people registration has much more aspects than only the data objects common for communicating parties. The focus of our work is to find an agreement about the public processes which leads

to message exchange. Therefore we use the appropriate UML modeling techniques, especially those for dynamic system behaviour (use cases, sequence and activity diagramms). The OSCI–XMeld schemata, however, are derived from the static part of the model only. Both, the dynamic and static model aspects have become a major part of the comprehensive OSCI–XMeld documentation.

The XGENERATOR analyzes the structural information (the UML classes mapped to complex types and elements in the OSCI–XMeld schema files) and produces a corresponding graphical representation as SVG content. The documentation of the complete OSCI–XMeld standard is done in the UML model by means of *DocBook* fragments. This information is taken by the XGENERATOR to produce a huge amount of DocBook content. Both DocBook and SVG files are brought together to form the essential part of the written OSCI–XMeld specification.

The OSCI–XMeld team has to deal with only one modeling technique: UML. – Experiences have shown that using several uncorrelated modeling techniques (typically available as a so-called "tool-zoo") makes it hard if not impossible to come to consistent results of high quality, especially in heterogeneous teams not only composed of computer scientists.

Last but not least, arbitrary schema guidelines or even schema languages (e.g. Relax-NG) can be supported by simply parameterizing the XGENERATOR without a need to change anything in the UML model.

Using the technique of deriving schemata and documentation from the formal model, we can guarantee the consistency of model, database, schema files and documentation at any time, thus improving efficiency and flexibility whereas time and costs are reduced significantly.

The XGENERATOR framework has been developd within the OSCI–XMeld project, but in principle it should be useful for other application layers of OSCI as well. Analyzing the requirements from other projects in Germany, we start to plan for a new version of the XGENERATOR software [1]. This will be closely related to the new Version 2.0 of the XMI standard [5].

From Standards to Solutions: Putting the Pieces Together

The efforts needed to get the people registration system up-to-date to become a comprehensive e-Government application make clear, how many different problems have to be solved before the concrete realization can start. A real benefit can only be expected based upon a complete and thorough realization of the complete picture, having in mind that a standardized data exchange is only one of many aspects to be taken into account.

This implies that from the 6.000 registration offices in Germany each one has to move from a mostly manual, paper-based communication to an automated, internet-based data exchange. As long as this condition is not met, a parallel infrastructure for the conventional exchange of letters between involved offices has to be provided and operated.

Commercial customers of the people registration system will only invest in this new technology if the reliability of each registration office can be guaranteed, regardless of regional conditions. Therefore the demand for a complete and obligatory installation of a new standard is first and foremost economical founded, implying considerable infrastructural requirements.

The Internet has been broadly accepted in several areas. Due to the high security requirements the use of the Internet for data exchange in an e-Government context is only possible based upon additional security mechanisms. The protocol OSCI–Transport offers all the required security mechanisms. Therefore the German Ministry of the Interior has layed down by law the mandatory use of OSCI–Transport for an interstate data exchange.

Since internal communication networks within states have been established, the same security objectives must be realized using different techniques. Solutions have to be found and realized both saving former investments and integrating the different networks to build a secure infrastructure usable transparently from any place in Germany.

To support the networking of the registration offices so-called "clearing offices" will be established, mapping between different security infrastructures. Of course this leds to interesting new questions in both organizational and legal areas.

The ongoing discussion concerning the necessary security infrastructure as a fundamental base for the realization of e-Government in Germany has shown the different interests of the involved social groups. Especially the relation between open standards and implementing products has been stressed. The public discussion resulted finally in the solution to not only provide with a standard but also with implementing software components. The OSCI Co-ordination office has developed an open source "OSCI–Transport library", which is available for free. This is especially useful for the manufacturers and providers of legacy systems for the people registration.

References

1. Ullrich Bartels and Frank Steimke. Developing standardised data interchange in eGovernment: From model to implementation. In *Proceedings of the 4th European Conference on e-Government.* To be published, June 2004.
2. Germany Federal Minister of the Interior. Standards and Architectures for eGovernment Applications 2.0. www.kbst.bund.de/saga, 2004.
3. H. Kubicek and M. Hagen. Leading the Information Society – Secure And Legally Binding Online Services For Citizens. http://www.fgtk.informatik.uni-bremen.de/website/deutsch/downloads/diverse/pdf/kubicek_glc.pdf.
4. OSCI Co-Ordination office. OSCI–Transport 1.2 – Specification. http://www.osci.de, June 2002.
5. XML Metadata Interchange (XMI) Specification. http://www.omg.org/docs/formal/03-05-02.pdf, May 2003.
6. XML Signature Syntax and Processing. http://www.w3.org/TR/xmldsig-core, Feb 2002.

Reliable Peer-to-Peer Access for Italian Citizens to Digital Government Services on the Internet*

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Abstract. In the delivery of e-government services to citizens it should be clear that the viewpoint cannot simply be the standard one of client-supplier commonly used to provide services on the Internet. In a modern society it has rather to be the peer-to-peer approach which is typical of democracies, where institutions are equal to citizens in front of the law. But this is not yet a widely accepted standpoint in digital government efforts going on in many advanced countries in the world.
Italian government, in its ever increasing effort to provide citizens with easier access to online government services, has instead adopted and is pursuing this symmetric approach, which is going to represent a fundamental tool in the ongoing march towards e-democracy.
In this paper we describe the organizations involved in the process and the Information Technology (IT) infrastructure enabling the effective management of the whole process while ensuring the mandatory security functions in a democratic manner.
Organizational complexity lies in the distribution of responsibilities for the management of people's personal data among the more than 8000 Italian Municipalities and the need of keeping a centralized control on all processes dealing with identity of people.
Technical complexity stems from the need of efficiently supporting this distribution of responsibilities while ensuring, at the same time, interoperability of IT-based systems independent of technical choices of the organizations involved, and fulfillment of privacy constraints. The IT architecture defined for this purpose features a clear separation between security services, provided at an infrastructure level, and application services, exposed on the Internet as Web Services.

Keywords: Trust and security, e-service interoperability.

1 Introduction

The ubiquitous presence of the Internet has offered to Public Administrations the great opportunity of being able to bring their offer of public services directly

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in the home of citizens, improving the level of provided services while keeping under control the associated costs [8, 10].

But this opportunity opens also the way to possible abuses, identity theft is the most prominent example of. So the point is how to set-up mechanisms and systems to enable citizens and public administrations to reliably identify each other on the Internet, without compromising people's rights and organizations' responsibilities.

The whole area of authentication of individuals and transaction parties is the really critical issue to transform such an opportunity into a working reality delivering its promises. It is often said "On the Internet nobody knows you are a citizen" and it is plainly true that while anonymity may be desirable for certain kind of Internet services, certainty of parties identification is a necessary condition for giving full validity to many kinds of transaction on the Internet.

Our solution supports the use of two access mechanisms to services on the Internet: the Electronic Identity Card (CIE - Carta d'Identita' Elettronica) and the National Service Card (CNS - Carta Nazionale dei Servizi). While the former is an identity document with full legal validity allowing the citizen also to access to digital government services, the latter is not an identification document and was introduced with the purpose of enabling a quicker and easier deployment of local services from Regional Public Administrations, during the initial phase of rolling out CIE to citizen.

The infrastructure supporting this solution has been developed during a multi- year cooperation between the Italian Ministry of Interior and the NESTOR Laboratory of the University of Rome "Tor Vergata". Many organizations are currently involved in this project. The Head of Department of Internal and Territorial Affairs of the Italian Ministry of Interior is responsible for the project and the whole project is being developed as an institutional duty of the Central Directorate for Demographic Services of the Ministry of Interior, on its responsibility and with its support [15]. The NESTOR Laboratory of the University of Rome "Tor Vergata" is the technical coordinator of the project. Prof. Talamo of the University of Rome "Tor Vergata" is the supervisor of the project. The Italian Mint (Istituto Poligrafico e Zecca dello Stato - IPZS), manufactures and initializes CIEs. The security system of the CIEs architecture (Sistema di Sicurezza della CIE - SSCE), generates keys used for activating CIEs and is responsible for guaranteeing security during the formation of data and issue of CIEs. Municipalities contributed to the definition of end-user requirements and ANCI, the Association of Italian Municipalities, by means of ANCITEL, its IT subsidiary, is cooperating to the deployment of the system all over the Italian territory.

2 People Identification and Access to e-Services in Italy

The Electronic Identity Card (CIE, for short) is a polycarbonate smart card equipped with a microchip, a laser band and a hologram which contains personal (e.g. name, surname, date of birth,…) and biometric (e.g. photo, fingerprint,...) data of a citizen.

The CIE is an identity document which, according to Italian Laws, is fully equivalent to the paper based ID card and it has two purposes: *(i)* in-presence identification of a person, like a traditional paper based ID-card, and *(ii)* remote authentication of a citizen, allowing access to digital government services. For example, citizens could use their CIE for accessing a Municipality's web site allowing them to perform operations like generation of self-certified documents, online tax payment, access to administrative databases, online applications and many other. Any public administration or agency which wants to give access to online services to citizens using the CIE, must register at the Ministry of the Interior. In this way, it is possible to guard citizens' rights as well as those of the service provider, as needed in a digital government system. For a more detailed presentation of its characteristics and of the overall process involved see [1,5].

The National Service Card (CNS, for short) is a polycarbonate smart card equipped with a microchip and containing personal data of a citizen.

CNS allows identification of a citizen in the Internet access to services provided by a Public Administration. CNS can be issued by any Public Administration but cannot have data for in-presence identification of people (e.g., photography) nor be used for this purpose. Also CNS can be issued or renovated to a citizen only if he or she has not already received his/her CIE [17]. CNS it is therefore a tool introduced to allow to Public Administrations to make them possible to provide e-services to citizens in their territory of interest during the initial transient phase of deployment of CIE. During this phase, CNS and CIE are fully interchangeable (i.e., plug-to-plug compatible) to access e-services of a public administration. Also a citizen holding a CNS has to be able to access (if he/she has the right to) also e-services provided by a Public Administration different from the one which has issued the CNS used for the access itself.

3 The Reference Scenario and CIE Deployment

We only remember here the most important characteristic of the reference scenario for the management of personal data in Italy. For a more detailed view see [4].

In Italy, Municipalities are responsible for maintaining an archive of personal data of people having established residence within the Municipality's territory (APR = Anagrafe della Popolazione Residente).

The Ministry of Interior has the overall responsibility for the correct maintenance of Personal Data Registries in all Italian Municipalities. In order to understand the dimensions of the problem, it is important to note the variety in size and complexity of these archives, since about 6000 of the 8192 Italian Municipalities have less then 5000 citizens, but 8 of the 20 Region chief towns have more than one million inhabitants.

In Italy we have defined an organizational and architectural solution featuring fully independence of involved organizations and a clear separation between security services, provided at an infrastructural level, and application services, exposed on the Internet as Web Services. Our solution is therefore able to fully

support the delivery of promises of better services to citizens by government through the use of IT.

The organizational component of our solution defined a single access index to the Municipality which is responsible for a citizen's personal data (INA = Indice Nazionale delle Anagrafi). This index, whose institution was established by a supplement [14] to the ordinary law regulating the Personal Data Registries kept in Municipalities [13], provides - for a given person - the reference to the Municipality responsible for his/her personal data. Uniqueness of reference to a person is ensured by using fiscal code as INA's access key.

Organizational competence for management of INA and of its services towards Municipalities and PAs was given to the National Center for Demographic Services (CNSD = Centro Nazionale Servizi Demografici), a newly established organizational unit of the Ministry of Interior [16]. CNSD is responsible for both the IT infrastructure supporting access to and management of INA and its services and for the end-user support in the utilization of its services. CNSD is also responsible for the management of telematics infrastructure ensuring secure and certified access to its services to all organizations. Technical solutions able to implement efficient and effective IT systems to support CNSD activities were devised and tuned by NESTOR Laboratory.

In the first phase of deployment of the CIE, which was carried out in Italy during 2001, 100.000 ID cards manufactured and initialized by the Italian Mint (IPZS), were assigned to 83 Municipalities, in proportion to their respective population. Municipalities also received hardware and software tools needed for issuing ID cards to citizens, and have been given the opportunity of obtaining support by different means, including on site assistance, through a call center, and by accessing a dedicated Internet site.

The feedback received from the organizations involved in the experimental phase represents an invaluable contribution to the success of the project, as no previous experience was available with projects having similar characteristics in terms of geographic distribution, inter-organizational issues and sensitivity of data, even in other countries.

The experience gained during this experimental phase, helped in identifying the activities which must be carried out by the organizations involved, as well as technical and organizational requirements needed for guaranteeing correct operation of the overall architecture.

The second phase of deployment of the Italian CIE architecture has already started. The target of this second phase is to provide the 56 Municipalities involved with 2.000.000 CIEs, and to issue them by the end of year 2004 thus satisfying the local demand for ID cards. 600.000 CIEs have already been produced until the first half of April.

4 The Security Backbone

Our solution to implement a secure distributed interoperability among Municipalities and PAs to provide secure digital government service in the field of

Personal Data Registries is based on establishing a permanent infrastructure layer (the Security Backbone) providing security services, placed between the base communication services layer and the application service layer.

The Security Backbone contains the following functional subsystems: (i) confidentiality and integrity services, (ii) authorization service, (iii) authentication service, (iv) documentation subsystem, (v) access policy management, and (vi) quality of service monitoring.

The various technical components we have used to build the Security Backbone are not, just by themselves, an intrinsic innovation, since each of them is already known in the literature. But their combination in setting up a permanent infrastructure layer providing security services is surely an innovation in the area of distributed digital government services based on the interoperability of legacy systems. For more details on the Security Backbone see [2, 3].

A large amount of technology is available dealing with many issues related to security for the Internet [6, 7 , 9 , 11, 12] and research activity is still very high with many conferences discussing more advanced security topics.

Also, advances in lower level protocols for communication (e.g. IPv6) or recently developed PKI-based approaches to inter-organizational security infrastructures (e.g. bridge CAs) will hopefully result in a widespread intrinsically secure communication infrastructure. For the time being, though, relying on the availability of such technologies to provide secure services does not constitute a solution that in general works.

On the other side, the architecture we have described in this paper can be implemented with commercially available components and does not require updates or change to existing end-user applications. We therefore think that it may contribute to spread the use of digital government services, where individual and collective security is a primary concern.

5 Conclusions

In this paper we have described the approach taken in Italy to ensure citizens access to digital government services while keeping the essence of a democratic society: the equality of all citizens and institutions in front of the law. We have presented the reference scenario and we have identified normative and organizational constraints on the activities to be performed when issuing CIEs and CNSs, the two access means in Italy to e-services made available on the Internet by Public Administrations.

Information security in the overall architecture is provided by adopting a solution to the provision of security services which can be deployed without relying on advanced security technologies and without needing any update or change to existing systems and applications.

The various functional subsystems used in our solution, called the Security Backbone, provide end-to-end security in the interaction among involved organizations and constitutes an addition, not a replacement, of security solutions deployed locally. Thus, we have shown that, by putting security services in an

infrastructure layer of inter-organizational communication, to be placed between the communication service layer and the application service layer, it is possible to provide, at reasonable cost, efficiency of service provision and effectiveness of security functions while preserving organizational and technical autonomy. Moreover, our approach is able to guaranteee equality of all parties in transactions related to e-services.

References

1. F.Arcieri, M.Ciclosi, F.Fioravanti, E.Nardelli, M.Talamo: The Italian Electronic Identity Card: a short introduction. *The National Conference on Digital Government Research (DG.O-04),* Seattle, Wa., USA, May.04, 2004.
2. F.Arcieri, G.Melideo, E.Nardelli, M.Talamo: Experiences and issues in the realization of e-government services. *IEEE Int. Workshop on Research Issues in Data Engineering (RIDE'02),* San Jose, Ca., USA, Feb.02, IEEE Computer Society Press, 2002.
3. F.Arcieri, G.Melideo, E.Nardelli, M.Talamo. A reference architecture for the certification of e-services in a digital government infrastructure. *Distributed and Parallel Databases,* 12:217–234, 2002.
4. F.Arcieri, F.Fioravanti, E.Nardelli, M.Talamo. A layered IT infrastructure for secure interoperability in Personal Data Registry digital government services. *IEEE Int. Workshop on Research Issues in Data Engineering (RIDE'04),* Boston, USA, Mar.04, IEEE Computer Society Press, 2004.
5. The Italian Identity Card Experience: European Interoperability for Travel Identification and Citizen Authentication in Service Delivery. *International Conference,* Rome, Italy, Apr.04, http://www.nestor.uniroma2.it/italianEIC.
6. W.R.Cheswick, S.M.Bellovin, A.D.Rubin. Firewalls and Internet Security: Repelling the Wily Hacker, 2nd edition. Addison-Wesley, 2003.
7. S.Deering and R.Hinden. Internet Protocol version 6 specification. RFC 2460, Internet Engineering Taks Force. Dec.98. http://www.rfc-editor.org/rfc/rfc2460.txt.
8. A.K.Elmagarmid, W.J.McIver: The Ongoing March Toward Digital Government, Guest Editors' Introduction to the special section on Digital Government, *IEEE Computer,* 34(2):32–38, Feb.01.
9. R.Hinden and S.Deering. Internet Protocol version 6 addressing architecture. RFC 2373, Internet Engineering Taks Force. Jul.98. http://www.rfc-editor.org/rfc/rfc2373.txt.
10. J,Joshi, A.Ghafoor, W.G.Aref, E.H.Spafford: Digital Government Security Infrastructure Design Challenges. *IEEE Computer,* 34(2): 66-72, Feb.01.
11. S.Northcutt, L.Zeltser, S.Winters, K.K.Frederick, R.W.Ritchey. Inside Network Perimeter Security. New Riders Publishing, 2003.
12. W.T.Polk, N.E.Hastings, A.Malpani. Public Key Infrastructures that Satisfy Security Goals. *IEEE Internet Computing,* 7(4):60–67, Jul-Aug.03.
13. Law n.1228, 24/dec/1954.
14. Law n.26 28/feb/2001.
15. Ministerial Decree of 16/jan/2002 of the Ministry of Interior.
16. Ministerial Decree of 23/apr/2002 of the Ministry of Interior.
17. Article 2, Paragraph 3, Decree of the President of the Republic n.177 of 2/mar/2004.

The Challenge of Inter-administration e-Government

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Abstract. eGovernment is expected by all "customers" of the administration (citizens, enterprises, administrative coworkers) as an additional channel of interaction. Creation and funding of such eGovernment structures require the willingness to cooperate across both functional and organizational entities in technical regard and concerning the definition and implementation of standards. Inter-municipal eGovernment as Public Private Partnership (PPP) can be a good model to create and finance this additional channel of interaction.

1 Introduction

The ability to process administrative transactions over electronic media, so-called eGovernment, is expected by all "customers" of the administration (citizens, enterprises, coworkers) as an additional channel of interaction.

The complexity and/or the expenditure associated with the introduction depends on the one hand side on the interaction depth and on the other hand on the number of instances included in the service. The potential benefits (rationalisation, reduction of waiting periods etc.) increase usually exactly along the same parameters. As a result from the expectations and challenges described, questions arise concerning potential partners, the correct time for actions, the associated costs and the range of eGovernment. Hardly one public authority and/or municipality in Germany is at present in the position to develop, operate and finance from its own strength such channels and/or applications, as are necessary for a barrier free as well as administration-spreading service portfolio on high service levels.

In the following the technical and financial prerequisites for an inter-municipal eGovernment as well as the practical experiences are described by the example of the eGovernment platform in North Rhine Westphalia, which is the largest state of Germany with more than 18 million inhabitants.

2 Technical Requirements

For the setting up of eGovernment (organization-spreading and/or individually) at least the following levels are to be differentiated from the technical view:

1. An IT infrastructure and a framework (e.g. eTownhall) with central functionalities (e.g. IT security infrastructure, ePayment or PKI) must be made available.

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2. Existing specialized local legacy systems must be connected to the internet (e.g. public register inquiries), new ones must be implemented (e.g. document management) and non existing procedures (e.g. eProcurement) have to be developed.
3. A multiplicity of services and/or applications (e.g. inter-municipal market place, electronic registration card request) must be implemented.
4. Finally entrances (Internet, call center, citizen office and mobile access) must be made available to these eGovernment services.

3 Financial Requirements and Business Model

The introduction of high-quality eGovernment-solutions is an investment project, which can disburse itself from a purely economic point of view only in the long run. However, different possibilities for the financing of area-wide, high-quality eGovernment are possible depending upon viewpoint (from view of the state or an eGovernment enterprise). Since, as represented above, administrative acting differs in many aspects from production processes, both for implementation efforts and attainable effects realistic estimates must be made.

The state (used as a synonym for public authorities as a whole) must be ready on the one hand to invest into this topic field. The potentials to reduce costs for the public sector cannot come to effect from today to tomorrow, it is rather a long-term project. On the other hand it must be clear for private enterprises that only few applications (except for pure consulting and licensing) result in convincing business models with fast and reliable positive ROI. And even these only can come off, if a critical amount of data and users exists.

There are several possibilities to introduce eGovernment. The public authorities handle it as their original task and invest into development and implementation. There is the possibility to outsource the introduction of eGovernment to private enterprises. Depending upon whether it concerns franchise business or classical outsourcing, the state has to fund a larger or smaller initial investment.

Establishing so called Public Private Partnerships is likewise a model, which lately, after being practiced already for a long time in anglo-saxon countries, becomes more popular in other European states (Germany, the Netherlands, Sweden etc.) as well.

4 Inter-municipal e-Government by the Example d-NRW

From these considerations the project “digital North Rhine-Westphalia”, or briefly “d-NRW” was started. These project, which is organized as a Public private Partnership (PPP), aims to connect technical innovation with a substantial increase in administrative customer orientation. Multilayered business processes are designed to meet the goal: Offering an organization-spreading and barrier-free service Portfolio while fulfilling highest quality levels. “d-NRW” is developing a modern, area-wide and efficient platform which makes it possible in one of the most important economic regions of Europe to improve the access to local and regional public authorities for citizens through the internet substantially. Moreover especially companies with their varying needs to communicate with regional and local authorities are provided with significantly improved ways to access public services.

4.1 Structure of the Public Private Partnership

The structure of the Public Private Partnership "d-NRW" was developed in the context of an EU-wide tendering process and consists in its core of two enterprises: A by the majority publicly controlled "Ownership company" and a predominantly private-economically controlled "operating company".

The "Ownership company" is owner of the platform and acts as such in legal transactions. It holds all copy and usage rights concerning the products developed and the knowledge generated. The "operating company" settles the operational tasks on behalf of the possession company on basis of a basis-of-relations treaty. Interaction between possession and operating company is regulated on the basis a comprehensive governance model.

4.2 IT Architecture

The IT architecture of "d-NRW" interacts as "basic structural drawing of the eGovernment platform" with all other application and project areas as well as with a broad variety of technical standards.

The "local satellite" makes municipal and/or a public administrative eGovernment services available (in a generic way) for citizens, enterprises and administrative co-workers over Intra-, Extra- or Internet, whereby over a presentation interface different channels can be used. These eGovernment services can access already existing backend systems of the municipality and/or administration over specialized procedures, if these backend systems have suitable interfaces or were adapted.

4.3 Local Satellite / eTownhall

The "local satellite / eTownhall" is a component system in the context of "d-NRW", which consists of the following parts:

a) basic infrastructure (software/middleware) with infrastructure services, configurable on different hardware platforms. The infrastructure services are:
   - components for authentification, authorizing, user administration
   - application service
   - presentation service
b) eGovernment modules for the supply of eGovernment services,
c) services for the adaptation of the generic "local satellite" into a concrete "eTownhall" for a certain municipality and/or a public administration.

Beside the actual "local satellite" there are central services for the "local satellite" (therefore it often referred to as "external"). It consists of modular components, that are tied up to the "local satellite" by open interfaces, so that individual central services can be exchanged by products of third parties (e.g. another content management system (CMS)), if necessary.

4.4 Public Register Inquiry (PRI)

Objective of the service PRI is the development and implementation of a solution, which accepts and bundles all inquiries of large private users ("power-users"), then divides and forwards the requests to the responsible local data centers and finally redistributes the answers to the customers. The entire paying process is thereby completed, while all guidelines and laws concerning data security and data privacy are obeyed.

The electronic registration information can drastically reduce overall costs compared to today's completion of forms and execution of processes of the public administration. Fully automated PRI are completed directly over the data base of the data center. Also the reception of the fees is optimized. PRI will gradually be accessible both over a central portal and over the existing portals of the municipalities. On the backend side the PRI adapts to the existing interfaces. The technical adjustment to existing legacy applications is ensured.

5 Benefits of Inter-municipal e-Government

The project "d-NRW" enables the public sector for the first time to integrate efficiently important central infrastructures and/or applications mainly due to the financial and technical participation of competent private partners, without affecting the local autonomy concerning the execution of sovereign tasks. By mutual development of eGovernment applications substantial means can be saved in favor of all involved by avoidance of multiple investments. Moreover standards can be defined and arranged by the participation of the relevant players for the state North Rhine-Westphalia.

By the implementation of "d-NRW", the state of North Rhine-Westphalia has provided a legal, organisational and financial framework for local authorities to build up eGovernment without compromising their autonomy. The questions arising from cooperation of governmental and privately funded organisational entities, e.g. concerning fiscal and competition law, have been answered positively, but with extensive efforts. This has to be considered an investment into "d-NRW" as well as the financial investments, that have been made.

The attractiveness of eGovernment services of "d-NRW" is increased by its area-wide approach. Side effects are an economical strengthening of the state North Rhine-Westphalia as well as a noticeable discharge of the local public funds.

Applying MDA Concepts in an e-Government Platform

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Abstract. This paper proposes an e-Government platform that intends to support legacy integration and service collaboration, at the design and run time, in order to turn viable all the characteristics of electronic government applications. Technology independence is considered as a very important goal to be achieved. Model Driven Architecture and metamodels are some of the resources to provide such independence.

Introduction

For a successful e-Government initiative, an open and evolutionary platform must be considered in order to provide means to enable the old world of the legacy systems accessible to the new facilities brought by Internet. Due to their design and implementation, legacy applications tend to be difficult to adapt to new business requirements. On the other side, a collaborative environment must be provided in order to enable the communication and collaboration between the several government institutions.

The Web Services (WS) architecture delivers standards for such collaborative environment. Although a good reference, the WS specifications, and the technologies to implement them, are still in evolution. To preserve the development efforts, at least minimal technology independence is desirable at the legacy integration and at the services design and compositions.

To meet these needs, we propose the construction of an e-Government platform, which main objective is to provide an effective and consistent approach to manage metadata and a service oriented architecture for the cooperation among disparate administrative units in a collaborative environment.

As a solution for the issues related to legacy integration, technology independence, preservation of development efforts and treatment of the complexity in the government environment, principles of MDA (Model-Driven Architecture), have been adopted, in conjunction with a metadata supporting infrastructure.

In our research group an effort is under way in the development of a platform to support Internet collaborative systems in the government context [Figueiredo2004]. Our proposals and the demonstration scenarios are based on the results of a EU-@LIS

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Project [eGOIA2004]. Basically, simple citizen services delivered today by the S. Paulo State Government in Citizen Bureaus (named Poupatempo), where the presence of the citizen is required, will be delivered through the Internet. These services, on a later stage, will be composed into complex ones in order to fit better the necessities of one-stop delivery.

Figure 1 shows an N-tier architecture for the platform. In the business logic, the service tier is responsible for the service management and the integration tier provides an integrated approach to the existing legacy systems.

The remainder of this paper is organized as follows. In section 2, we present key concepts related to MDA and Web Services. The application of MDA concepts in the proposed e-Government platform is presented in section 3. Section 4, presents some final considerations and concludes this work..

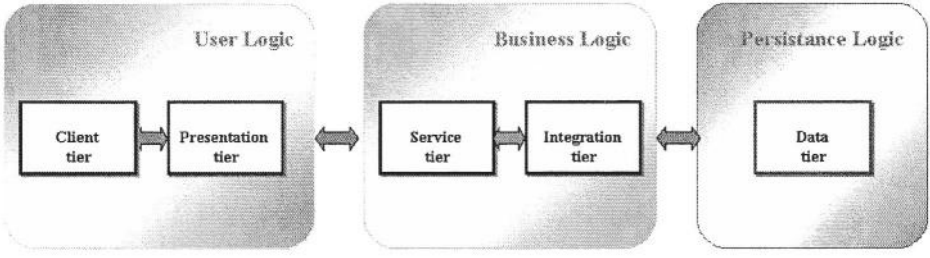

Fig. 1. Platform n-tier architecture.

Background Information

Metadata is a key element in the e-Government platform. Ubiquitous metadata facilitates software interoperability between platform components in specific ways, including [Poole2001]:

Data interchange, transformation, and type mapping between dissimilar data resources can be driven by formal, product-independent metadata descriptions of the transformations, data types, and type-system mappings;

Software components with no prior knowledge of each other's capabilities, interfaces, and data representations can interoperate once they have established a metadata "handshake", in which each one exposes its features and assesses those of the other.

In our work we have adopted the Model-Driven Architecture (MDA) [OMG2004] as the modeling framework. The three primary goals of MDA are portability, interoperability and reusability through a consistent separation of some basic concerns in the descriptions of software. Regardless of what kind of system is involved, MDA recommends a separation among (i) platform independent descriptions of components and their interactions (Platform Independent Models - PIM); (ii) technical artifacts, such as specific design models (Platform Specific Model - PSM) and source code; and (iii) business models that are being implemented by the platform independent descriptions of how components and services interact.

Besides the MDA concepts of PIM and PSM, two others, are relevant in our work. They are illustrated in Fig. 2 and described as follows.

Metamodel Mapping: A metamodel mapping provides rules and/or algorithms for transformation of a PIM to PSM, of a particular platform, or a PSM to PIM.

Transformation: Model transformation is the process of converting one model to another model of the same system. The input to the transformation is the marked PIM (or PSM) and the mapping. The result is the PSM (or PIM) and the record of transformation. Transformations can be done manually, with computer assistance, or automatically.

In the core of the MDA approach is the metamodeling architecture introduced by the MOF standard [OMG2002]. The main characteristics of this architecture are: (i) use models to define other models; and (ii) is reflective, i.e., it is self-defining. In addition, standard mappings to expose MOF-compliant metamodels with CORBA IDL and Java interfaces have been defined. XMI format is the standard way to exchange metamodels and its correspondent models in a stream-based format. These MOF features give to an MDA infrastructure the ability to store models and other types of metadata in a shared repository and to exchange them between different tools.

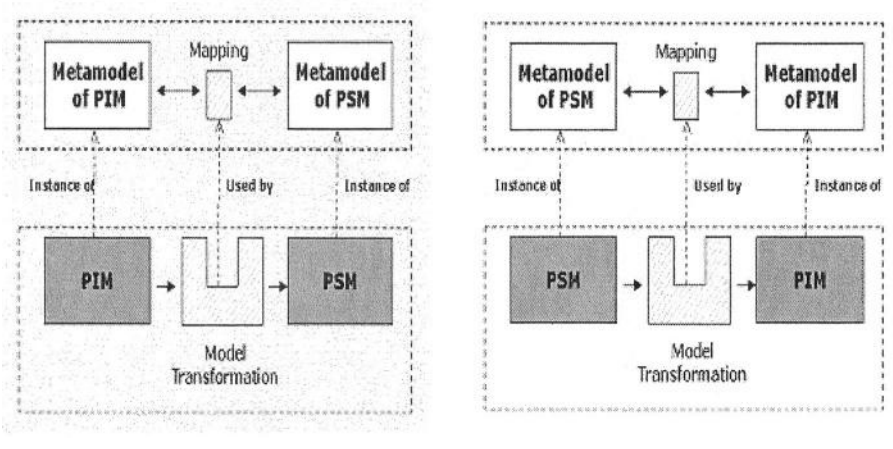

Fig. 2. MDA mapping and transformation.

The Composition of Web Services promotes the coordinated interaction between two or more partners, establishing a collaboration relationship. The composition may involve several levels of functionality of the so called Web Services stack: conversation, choreography, orchestration and transaction [Turner2003]. The conversation deals with the external point of view of the messages that a Web Service sends or receives. The choreography specifies the coordination of some Web Services under the aspect of protocols, defining messages and the sequence of messages exchanged between the parts. The orchestration (also called workflow or business process) is the description of the flow of data and control involving the execution of a set of services. Differently of the choreography, it describes internal details of the composition in order to define an executable process. And transaction describes the execution in an atomic form, i.e., providing rollback mechanisms in case of failure or service abortion.

The Use of MDA CONCEPTS in the Platform

In this section we describe the way PIM, PSM, mappings and transformations are used in the e-Government platform, in order to provide legacy integration and service collaboration support.

Legacy Integration

Our approach to promote legacy integration in the proposed e-Government platform is to define high-level abstractions, through PIM models, and transform them into different PSM models. Common Warehouse Management (CWM) is the technology used to support the definition of PIM models in the legacy data re-engineering process. The CWM provides a framework comprised of a number of metamodels for representing metadata in major areas such as object-oriented, relational, record, and XML resources. The CWM also addresses the key aspect of data transformation, providing a metamodel with constructions that enable the definition of a transformation rule from a data source to a data target.

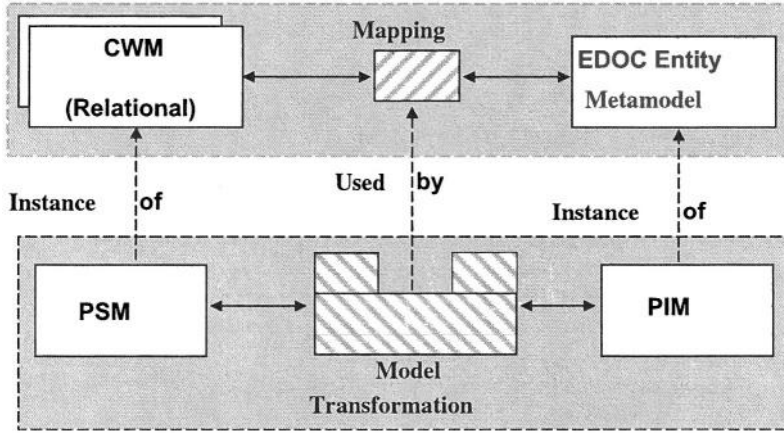

Fig. 3. Legacy integration.

Figure 3 illustrates the use of PIM, PSM, mappings and transformations to support legacy data integration. Legacy data, retrieved from the databases, are passed to the platform as a CWM model, which is considered a platform specific model, because it is related to a technology (e.g. relational database). In the next step, the CWM model is transformed in an EDOC model that is a high-level abstraction in the platform. This EDOC model represents data objects, such as, data about citizens in a government context. From this point, the PIM model can be transformed to different specific technologies. For example, a neutral format may be created for the data belonging to the different legacy database, allowing the unification of the data and their use/share by citizen life-centric services implemented as Web Services.

At the moment, we have worked in the implementation of a MOF-compliant repository management system, which major benefits to the platform are the support to metamodels from different domains and the generation of a metadata management system to hold the models described by a metamodel.

Web Service Architecture and Collaborative Environment

The proposed platform supports the design of collaborative services using the MDA concepts and the Web Services composition techniques. The services are first developed platform independent, by means of the EDOC UML profile and thereafter transformed to platform specific models like Web Services (WS-PSM).

In order to produce the model transformations, as described in section 2, it is very convenient to produce metamodels of WS standards (e.g. WSDL, SOAP, UDDI, BPEL4WS) and to map them to correspondent EDOC Metamodels (Figure 4).

EDOC is composed of several parts assembled under the so called Enterprise Collaboration Architecture (ECA), each one well defined by a particular metamodel: the Component Collaboration Architecture (CCA), the Entities Profile (ER), the Events Profile, the Business Process Profile (BPP), and the Relationships Profile.

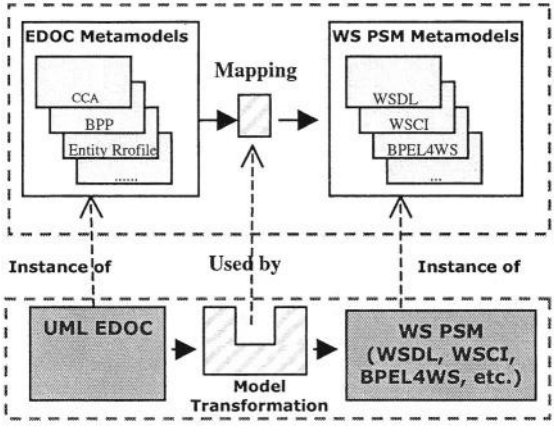

Fig. 4. WS Collaboration infrastructure.

CCA represents the basic concepts of a service, including activities, ports and process and is closely related to WSDL. Their similarities allow the mapping of their metamodels and the transformation from an EDOC-PIM to WSDL structures. CCA goes much further, explicitly defining richer collaboration metamodels, including control mechanisms of choreography and transaction. In part these mechanisms may be mapped to correspondent WS metamodels of SOAP, WSCI [W3C2004], BPEL4WS. EDOC contains a recursive component model, which turns possible to express the choreography of the component's data exchange with the outside world and, through recursion, also with its inside world.

The Entity Profile of EDOC is used to generate new PIM data models, that can be further used in the development of applications (e.g. in the integration tier). There is yet no similar standard proposed in the context of WS's. At present time PSM Data base proposals like SQL are dominant.

The Business Process Profile gives another example of possible mapping. The BPP provides modelling concepts that allow the description of business processes in terms of a composition of business activities, selection criteria for the entities that carry out these activities, and their communication and coordination. These are the concepts needed for the modelling of Web Services workflows, also known as Web Services orchestration. For example, developing a metamodel of BPEL4WS will allow later on the mapping to the BPP metamodels and the transformations of BPP models to BPEL4WS descriptions.

With these proposals we are, in reality, constructing a WS-Metamodel, composed by different metamodels, as is already the case in EDOC. Using the MOF based rules we assure a coherent construction. But several elements are not yet present in the WS stack, or expressed in another way, EDOC is much richer in its semantic.

Conclusions

This paper proposes an e-Government platform that intends to give support for both, legacy integration and service collaboration, at the design and run time, in order to turn viable all the characteristics of an electronic Government.

The use of a robust modeling infrastructure is essential to integrate the variety of technologies that comprise a government environment. We believe that MDA, with its core components, provides an open and evolutionary infrastructure. In particular, MOF is relevant by providing a common representation of models and the basis of a metadata management system.

Considering that the many technologies and modeling tools need to work together, the MDA model transformation tools are key elements to integrate disparate legacy based services from different government entities. The integration here is understood in a broad sense, in other words, it accomplishes all aspects involved in service composition and collaboration, such as orchestration, choreography and transaction. As new technologies, tools and platforms are developed , PIM models can be mapped to them, so that the government investments are protected.

We have included in the WS-PSM the specifications that implement the service collaboration tiers, such as WSCI, BPEL4WS and WSCL. Therefore, the metamodel of the WS-PSM will be more complex and will turn possible the direct mapping between the EDOC model and the WS-PSM with all collaborations aspects already included.

e-Governance: Some Performance and Quality Assurance Aspects

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Abstract. Gradually, e-Governance emerges as theory of informatized societal management. It is supposed to start by defining its (i) objectives, (ii) scope, (iii) concepts and models, (iv) key problems, methods and solutions and (v) definition of performance (vi) quality assurance. The present paper is focused on (v) and (vi), in an attempt to put into discussions a possible list of about twenty indicators for eG performance and a number of specific activities and measures for quality assurance.

Statement of the Problem

Governance (G) can be considered as the set of activities generated by the Executive, Judicial and Legislative Authorities of socio-economic systems (SES). If supported by integrated ICT systems, then it is e-Governance (eG). A part of eG, namely the e-Services delivered by the Public Administration, is usually considered e-Government (eGvt). This paper is focused on eG's performance and quality assurance (QA) aspects, which are certainly related.

The need to define eG/eGvt performance is generally recognized In present, performance is considered mainly in the eGvt context, and in a technical sense.(e.g.the well known 20 indicators x 4 levels defined in the e-Europe Program).eGvt performance is considered in a broader sense by OECD (e.g. [1], [2]) and local governments (e.g. [3]) as well as research and consulting organizations and experts (e.g.[4]...[8]). However, performance is not necessarily related to the results of [e]G. (The qualitative nature of the societal objectives may be an obstacle). There is still no widely accepted roadmap towards eG (though starts exist e.g.[9][10]) to make a simple positioning. feasible. Quality of [e]G / eGvt is also gaining interest. Apart central e.g.[l l] and local [12] governmental actions, the delivery of ISO 9001:2000 certification for local governments [e.g 13].]or government departments (e.g 14]) started. Though the model of a SES differs from that of an enterprise, it is the recognition of a need. The present paper continues former ones [15], [16] with a management point of view, proposing as a first step: to bring in discussion, even if more or less questionable: a) set of eG performance indicators and b) a set of actions for eG Quality Assurance.

eG Performance

A quantitative definition of the performance of eG is necessary in order to bring precision in discussing states and trends of SESs. SES performance can be defined in the

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sense of degree of meeting general or specific socio-economic objectives [and restrictions]. Even before a quantitative theory exists, a number of keywords are used such as: "GDP / capita:", "development", or "social cohesion". They deserve a definition, even if it is initially imperfect. A minimal list of indicators is proposed.

G*eneral Indicators.* *Related to population* (i) life expectancy at birth (male, female) [years] and (ii) proportion of holders of university degrees / population ; *related to economy:* (iii) GDP / capita [k EUR or k USD, comparable to a reference year], (iv) (balance of external payments) / GDP [%], (v) annual inflation rate [%]; (vi) annual consumer price index [%]; *related to the socio- economic system:* (vii) variation of GDP / variation of employment [EUR or USD per capita] and (viii) the corresponding quadrant to characterize the socio-economic development trend (sustained growth, non-sustained growth, economic decrease, economic collapse) (ix) value of the Gini coefficient; *related to the socio-economic environment:* (x) corruption coefficient [as determined by Transparency International], (xi) total taxation due / total taxation paid, (xii) value produced by the underground economy [estimated]./ GDP [%]. (xiii) average and variance of the response time to petitions [days]. In total 13 indicators.

Indicators Referring to the Authorities. *Related to Executive Authority*:(xiv) no total e-votes / total votes [%], (xv) total ICT investments / GDP [%] ; total ICT expenses / GDP [%], (xvi) sum of the proportion of each of the 20 e-Services * service level (xvii) Internet (WAN) users /100 employees [%]; *related to Judicial Authority* (xviii) average total duration to solve a case (for a number. of representative categories) [days], (xviii) equality before the Law (variation of the final punishment for the same category of facts and value of the damage caused for a number of representative categories- cluster analysis); *related to Legislative:Authority):* (xix) no of Government Ordinances /no of Laws passed by the Parliament [%], (xx) Mean time before amending a Law, a Government Ordinance, a Decree. [days] (xxi) Total no of Laws, Ordinances and Decrees / annual total no of working days. In total 8 indicators .

Some of the proposed indicators exist also in the OECD set. Some need a more detailed definition (such as (xviii)) or procedure to collect (such as (ix)). Some imply eG.

eG Quality Assurance

In the microeconomic world, the ISO 9001:2000 Requirements for Quality Management standard is a widely recognized instrument. With some adaptation, it certainly can be used also for the institutions of the public sector, considered as a quasi-enterprise. For the non-core activity, the model of the public institution is that of a particular case of enterprise. But for e-G as a societal management subsystem, the situation is different: G/eG has a broader scope as the enterprise governance; some of the decisions are implemented in the SES by force, if necessary; some management decisions which are normative acts are enforced by publication etc. The drafting of a G/ eG QA standard would be certainly useful; it could incorporate transparency, accountability, responsibility and coherent de-centralization requirements as well as specific restrictions such as in the Declarations of Rights. A number of conditions can be formulated due to their invariant character. A few examples are::a) *"Customer orientation"*. For eG this means e.g. the periodic and systematic survey of customer

opinions and complaints by people of the SES, organizations and employees of the public institutions and also free press, access to public information, e-Democracy, one-stop service. *b) "Processes under control"* .For eG this means e.g. precise definition of the organization of the public sector, including precise delegation of authority at the level of institutions and roles, ICT-aided management of human, substance, financial and informational resources amd flows, integrated information systems, electronic documents and archives. It could also mean a performant national statistical information system. c) *"Continuous improvement"* For eG this means e.g. accent on virtuous management closed loops, creation of new informational feedback loops, planning based on modeling and periodic public follow-ups, including performance analysis, audits and .other quality checks and so on.

Some QA recommendations are necessarily oriented on each of the three Authorities in the eG context. In the case of the *Legislative Authority* this could mean election of persons (not lists}, full logic coherence of the set of normative documents and public knowledge base for concepts and administrative-type procedures. It could also mean the simulation of the possible consequences before adopting a normative act. In the case of the *Judicial Authority* this could mean meeting the performance goals by informatization. Many recommendations are to be expected in the case of the *Executive Authority.* Possible examples are: (i) eG portal open access to public information, (ii) integrated management of financial resources of the state and financial obligations to the state, (iii) optimization of the taxation (not too high to hinder microeconomic development, not too low to hinder the assurance of the public services and hence also the microeconomic development), (iv) e-Procurement of public acquisitions including feedback concerning tender specification – contract – acceptance – end of guarantee – support service (v) anti-corruption, anti-Mafia and anti- terrorism systems

Conclusions

Following conclusions can be proposed:

a) Definition of performance and QA are relevant problems for eG.
b) Their importance is recognized.
c) Both still require a specific research.
d) However, it is possible to start by:
   (i) experimenting a set of 21 indicators for characterizing eG performance
   (ii) drafting a standard for eG's Quality Assurance

References

1. Measuring the information economy 2002 (80 indicators)
   http:// www. oecd. org/ str/measuring . infoeconmy
2. Schaaper, M.: A proposal for a core list of indcators for ICT measurement
   http:// www.org oedc/ data oecd/ 3/ 3/ 22453185. pdf
3. Performance management performance indices http: // www. hanks.gov. uk
4. http://www. fraunhofer. de/ egovernment-engl. Htm (2004 Forum)
5. de Maio, C: A comprehensive framework for linking agency strategic plans and IT capital plans, to a performance rising system The Performance Institute, 2002
   (via http:// www. google.com)

6. Gant, J.: Evolution of e-Government performance Maxwell School & School of Information Strategy Syracuse University, 2003
7. Unified information system for e-Government. Performance Management and Service Delivery Elixir Technology http:// www. elixirtech.com (March 2004)
8. Barnes, S., Vidgen, R: Assessing the quality of a national e-Government performance Proceedings HICS, 2003
9. Traunmuller, R., Wimmer, M.: e-Governement at a decisive moment :sketching a roadmap for excellence *In: Traunmuller, R.(ed):Electronic Governement Springe Berlin, 2003 pp 1-14*
10. Costake, N: .A preliminary report on e-Governance http//: www. lefis. org => legislation
11. The e-Government Act promoting e-quality or exagerating the digital divide? http:// www. law. duke. edu/journals/ altr/ articles/ 2003 altr00
12. Hampshire City Council http:// hants. gov. uk e-government/ ictstrategy/ quality html
13. BSI presents ISO 9001:2000 certification to the Municipal Covernement www. bsiamencos.com
14. See http:// www. qmsuk.com
15. Costake, N.: Sketch of a pragmatic theory of e-Government in transforming countries *In Wimmer, M.(ed) Quo Vadis e-Goverement: State-of-the–art 2003 OCG Vienna, 2003 pp 100-108*
16. Costake, N.: e-Governance: a societal management instrument *In:Gupta, M.(ed.) Towards e-Government Tata Mc Grow-Hill New Delhi, 2004* pp 209-216

FRAMES Towards Risk Modelling in e-Government Services: A UK Perspective

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Abstract. Electronic government transaction services may offer a potential of increased efficiency and quality with the minimum cost in the way the public administration deals with its customers. Recent reports show that this is far from reality, as eGovernment projects seem to be failing to deliver. Within that context, an ongoing doctorate programme investigates the risk classification of eGovernment services and explores how a multi-perspective risk assessment framework may assist towards the management of such projects. This article presents the prototype version of the framework. Additionally, this paper describes an initial field investigation that was necessary to validate the prototype framework, a discussion on risk in eGovernment, as well as the risk taxonomy that is used to support the prototype.

1 Introduction

eGovernment is a concept, whereby information and communication technologies are employed in order to transform and deliver governmental services to citizens, businesses and other governments. It has already passed through theory into practice. Promising practice is usually realised in the form of an eService, which in turn is simply defined [1] as the 'online' service that is provided by the public administration within an eGovernment environment. Unfortunately though, recent reports in the UK [2] show that the cost of cancelled or over-budget government IT projects has exceeded £1.5billion in the last six years. For example, just a single cancelled eGovernment project on smartcards resulted in a loss of £698million to the British government. Similar situations may be avoided or at least better handled through appropriate risk assessment strategies. Such strategies may be able to enhance decision-making by turning threats into opportunities for success and provide better project management through the enabling of contingency plans.

eGovernment projects are inherently complex, mostly sharing similar risks with their eBusiness counterpart projects. Implementing eGovernment as a major development may not be easy, since it can involve many factors of risk that could threaten the success of the project. Adequate risk assessment procedures may help in avoiding major pitfalls, though sometimes failures cannot always be predicted precisely. Since electronic government projects have a broad scope, risks can be found in many diverse areas. Therefore, risk assessment in eGovernment, if explored holistically, should cover a broad and multidisciplinary environment in order to have a reasonably adequate positive effect.

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Certain benefits are expected to be gained from the introduction of appropriate risk assessment strategies in eGovernment projects. First of all, an obvious overall reduction in risk exposure may happen. Such strategies should also aid in the improvement of decision-making, since there would exist a comprehensive and structured understanding of the activities, opportunities and threats involved in the project. Furthermore, following the guidelines of a risk assessment framework, eGovernment project managers would be more equipped to address future problems in a consistent and controlled manner. The benefits of systematic eGovernment risk assessment are also expected to improve the control of project costs, quality and time, factors that are extremely important, since they are the precursors for the balancing of 'side-effects' such as citizens' satisfaction, public authorities' image and others. eGovernment is a relatively modern concept and therefore its evolving terminology is still not 'standardized', thus eGovernment managers might be using different terms whilst talking about the same subject, which could result in undesirable effects. With the introduction of a holistic risk assessment framework, the interested parties in eGovernment would be able to use a common language, thus better communicate about various eGovernment issues.

This paper will provide the background behind a current doctorate programme in risk assessment modelling for eGovernment services by discussing the main eGovernment risk areas and the design of a high-level risk assessment modelling framework. This programme aims to provide an answer to the following question: *'How may a qualitative multi-perspective risk assessment & modelling framework contribute to e-transaction strategy for government services?'* This article presents the findings of a recent field investigation and details an eGovernment transaction services risk taxonomy. The main aims of such field research were: a) to validate the framework; b) to validate the risk taxonomy; and c) to explore potential relationships between various risk issues and further develop an eService risk ontology.

2 e-Government Services Risk Taxonomy

In order to develop and support the risk-modelling framework first we have to see what sort of generic risk factors can be usually found in any eGovernment transaction service project. After theoretical and previous field investigation [3],[4],[5] in the subject, we gathered the most typical risks that may arise in the domain.

To classify such risks in various generic categories we had to consult previous research in other fields related to eGovernment. Experience from the electronic commerce/business domain and the relevant literature shows that some [6],[7],[8, p.9] have attempted to classify risks in various high-level categories according to the nature of the risks. Accordingly, we distinguished four broad categories, a) *people,* b) *deployment,* c) *design & implementation.* These categories act as the basis of our risk taxonomy eGovernment services.

The eGovernment Services Risk Taxonomy serves a number of purposes. The main reason behind it is the fact that it can structure the various risk issues surrounding electronic transaction service projects for the public administration. More specifically, this taxonomy encompasses a number of risk statements that have been developed throughout the research programme. Examples of such risk statements are: "Authorised customers have the skills to use the system" or "Public authority staff

have a positive attitude to change" and "The multiple channels of communication are designed and developed in a manner that does not compromise the security of the system in terms of data integrity". By employing such risk statements we have the potential to measure (in a manner more qualitative rather than quantitative) the probability and the impact, as well as assign ownership, of the risk. In other words, this taxonomy will be the starting point for risk assessment in eService projects and it will formulate a pool of knowledge in the form of risk statements that will in fact be the 'engine' that 'runs' the risk assessment framework. Furthermore, such a taxonomy may also provide the foundation for a common vocabulary of the government services that may ultimately help people working in that field to communicate in a more efficient way. The eGovernment Service Risk Taxonomy as it stands on the present moment is presented in Figure 1.

Fig. 1. eGovemment Services Risk Taxonomy.

3 e-Government Risk Assessment Modelling Framework

Our Framework for Risk Assessment & Modelling in eGovernment Services (FRAMES) attempts to provide a framework for qualitative risk assessment in eGovernment transaction services. The main aims of the prototype can be summarised in the following four statements: 1) to provide a holistic view of the risks associated with an eGovernment transaction service; 2) to support the decision maker in assessing the risks involved in the development of the electronic transaction service; 3) to enhance decision-making at the feasibility stage of the project development; and 4) to help us provide an answer to the research question mentioned in Section 1.

To structurally develop FRAMES in its current form various eGovernment frameworks [9],[10],[11] have been examined. Such frameworks, despite the fact that they can provide holistic views of the eGovernment concept from various perspectives have not been adequate for our risk assessment modelling mainly for two reasons: a) they aimed at too high a level of abstraction, and b) they are focused on describing the eGovernment concept in general and not the eServices in particular.

FRAMES accepts that any electronic government transaction service can be seen as a system that requires both social and technical dimensions and with interdependencies between them. Within that context FRAMES provides a way of implementing risk assessment in eServices. As such, any eGovernment transaction service project is seen *(Figure 2)* as a system that comprises of social and technical subsystems that interconnect four main modules of the transaction service project. These four main modules are: i) *the customers,* ii) *the eService,* iii) *the organisational level,* and iv) *the intra-organisational level.*

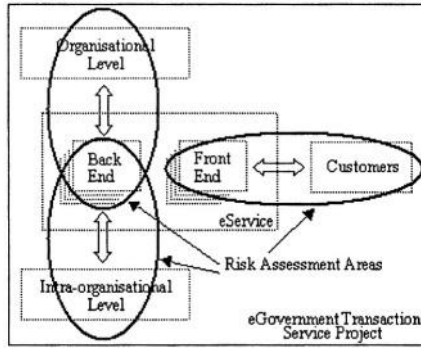

Fig. 2. FRAMES.

The 'customers' module mainly refers to the end-users of the transaction service. These users can be citizens or businesses (and in some cases other governments) that interact with the front end of the system. Such interaction is understood to be in the form of using the system and/or providing feedback to the system. The second module is the eService itself and it is divided into two main parts; a) the front end that is the main application/function that the customer is interacting with, and b) the back end that denotes the point where the eService interacts with the 'parent' organisation, namely the public authority, which is responsible for the service, as well as other organisations that contribute, share information, interact with the eService (note that both the back and the front end may be seen as one of the entities, according to the 'Integration/Fragmentation model' [12]). The third main module is the organisational level and it basically refers to the public authority that is responsible for the development of the electronic government transaction service. Within that level, the main actors / functions that support / develop the electronic transaction service can be found. Finally, the fourth module is the intra-organisational level that usually entails, other than the public authority, organisations (governmental or non-governmental) that are needed to support / develop the eService.

Within FRAMES there are three major subsystems that are formed between the modules of the system. One such subsystem is formed by the connecting relationship of customers and the front end of the eService. A second subsystem is formed by the connecting relationship between the organisational level and the back end of the eService module. And finally, a third such subsystem is formed between the back end of the eService module and the intra-organisational level. Such subsystems are needed in order to better 'customise' the risk assessment process within any eGovernment transaction service project. Each of these subsystems contains people that have differ-

ent roles and utilize technology to achieve certain tasks that will work towards the system's goals. FRAMES understands that there are various typical high level risks within these particular areas.

4 Field Investigation

A small field investigation was undertaken to validate the framework and its associated taxonomy. We conducted three interviews with experts in the area of eGovernment. The interviewees were selected such that each of them participates in the field of eGovernment from a different perspective. As such, one is an active eGovernment academic researcher and consultant, the second is an eGovernment manager for a public authority and the third person that contributed is a development manager in a large multinational corporation. Two of the interviews were carried out in person and one of them through electronic correspondence. The type of the interview was semi-structured with open-ended questions in order to allow maximum information extraction. In this paper we shall provide some useful deductions that arose from this investigation.

4.1 Discussion on e-Government Project Risk

As well as validating the risk modelling framework and associated taxonomy for eGovernment services this field investigation also provided a discussion on generic issues related to eGovernment projects. This section will provide the results from such discussion.

One of the questions asked during this fieldwork concerned the types of the eGovernment projects *(see Figure 3).* Two high-level types were identified: a) *infrastructure,* and b) *process.* On the first level there appears to be two categories of eGovernment projects, which are the: a) *front and back office,* referring to the automation of the front and back ends of the public administration; and b) *the digital inclusion,* referring to projects that will enable the customers (mainly the citizens) to interact electronically with the public administration. On the other hand, the 'process level' includes eGovernment projects that may be distinguished in the following three categories: a) *internal projects,* mainly referring to the projects done within a particular public authority to make it more effective; b) intergovernmental projects that are basically the ones between different departments or agencies within the public administration; and c) citizen focused, which themselves can be distinguished to: c1) active citizenship – that are responsible to engage citizens in decision-making processes; and c2) *customer service* – referring to those responsible for timely and efficient delivery of accessible integrated services.

Consequently, we explored the issue of any potential difference in risks across the above-mentioned eGovernment projects' categories. Typically, infrastructure projects, are perceived to be less risky than their process-oriented counterparts, as they do not tend to change politically endorsed procedures and business priorities. From this field investigation it was apparent that FRAMES can accommodate the 'process' kind of eGovernment projects as shown in Figure 3.

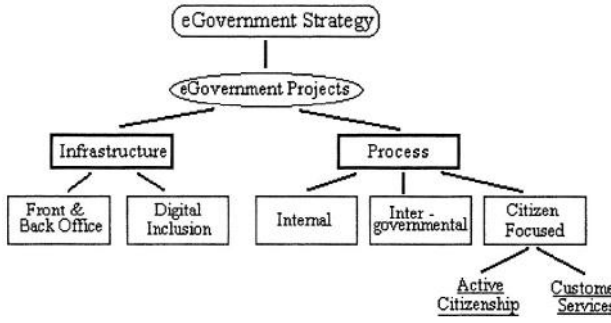

Fig. 3. e-Government Mapping.

The applicability of the terms in the taxonomy was demonstrated through the interviews. The interview elaborated on the main areas of concern surrounding eGovernment projects. All three participants identified the 'need' for a particular eService as the primary concern and consequently the focus on the real problems and objectives of the eService project in order to fulfil such 'need'. From a management point of view, main areas of concern in the domain span across issues, such as the 'realism' of the timeframe of the project or the efficient planning of priorities, as well as the issue of cost and more specifically the source of funding and the manner and level of return of investment from the project itself. From a technical perspective, the eGovernment experts identified three main areas of concern. Firstly, the technologies used have to be mature, stable and user-friendly. Secondly, the newly developed system has to be interoperable and integrate smoothly with existing and future systems. And thirdly, the eGovernment project has to comply with any existing standards. Finally, two social concerns were highlighted. The acceptance of the new ways (introduced by the system) of doing things and the attitude the public servants will take towards the new status. Secondly, the level of commitment to specific providers and the consequences of such partnerships was pinpointed.

Furthermore, the interviewees argued that eGovernment – in general – should be seen as the evolution of the previous public administration status and should be appreciated for the things it can really deliver. The 'uniqueness' of such projects rather relies on the fact that they have to deal with extremely complex business processes, involving a variety of departments and agencies. Additionally, services for the public administration are highly customer-oriented, placing them under judgement by the end-user, which uniquely depends on many critical non-IT and/or external project factors. eGovernment projects seem to realise the IT paradox in a more intense way. By this, we mean that there potentially exists a situation where the investment is too high compared to the marginal productivity or quality gains.

The main sources of risk surrounding eGovernment projects were also questioned. Our taxonomy was flexible enough to be able to accommodate all of these risk sources. To be more specific, matters such as policy change, need for the service and project management issues, were raised and they can all be applied in the strategy class of our risk taxonomy. Another identified source of risk is the fact that such projects should be run by domain experts rather than IT ones, which can also be satisfied by the taxonomy under the people class. Moreover, one other major risk source is perceived to be the requirements for the service that can be put under the design &

implementation category. Finally, the interviewees discussed about the delivery and management of change within an organisation, which also fits into our risk taxonomy, under the deployment category.

5 Conclusions and Future Work

This paper discussed a framework and related taxonomy for risk assessment modelling in eGovernment services. It is hoped that such taxonomy may provide a better understanding of the risk in eGovernment services, as well as develop a list of new, more complete risk statements. Furthermore, we anticipate that such a taxonomy can provide a solid basis for the future development of an eGovernment services risk ontology. Such an ontology is a necessary mechanism for a shared vocabulary of understanding by eGovernment user/managers. To develop this eService risk ontology we shall expand on the electronic transaction services ontology developed within the Smartgov project [13]. Additionally, we expect to utilise this ontology to develop an IT risk assessment application to be used in conjunction with FRAMES and therefore enable us to assess the actual contribution of such qualitative multi-perspective framework to the e-transaction strategy for government services.

Acknowledgements

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References

1. Hoogwout, M 'Organising for Online Service Delivery: The Effects of Network on the Organisation of Transactional Service Delivery in Dutch Local Government' In *Proceedings of Electronic Government, First International Conference, EGOV 2002* (eds. Traunmuller, R. and Lenk, K.) Aix-en-Provence France (September 2-6 2002) pp 33-36.
2. Arnott, S '£1.5bn Squandered on Government IT' *Computing,* (March 13 2003) p.1.
3. Akomode, J, Taleb-Bendiab, A, Evangelidis, A, Taylor, M 'UML Approach to Risk Assessment Modelling for eGovernment' In *Proceedings of the 2nd European Conference on E-Govemment* St. Catherine's College Oxford UK (2002) pp 395-402.
4. Evangelidis, A, Akomode, J, Taleb-Bendiab, A, Taylor, M 'Risk Assessment & Success Factors for eGovernment in a UK Establishment' In *proceedings of Electronic Government, First International Conference, EGOV 2002* (eds. Traunmuller, R. and Lenk, K.) Aix-en-Provence France (2002) pp 395-402.
5. Evangelidis, A., Macintosh, A. 'Introduction to FRAMES – An eGovernment Risk Modelling Framework' In *Proceedings of the 3rd European Conference on E-Govemment'* Trinity College, Dublin, Ireland (2003).
6. Tchankova, L. 'Risk Identification – Basic Stage in Risk Management' *Environmental Management and Health* vol. 13 is. 3 (2002) pp 290-297.
7. Liebermann, Y., Stashevsky, S. 'Perceived Risks as Barriers to Internet and E-Commerce Usage' *Qualitative Market Research: An International Journal* vol. 5 is. 4 (2002) pp 291-300.

8. Treasury Board of Canada Secretariat 'Integrated Risk Management Framework' *The TBS Web site http://www.tbs-sct.gc.ca* (2001).
9. Gisler, M., Spahni, D. 'eGovernment Experiences of the Swiss Federal Institute of Intellectual Property' *DEXA conference, Workshop on Electronic Government,* Greenwich, England, IEEE Press (2000) pp. 278-281.
10. Dridi, F., Pernul, G., Unger, V. 'Security for the Electronic Government' *Proceedings of the 1st European Conference on e-Government,* Trinity College Dublin, Ireland (2001) pp. 99-110.
11. Lenk, K., Traunmüller, R. 'A Framework for Electronic Government' *DEXA conference, Workshop on Electronic Government,* Greenwich, England, IEEE Press (2000) pp. 271-277.
12. Laprø, L., J. 'Design Issues for Individual Online Public Services' *DEXA conference, Workshop on Electronic Government,* Greenwich, England, IEEE Press (2000) pp. 335-339.
13. Adams, N., Fraser, J., Macintosh, A., McKay-Hubbard, A. 'Towards an Ontology for Electronic Transaction Services' *International Journal of Intelligent Systems in Accounting, Finance & Management* 11 (2002) pp. 173-181.

Public e-Procurement – Determinants of Attitudes Towards Adoption

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Abstract. The paper discusses the need for more research on the adoption of public e-procurement and what factors influences this adoption. A number of European countries have developed and implemented solutions for public e-procurement at a national level. Despite major initiatives from state level and claims of reduced cost through wider choice and higher efficiency these have been adopted to a less extent than expected by the public sector in some of the countries. Lack of adoption may be due to a number of reasons. Technical problems, costly solutions and competing electronic marketplaces (Somasundaram 2004b) are causes often suggested. Henriksen et. al. (2004) suggests that decentralisation of purchasing power conflicting with centralised solutions may be an important cause in Denmark. In Norway, the governemnts project manager for implementation of e-procurement suggests lack of organisational change as a cause for lack of adoption (Computerworld 2004). We need to identify the reasons for the lack of adoption so that public spending is not wasted. We suggest that institutional theory may help understand the different attitudes towards adoption, and that community goals expressed as concern for the regional business community may be an important institutional factor. The paper outlines a research agenda and presents a tentative research model and a design to test this. The study itself will start early autumn 2004, and preliminary results will be available late 2004.

1 Introduction

E-procurement has been on the political agenda for a while. At the Lisbon summit in 2000 EU decided to pay special attention to e-Procurement (Henriksen and Andersen 2003). E-Procurement in the public sector is emerging with Scandinavian countries such as Denmark, Norway and Finland, other European countries such as UK, Spain, Germany and Portugal and Italy, and Singapore, Brazil and Australia being in different implementation stages (Somasundaram 2004a). Despite this, adoption is slow, at least in some of the front-running countries. Data from Denmark (Henriksen et.al. 2004) shows that about one year after the launch of the public eProcurement portal the value of procurement transaction was 0.01 billion DKK. In Norway the turnover in 2003 (Computerworld 2004) was 0.05 billion NKK compared to a goal of 1 billion. This paper attempts to explore some of the reasons why, so we can better design and implement public e-procurement portals and design measures to secure adoption.

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2 Theoretical Background

2.1 e-Procurement

The term e-procurement is defined by McManus (2002) to be different from e-purchasing, he explains (Ram) as "the combined functions of purchasing, inventory control, traffic and transportation, receiving and inspection, storekeeping and salvage and disposal operations" (NIGP 1996), whereas the term purchasing describes determining the need, selecting the supplier, arriving at a fair and reasonable price and terms, preparing the contract or purchasing order, and following up top ensure timely delivery (NIGP 1996). Norway and Denmark are, among the few countries that have already implemented e-procurement, these systems are more in line with the narrower term purchasing than procurement.

Imperatives for public e-procurement portals stimulating e-business and e-purchasing in general and in public sector especially to achieve more effective processes linked to purchasing and payment are, according to the web-site for the public e-Procurement portal in Norway (www.ehandel.no). By coordinating and standardising according to public legislation and regulations, it is an attempt to shift the power from suppliers to buyers by forcing suppliers to move from their specific e-business solutions to the public portal.

The Danish Gatetrade has previously been documented in Henriksen et al. (2004). It is owned by four major Danish organisations, who all expressed their strong support and intent of using it, and hence it could be expected to be quickly adopted. It is not. Henriksen et al. (op.cit) have suggested that a major obstacle is decentralisation of purchasing power which clashes with the attempt of centralisation of the procedure through a standardised portal. Somasundaram (2004b) has also indicated that competing e-procurement portals may hinder the adoption of the governments recommended portal.

The Norwegian public e-procurement portal has been developed by IBX after winning a contract with the government, and started operating June 2002. A number of municipalities, counties and suppliers have signed contracts with the portal, but the value of the purchases is still limited, which implies that the contract in itself does not guarantee high turnover. Norway shares many of the features of the Danish public sector with an important trend towards decentralisation of power to the kommunes (municipalities), and the total number of kommunes in Norway is 434 which is even higher in Denmark. This implies an even more fragmented structure with the average kommune being small, having approximately 7.000 inhabitants. However the 7 biggest have all signed contract with the portal, accounting for 30% of the total population. Still the turnover is limited, but it is increasing according to the government's web-site on the project (www.ehandel.no).

2.2 Implementation and Adoption of Information Systems

In general implementation of information systems is not straightforward, as numerous papers have documented. Davis et al. (1989) developed the Technology Acceptance Model (TAM) based on previous work by Fishbein and Ajzens Theory on Reasoned Action (1975) to explain intentions of use and actual use of IT in organisations. In the TAM model ease of use and usefulness are the two independent variables explaining attitudes, behavioral intentions and actual use. Taylor and Todd later showed that this

model is well suited to predict variations in adoption and use of IT in organisations. Usefulness and ease of use as important factors in adoption of information systems. Various other factors have later been identified such as top management support.

The term usefulness seems important in the context of public e-procurement systems, since public e-procurement has many stakeholders. Usefulness of e-procurement needs to be explored, on what level and for who is usefulness decisive for adoption of e-procurement? Is it usefulness for the actual purchasing manager, is it usefulness for the organisation or is it usefulness for the community? Electronic purchasing does not only imply possible efficiency benefits in terms of reduced costs, it also implies new ways of purchasing with loss of authority for the individual purchaser and it may imply shifting to different suppliers.

2.3 Institutional Theory

Research in public e-procurement does not seem to have taken into account some of the specific characteristics of this sector. Public sector and private enterprises usually have different strategic objectives and mandate (community oriented and non-for-profit versus shareholder oriented and for-profit) and operational objectives (maximize service and quality with set budget versus maximize profit with minimal cost). Perhaps most importantly is the institutional environment with policies and regulations applied to a large population influencing the public sector in general, whereas private enterprises are governed by relatively independent corporate boards. In a study of the Norwegian public sector, Dertz et al. (2003) showed that institutional factors are important in influencing IT sourcing decisions. Such factors may also be influencing adoption of e-procurement.

Oliver (1991) suggests that organizational responses will vary from conforming to resistant, from passive to active, depending on the institutional pressure towards conformity that are exerted on organisations. Organisations are often confronted with conflicting institutional demands or with inconsistencies between institutional expectations and internal organizational objectives related to efficiency or autonomy. Different strategies may be exerted, from balancing the conflicting demands to more active resistance such as concealment which involves disguising nonconformity, for example by establishing plans to disguise the fact that it does not intend to implement them. We believe that municipalities may experience such conflicting demands in e-Procurement adoption from state pressure and societal and cultural pressure.

3 Research Model, Methodology and Design

As this is still work in progress, both the research model and the design is still under development, hence it is likely to be changed to reflect input from pilot interviews.

3.1 Research Model

We have developed a tentative and fairly simplistic research model including usefulness and institutional factors as important for attitude towards adoption. We expect usefulness to be a combination of usefulness for the individual user or purchasing manager and for the organisation as a whole, in line with agent-principal theory. The

overriding goal for organisations use of e-procurement is effectiveness. The individual purchasing manager may have personal goals such as autonomy. Organisational effectiveness will be dependent of a number of important factors such as technical features, costs of implementation and use, number of vendors or suppliers available over the portal and competing electronic marketplaces.

However we expect institutional factors to be important, including state goals and community goals. State goals are expected to be towards conformity. Community goals are expressed through local politicians and trade contacts and is anticipated to be for the regional business community. We must however point out that the model is preliminary, it will be further developed through interviews before empirical testing. For example we need to explore what community goals exists and how they are expressed. The tentative model is shown in figure 1 below:

We anticipate that the attitudes of the municipalities can be grouped in four different categories, dismissal, wait and see, decision of adoption as concealment and actual adoption, however this still remains to be seen. Through this model we can identify hypothesis such as: Community goals with concern for the business community may lead to a "wait and see" attitude, waiting for the local businesses to be competitive via the e-procurement solution.

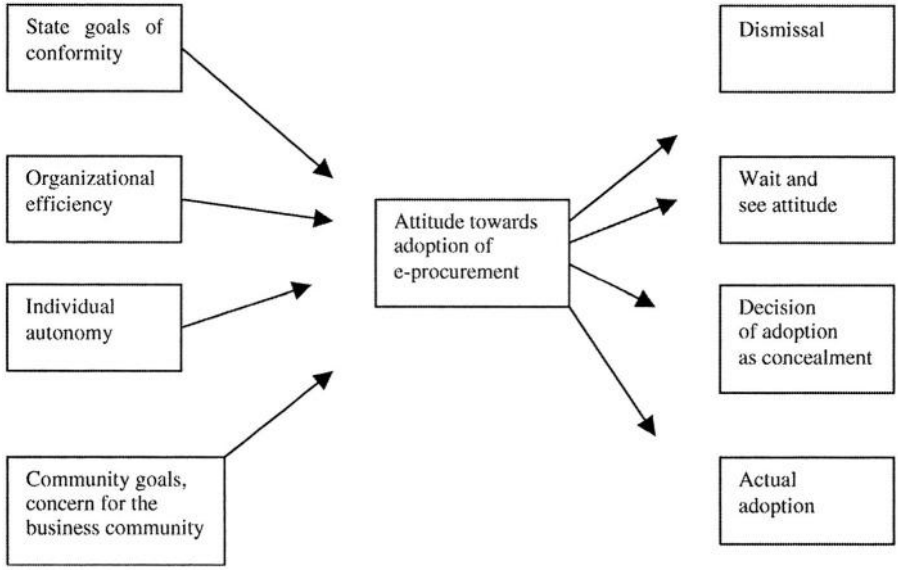

Fig. 1. Research model showing the effect of state goals towards conformity, organisation goals towards efficiency, individual goals towards autonomy and community goals towards concern for the business community on the attitude towards adoption of e-procurement.

3.2 Research Design

The study will be carried out through a combination of interviews with a group of municipalities having chosen different strategies, development of the research model, pilot testing of survey and actual survey. Since the group of municipalities in Norway having implemented the public e-procurement (through signing contract) is limited

the sample will include all of these in addition to the same number of non-implementing municipalities.

A difficulty will be to distinguish between what we have termed as decision of implementation as concealment and actual adoption. This may be possible to do trough triangulation, by comparing answers from different organization actors and by comparing answers to actual turnover. To facilitate this, questionnaires will be distributed to purchasing managers, and possibly also to other decision makers in the municipality such as the CEO. Data will possibly also be gathered on the current turnover of the actual municipality, but it still remains to see if this is possible.

4 Expected Results

The study may help to explain both decision making in public organisations in general and to some extent the lack of turnover on the public e-procurement portals. Through this increased understanding more efficient policies towards implementation of e-procurement portals and towards adoption of these may be developed.

References

1. Computerworld (2004). Skivebom for offentlig markedsplass. Published 5. March 2004, available at http://www.computerworld.no/index.cfm?fuseaction=debatt_artikkel&id=19E3BA10-AlF5-3083-E9E078A306DCOD23&nolog=1
2. Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management Science, vol 35, no. 8.
3. Dertz, W., Hu, Q. and Moe, C.E. (2003). Influential Factors in IT Sourcing Decisions of Norwegian Public Sector: An Exploratory Study. In Proceedings of Americas Conference on Information Systems (AMCIS), August, 2003.
4. Fishbein, M. and Ajzen, I. (1975). Belief, attitude, intention and behavior: an introduction to theory and research. Addison-Wesley, Reading, MA
5. Henriksen, H.Z. and Andersen, K.V. (2003). eProcurement adoption: Theory and Practice. In Traunmüller, R (ed.) Electronic Government. Second International Conference, EGOV 2003.
6. Henriksen, H.Z., Mahnke V. and Meiland, J.H. (2004). Public eProcurement Economic and Political Rationality. In proceedings of Hawaii International Conference on System Sciences (HICSS) 37, January 5-8, 2004
7. MacManus, S. (2002) Understanding the Incremental Nature of E-Procurement Implementation at the State and Local Levels. Journal of Public Procurement, vol. 2 no. 1, pp. 5-28.
8. NIGP (1996). National Association of State Purchasing Officials/National Association of Information Resource Executives Joint Force on Information Technology and Procurement Reform.
9. Oliver, C. (1991). Strategic responses to institutional processes. Academy of Management Review, vol. 16, No. 1, pp 145-179.
10. Somasundaram, R. (2004a). Diffusion of e-Procurement in the public sector – revisiting centralization versus decentralization debates as a twist in the tale. Presented at the First Scandinavian Workshop on e_government (SEG), February 2004.
11. Somasundaram, R. (2004b). The "Centralization" Challenge of E-procurement in the Danish Public Sector. Unpublished?.
12. Taylor, S. and Todd, P.A. (1995) Understanding information technology usage: a test of competing models. Information Systems Research, vol 6 no. 2.
13. www.ehandel.no (accessed at March 15th 2004): Pangstart for e-handelen i 2004.

e-Government as an Enabler of Public Management Reform: The Case of Switzerland

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Abstract. Governmental reform has been on Switzerland's political agenda since the 1970s. In the 1990s, the ideas of NPM (New Public Management) spread quickly within the Swiss public sector. From the mid 1990s, the three levels of government also began experimenting with electronic government. Ten years later these experiments have matured and Switzerland is regularly ranked among the top countries for the implementation of electronic government. It is possible to link these eGovernment experiments and projects to some of the ideas and promises of NPM, such as customer orientation, seamless interaction between levels of government, businesslike management, and better transparency of public affairs. By means of ten examples, this paper illustrates how eGovernment has become one of the most meaningful agents of government transformation and modernisation at the beginning of the 21st century, at least in Switzerland.

1 Introduction

eGovernment not only concerns modernising public administration through Information and Communication Technologies (ICT) but recently has also been presented as a key enabler of transformation within public administration [1]. Accordingly, eGovernment should thus assist the various public administrations and governmental agencies at national, regional and local levels to create a more efficient and effective State where administrative boundaries tend to disappear and a new citizen-centric type of governance can emerge. This stage is reached when eGovernment goes beyond eAdministration and eDemocracy and moves towards eGovernance.

The objective of public administration transformation is nevertheless not a new one. In fact, governmental reform has been proposed in many countries for over thirty years. New Public Management ideas were very strong all over the world in the 1990s, at precisely the point that eGovernment started to come into play. The link between public management reform and eGovernment is, however, rarely made. This paper aims at presenting this link as established by Switzerland, a country where public management reform has been on the public agenda since the 1980s and that regularly ranks among the top countries for the implementation of eGovernment.

The paper is organised as follows: Section 2 presents the ideas of public management (PM) reform in general and their application in Switzerland. It also briefly outlines the development of eGovernment in this country. Section 3 presents the four core ideas of PM reform that can be supported by eGovernment and shows how some

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Swiss public websites enable these ideas. Section 4 concludes on the use of eGovernment as a catalyst for further PM reform in the direction of a "cyberstate".

2 Public Management Reform and e-Goverment in Switzerland

According to Germann [2, p. 173], public management (PM) reform is one of the five types of governmental reform, the others being territorial, functional/structural, civil service and financial reforms. PM reform also deals with human and financial resources. It is the most all-embracing type of reform, also known as managerialism, and its main purpose is to apply management methods from the private sector in the public sector.

PM reform was introduced in Switzerland in the 1980s at the same time as academic programmes were launched at the Universities of Lausanne (at IDHEAP – Swiss Graduate School of Public Administration) and St. Gallen (PM Centre of Excellence). At the time, PM reform focused on efficiency and at times effectiveness, as the acronyms of the following reform programmes denote: EFFI (1984-1987) followed by EFFI-QM (1986-1990) at the Federal level; and EFFISTA (1987-1992) at the Cantonal level (Bern) [2, p. 207].

At the beginning of the 1990s, Hood [3] coined the term "New Public Management" (NPM) and Osborne & Gaebler proposed their "Reinventing Government" [4]. These new trends were introduced in Switzerland by such scholars as Delley [5], Emery [6], Finger [7] and Schedler [8]. By the mid 1990s, many projects for *Nouvelle Gestion Publique* (*NGP*) and *Wirkungsorientierte Verwaltungsführung* (WoF) were introduced respectively in the French and German speaking parts of Switzerland at Federal, Cantonal and local levels. Although the NPM mantra has almost disappeared ten years later, many projects are still alive and presented on public administration websites. See for example: www.flag.admin.ch/d/index_d.html at Federal level, www.ag.ch/wov at Cantonal level (Argau) and www.puma.bs.ch at city level (Basel). The Canton of Zurich has even created an e-learning tool available to all those who want to learn about these PM reform ideas in German (cf. http://e-learning.wif.zh.ch). One can already see that the first stage of eGovernment (i.e. information [9]) contributes towards facilitating PM reform by spreading news about it among the citizens concerned and civil servants involved. Moreover, some scholars within the Swiss eGovernment scene were also among the first to propose NPM (for example Schedler [8]).

The first governmental websites in Switzerland were introduced in 1994 by the cities of Basel and Geneva and were soon followed by their respective Cantons. The Federal Government introduced its first portal (www.admin.ch) in 1995. By 1999, all Cantons had their own websites [10]. Ten years later, about 2,500 public websites are referenced by the www.gov.ch database maintained by IDHEAP. In [11] Glassey & Chappelet survey the federal and cantonal strategies concerning e-government. An overview of the current Swiss best practices can be found in [12]. Although Switzerland is often ranked in the top countries of many "ICT in Government" surveys, there are still few online services or transactions (third stage of eGovernment [9]). The following web address gives a good overview of the Federal Government strategy and the structures in place for eGovernment: www.admin.ch/ch/f/egov/egov/index.html (in French, German and Italian).

3 Enabling Core PM Ideas Through Swiss e-Government Websites

eGovernment can be defined as the use of ICT by public institutions to improve their relationships with their users (in the so-called front office) and internal functioning (back office) [1]. From this definition, one can see that eGovernment enables at least two ideas within PM reforms: customer orientation (at a front office level) and process efficiency (at the back office level). There are, however, several other PM ideas as can be seen by browsing the vast literature on PM reform in the 1990s. The focus of this paper will be on four of these ideas: customer orientation; businesslike management; new forms of public services delivery; citizen empowerment. The efficiency of processes (which originated in the Process Reengineering movement) is not covered in this paper since it is evident that eGovernment applications should make internal processes more efficient.

3.1 Customer Orientation

Customer orientation is certainly at the core of the PM reform movement. It evokes a similar trend in the private sector, i.e. quality management initiatives. It can be translated by the eGovernment concepts of one-stop shopping, seamless government or joined-up government. These concepts are implemented by the four Swiss public websites presented below.

Like many countries, Switzerland now has a national portal at www.ch.ch, which opened in 2003 under the French name of "Guichet virtuel". It is a navigation aid through the jungle of public administration tasks, geared toward Swiss citizens and residents. Some 119 public tasks were identified at Cantonal level and 48 at municipal level. The portal is based on life-events organised into eight subject areas (at present) and is available in the four Swiss national languages plus (since 2004) English. It is run and mainly financed by the Federal Chancellery although very few administrative tasks are performed at national level, Switzerland being a federalist State. Such a portal is clearly of assistance to the country's inhabitants for matters of daily life, although there are not yet many users. Studies have shown that these first "customers" are more satisfied with this than they are with other eGovernment websites [13]. Another consequence of the introduction of this portal is the blurring of Cantonal and municipal boundaries.

A similar portal has been designed for small and medium enterprises (SMEs) under the address www.pmeinfo.ch. It aims to provide SMEs and those wishing to set up a business in Switzerland with simple access to relevant information (legal forms, taxes, company registration, social insurance matters, financing, etc). It is run by the State Secretariat for Economic Affairs in partnership with several other Federal agencies. This portal constitutes a one-stop shop highly appreciated by (new) businesses who tend to complain that public services for entrepreneurs are not sufficiently customer-oriented (see for example [14]).

Among many others, two examples of successful seamless or joined-up government can be singled out in Switzerland. One of the oldest ones (dating back to the year 2000) is the portal for obtaining building permits in the Canton of Vaud, a process that involves the owner/builder, his/her commune, various Cantonal agencies and intermediaries such as architects, land surveyors and contractors. The portal (www.camac.vd.ch) and the application procedures it covers provides assistance for

processing a construction request within the legally specified 30-day deadline by tracking it through the various agencies' workflow, rendering the complex process smoother for its many clients. Performance indicators, which constitute a basic tenet of NPM culture, are also regularly published in the website.

A more recent example of seamless government is the portal for obtaining work permits in the Canton of Zurich (www.arbeitsbewillingungen.zh.ch, also available in English). It allows a foreigner to enter and modify (with a password) an online work permit application, to track its status and to view basic data about enterprises and persons concerned by his/her request. This type of application clearly streamlines the administrative process and reduces the waiting time needed to deliver a work permit, since foreigners are supposed to stay abroad until their work permit is issued. It also extends the notion of public customers to non-Swiss residents living abroad.

3.2 Businesslike Management

Businesslike management is also one of the core tenets of PM reform. It is based on the idea that public administrations should rationalise their decisions for reasons of economy, thus sparing on the use of public funds to the greatest possible extent. A perfect enabler of this idea is SIMAP, the Swiss electronic information system for public tenders (www.simap.ch). This system provides secure access for all contracting parties: it permits contractors to register and to download all necessary documents, laws and regulations and includes an online questions and answers section. First used in 2003 by nine Cantons and six large cities, most other Cantons and the Swiss Confederation will join in 2004. The system promotes free competition and transparency regarding public tenders and also favours restraint within public sector spending. It is interesting to note that this system is run by an association whose members are the public authorities using it. This is an example of the new forms of public service delivery that are presented in the next section.

3.3 New Forms of Public Services Delivery

Apart from the creation of non-profit legal entities such as the one sustaining SIMAP, the proponents of PM reform have emphasised the possibility of involving the private sector in public service delivery. This has mostly taken the form of full privatisation, outsourcing of services and public-private partnerships. eGovernment can be delivered by means of these schemes.

For instance, the City of Montreux website has been totally outsourced by the municipality to a privately managed portal, www.montreux.ch, which contains business and tourism information (Montreux is renowned throughout the world for its annual July Jazz Festival). Basic city information (contact details and opening hours) is available under the "Town hall" section of this commercial portal. This form of public information delivery is very unusual in Switzerland but helps Montreux, a relatively small city, save money even though the resulting city website is very basic.

The Schools on the Net programme is an example of a public-private partnership in the realm of Swiss eGovernment. It is a programme to train teachers in the use of ICT for teaching and learning, as well as to equip all Swiss primary and secondary (public) schools with Internet broadband connections. In 2004, more than two thousand schools are connected thanks to ICT infrastructure provided at reduced or at no cost

by companies such as Swisscom, IBM, Cisco and Apple. The Federal and Cantonal governments provide additional financing, in particular for the maintenance of a portal to gather information on best educational practices and experiences with ICT (www.educa.ch).

3.4 Citizen Empowerment

Citizen empowerment is the final core idea of PM reform that we shall examine in the light of eGovernment and in particular of eDemocracy. This idea is based on the belief that if they are more involved in government, citizens will help monitor government activities and contribute towards solving problems more easily than would be the case in a situation where the government enforced bureaucratic solutions unilaterally. One must admit that Swiss eGovernment has not yet succeed in creating empowered communities of citizens. The examples that can be given in Switzerland are only a first stage towards what could be achieved in the future, and to date fall under the ideas of more direct participation through e-voting and of increasing the accountability of elected representatives.

In 2000, the Federal Government elicited pilot experiments for e-voting in the Cantons of Geneva, Neuchâtel and Zurich [15]. In 2003, the Canton of Geneva, which is the most advanced, organised three legally binding ballots in the communes of Anières and Cologny using its electronic voting portal (www.geneve.ch/ge-vote). The percentage of votes cast via the Internet was higher than expected. In 2004, this portal should also be used by the city of Carouge and the Geneva citizens living abroad for a legally binding Federal vote. In 2005, a decision should be taken to introduce electronic voting as a third alternative for polling in Geneva (in addition to real and distance polling). In the following years, the portal will be upgraded to allow the signing of popular initiatives and referendums that are typical of Swiss democracy in which most decisions can be contested by a rather small number of citizens' signatures.

Elected representatives' accountability to their electors has also been a sub-theme of citizen empowerment, and two Swiss websites help fulfil this goal. The first one is none other than the Federal Parliament portal (www.parlament.ch) which, among many other features facilitating the democratic process, gives the full text, audio and video of representatives' speeches a few hours after they are delivered. The "netizens" can react online to these speeches by e-mail. Such a function reinforces the transparency of Parliament activity while expanding the possibilities for citizens to express directly their views on policy matters.

For the last parliament elections held in October 2003, a group of political scientists supported by the media offered a website (www.smartvote.ch) to facilitate the electors' choice among the three thousand candidates for 246 seats. Some 2,919 candidates accepted to state their position on forty main issues by means of an online questionnaire. Their responses were matched to an elector's own responses to the same questionnaire. This privately sponsored experiment helped foster citizen involvement in the October 2003 elections.

4 Conclusion

The ten Swiss examples outlined in this paper show how eGovernment, under its subcategories of eAdministration and eDemocracy, can enable some of the core ideas

of PM reform as it developed in the 1990s under the labels of New Public Management or Reinventing Government. But we are only at the beginning of what eGovernment can accomplish towards a more citizen-centric and seamless public administration. Indeed, eGovernment is not only a means of improving public services but a powerful agent for transforming public administration. In Switzerland, it will progressively change the entire range of relationships within public bodies and hence the functioning of this federalist State in our information society, moving it towards a "cyberstate" where traditional administrative boundaries will progressively blur.

On the other hand, ideas of PM reform such as customer orientation and citizen empowerment are also good recipes for the success of e-government projects among the people. Only those projects genuinely implementing these ideas will induce citizens to leap into online dealing with government to a greater extent.

References

1. Leitner C. (2003), eGovernment in Europe: The State of Affairs. Maastricht: European Institute of Public Administration, p. 13.
2. Germann R. E. (1996), Administration publique en suisse. Bern: Haupt, vol. 1.
3. Hood C. (1991), A Public management for all seasons. Public Administration, vol. 69.
4. Osborne D. & Gaebler T. (1992), Reinventing Government. Reading: Addison Wesley.
5. Dellay J.-D. (1994). Quand l'esprit d'entreprise vient à l'Etat. Lausanne: DP.
6. Emery Y. (Ed.) (2000), L'administration dans tous ses états. Lausanne: PPUR.
7. Finger M. & Ruchat B. (Eds) (1997), Pour une nouvelle approche du management public. Paris : Seli Arslan.
8. Schedler K. (1995), Ansätze einer wirkungsorientierten Verwaltungsführung. Bern: Haupt.
9. European Commission (1999), Green paper on public sector information, p. 8.
10. Chappelet J.-L. & Hitz M. (1999), L'internet et les cantons suisses, La Vie Economique, 3/99, p. 56-60. (Also in German.)
11. Glassey O. & Chappelet J.-L. (2003), "From E-Government to E-Governance: A Survey of the Federal and Cantonal E-Policies in Switzerland", in *Electronic Government* (R. Traunmueller, Editor), Lecture Notes in Computer Science 2739, Berlin: Springer, 2003, p. 25-31.
12. ISB Informatikstrategieorgan Bund (2004), CyberEtat de l'art 2004, Bern: Evanti.ch, May.
13. Golder L. & Longchamp C. (2003), Analyse des besoins en relation avec l'offre Internet de la Confédération. Bern: GfS, p. 10.
14. MIS-Trend (2003), Etude sur la compétitivité cantonale. Lausanne: CVCI.
For more information cf. www.admin.ch/ch/f/egov/ve (in French or German) and www.geneve.ch/chancellerie/e-government/e-voting.html (visited on 6th January 2004).

Digital Divides Revisited: Towards a Model for Analysis

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Abstract. This paper presents a model for analyzing divides. The model is based on earlier research on the divide and includes: physical access, autonomy of use, know-how and motivation. Depending on the type of digital divide and the local situation, rectifying efforts must address the most crucial factor, which could be any of the four.

1 Introduction and Motivation

The digital divide is most commonly described as the gap between the technology haves and have-nots and therefore the spotlight has traditionally been on those citizen groups that lack computers and web access. This kind of research has not required a sophisticated model for analysis. However, most people today agree that access alone is no longer the only measure of the digital divide and that it will not capture the full extent of the digital divide. In order to rectify this restraining approach there is a need for a multifaceted model for analysis. There is no doubt that the access-aspect of the subject is relevant - especially if taken a global view. Nevertheless, in those countries where Internet use is frequent there is a need for looking beyond the access part of the dilemma. This paper will present a model that encompasses four dimensions of the digital divide: *physical access, autonomy of use, know-how* and *motivation.*

2 Method

This paper draws on a report (Andersson, 2003) commissioned by the Swedish Ministry of Justice for the purpose of guiding a comprehensive political strategy in order to diminish digital divides in Sweden. The report draws on a literature study on research on the digital divide. The literature survey was conducted during Spring 2003, using a multitude of online journal databases. The paper draws on close reading of 50 of those selected by title and abstract. Approximately 50 per cent of the research papers used is large reports that present the results of extensive statistical inquiries, such as nationwide public surveys. About half of these are from Sweden. The model for analysis presented in this paper partly builds on the works of DiMaggio and Hargittai (2001).

3 Dimensions of the Divide

Earlier research on dimensions for capturing the divide often addresses the dimensions of physical access and know-how. Several authors (Buckler 2001; Hargittai

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2002; DiMaggio, Hargittai 2001; James 2001) have identified knowledge, skill or know-how as a vital distinguisher. One talks about "the 'second-level-digital divide" (Hargittai 2002) or "the competence aspect of the digital divide" (Hartviksen et al 2001). Differences in the autonomy of use have also been observed (DiMaggio, Hargittai 2001, ICTC 49 2002; WWI 2002) but not as frequently discussed as in the case of access and competence. Papers and surveys showing that motivation and social support are important distinguishers (DiMaggio and Hargittai 2001, ICTC nr.15 2002; NTIA 2000; NTIA 2002; Katz et al 1997) have also been given some attention in the last years.

The literature study would prove that there are many different inequalities, or divides, to consider when producing a model. There are, of course, the obvious differences in *physical access* whether it being access of home computer or broadband connections. Other inequalities are found in *know-how* and in the willingness to use the medium - the *motivation.* The study would also show that even when the dimensions *physical access, know-how* and *motivation* are fulfilled there might still be another obstacle to use the Internet as one pleases – the *autonomy of use.* (Andersson 2003)

4 Towards a Model for Capturing the Divide

In order to identify where different citizen groups get into difficulties, a model is presented.

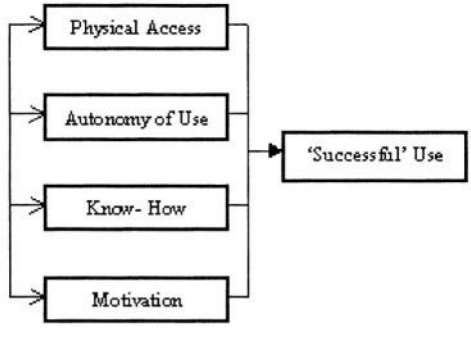

Fig. 1. Model for analyzing digital divides where the goal is the subjectively experienced successful use of the Internet.

The goal in this model is successful use (rectangle to the right) and the rectangles to the left are the ingredients needed for "successful" use of the Internet. *Successful use* means that the user can use the Internet to whatever he or she has set their aim for. When identifying a digital divide the problem is first discovered in the use category (one do not use the medium at all or much less than others or not in the way that the user wanted). The trouble in use can then be derived from any one (or several) of the four categories to the left. The categories to the left are dependent on one another. To reach the level of 'successful use' there is a need for all four categories to be fulfilled. The two-way arrows to the left in the model are there to illustrate that one factor can lead to another. For instance, it could start with motivation, you live a long way from

your bank office and this is the reason to get connected. The literature study would show that each one of the four factors – physical access, know-how, autonomy of use and motivation– could be a crucial obstacle.

Short introduction to the concepts:

Physical Access: Indicates whether one has access to a computer and an Internet connection. There can also be disparities in the quality of Internet infrastructure (hardware, software and connection). How does the physical access limit the use of the Internet? Since bandwidth increases, more websites oblige better browsers, graphics etc – can the user access the full range of Internet content? (Hargittai, DiMaggio 2001)

Autonomy of Use: To what extent do the user control his or hers use of the Internet? This can be due to where the user has access to the Internet; there is a difference in the use of Internet depending on whether you access is from home as opposed to the local library or at school. If used at school or work there are often limitations in time and filters and regulations may influence the use. (Hargittai, DiMaggio 2001) Even in your home other family members might limit the use thus decreasing the autonomy.

Know-How: Encompasses both the technical skills (knowledge on software, hardware, networks etc) and the ability to find information on line. One talks about *Internet competence* (DiMaggio, Hargittai 2001), *information literacy* (Doyle 1994), the ability to access, evaluate, and use information from a variety of sources, or the importance of being *computer literate* (James 2001; Mazrui 2001). Thus one has to be both computer literate and information literate to fully make use of the Internet.

Motivation: In order use the Internet successfully you have to want to use it or at least have a reason to use it. There are different motives to why one chooses to use (or not to use) the Internet; trust is one; others might be benefit, entertainment and social (Katz, Aspden 1997; ICTC nr.15 2002).

5 Conclusions and Future Work

In conclusion, to further the discussion of the digital divide, there is a need for a model that can encompass many different fissures of the divide. The model suggested in this paper has laid a ground for this and on basis of the literature study that underlies this paper the model has proven to work well. The model would help find the exact problem and find explanations to inequalities that could easily have been overlooked otherwise.

This model is a start in capturing a more complex picture of the digital divide than the classical 'haves' – and 'have-nots'. However the model should go deeper than in its present state. Sub-categories could be added to the four dimensions. For instance, the category "autonomy of use" could be divided into the sub-categories 'location of access', 'rules and regulations' and 'time'.

References

1. Andersson, A.: Digital Divides – past, present and future. (In Swedish: Digitala klyftor – förr, nu och i framtiden). Report for the Swedish Justice Ministry, Regeringskansliet, Elanders Gotab Stockholm (2003)

2. Buckler, G.: Digital divide creates haves and have nots. Computing Canada, 27:24, p. 21 (2001)
3. DiMaggio, P., Hargittai, E.: From the "Digital Divide" to "Digital Inequality": Studying
4. Internet Use As Penetration Increases. Working Paper #15. Center for Arts and Cultural Policy Studies, Woodrow Wilson School, Princeton University (2001)
5. Doyle, C: Information Literacy in an Information Society: A Concept for the Information Age, ERIC Clearinghouse on Information and Technology, Syracuse, New York (1994)
6. Hargittai, E.: Beyond logs and surveys: In-depth measures of people's Web use skills. Journal of the American Society for Information Science and Technology, 53:14, p. 1239, New York (2002)
7. Hargittai, E.: Second-Level Digital Divide: Mapping Differences in People's Online Skills. First Monday, 7:4, URL: http://firstmonday.org/issues/issue7_4/hargittai/index.html (2002)
8. Hartviksen, G., Akselsen, S.: MICTS: Municipal ICT Schools – A Means for Bridging the Digital Divide Between Rural and Urban Communities. Education and Information Technologies, 7:2, pp. 93–109 (2002)
9. ICTC: Women's use of the Internet (In Swedish: Om kvinnors användning av Internet). SOU 2002: 49, URL: http://www.itkommissionen.se (2002)
10. ICTC: IT and the Elderly (in Swedish: IT och äldre). SOU 2002:15, URL: http://www.itkommissionen.se (2002)
11. James, E.: Learning to bridge the digital divide. The OECD Observer, Jan: 224, pp. 43-45. ISSN: 00297054 (2001)
12. Katz, J., Aspden, P.: Motivations for and barriers to Internet usage: results of a national public opinion survey. Internet Research, 7:3, pp. 170–188. ISSN 1066-2243. (1997)
13. Mazrui, Ali, Mazrui, Ala.: The digital revolution and the new reformation. Harvard International Review, 23:1, pp. 52-55, ISSN: 07391854, Cambridge (2001)
14. NTIA (National Telecommunications and Information Administration): A Nation Online: How Americans Are Expanding Their Use of the Internet. U.S. Department of Commerce (2002) URL: http://www.ntia.doc.gov/ntiahome/dn/
15. NTIA: Falling Through the Net: Toward Digital Inclusion, A Report on Americans' Access to Technology Tools, U.S. Department of Commerce (2000)
16. WWI (World Internet Institute): Swedes and the Internet 2002. URL: http://www.worldinternetinstitute.org/

An Integrated Framework for Analyzing Domestic and International Digital Divides

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Abstract. Digital divides have become an important issue that attracts a great attention of almost every country in the world and major international organizations. However, few or none of the previous researches have taken into account both domestic and international digital divide issues at the same time and offered an integrated view to structurally illustrate these issues from various aspects. The goal of this paper is to propose an integrated framework for assessing and analyzing domestic and international digital divides of a country or a group of countries. Situations of digital divides in Taiwan, three other industrialized economies in southeastern Asia, and four northern European countries are examined and compared based on the framework. Related e-government strategies for bridging the divides are also discussed.

1 Introduction

Digital divide (DD) has been identified as a critical factor for a country to make a successful transition into the information society and digital economy [1,15]. As a global issue, DD can be further categorized into domestic digital divide (DDD) and international digital divide (IDD). The DDD covers the uneven situations of universal information and communication technology (ICT) access between different socio-demographic groups within a nation, while the IDD indicates disparities of ICT access and utilization between developed and developing countries [11,12,16,23]. There are case studies and surveys that provide empirical evidences of the globally existing DDDs and growing IDDs among member countries of APEC and OECD [15,16,22,23]. G-8 initiatives suggested that DD may hinder the readiness of e-government and will probably deprive most people of the digital opportunities [2]. Furthermore, DD has been cited as a factor of the growing economic divide that indicates the imbalance between countries due to lagging developments in ICT [3,20]. For understanding and solving the DD problems, suggestions have been made to create frameworks for directing governmental strategies [2,3,11,18]. However, most of the previous research works are surveys and case studies of the current DD states in a specific country or among countries within a specific region. Few, if not none, have taken into account both the DDD and IDD issues at the same time and offered an

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integrated framework to structurally investigate and measure DDs using key factors from all aspects. This paper aims at making up for this literature gap by proposing a conceptual framework that integrates key dimensions of the DDs from both domestic and international perspectives. We believe that such an ontology-based integrated framework can be used as a guideline to help governments in assessing the states of DDs and planning strategies to tackle the IDD and DDD problems simultaneously. Two groups of countries, the newly industrialized economies (NIES) in southeastern Asia (SEA) including Taiwan, Singapore, South Korea and Hong Kong, and the countries in northern Europe (NE) including Sweden, Norway, Finland and Demark, are selected for comparative analysis based on the proposed framework.

2 The Integrated Framework for Digital Divides

Reviewing the literature learns that conceptual discussions regarding the DD framework full of diverse point of views. Kim and Kim [11] categorize DD into three levels: media accessibility, information mobilization, and information consciousness. Class, education, age, sex, and region have been mentioned as major elements for causing the divides. MeIver [13] views DD from a human rights perspective and suggests enforcing equal opportunities on ICT accessibility. Jalava and Pohjola [10] relate ICT with the economic growth and see it as a major force in pushing developing countries toward new economy. Wong [22] examines ICT adoption rates, levels of economic development, and world competitiveness for comparing the DDs between Asian and non-Asian OECD countries. Iyer et al. [9] address several underlying rationales for global DDs and select GDP per capita and Internet penetration for clustering countries into different e-commerce growth types. Corrocher and Ordanini [3] use six categories including market, diffusion, infrastructure, competitiveness, human resources, and competition to measure cross-country DDs. The Information Society Index (ISI) released by IDC/World Times [7] uses four measurement criteria, i.e., computer, information, Internet, and social infrastructure for assessing a country's readiness to participate in the information society. Economist Intelligence Unit (EIU)/Pyramid Research [6] instead views E-Readiness from six categories: connectivity and technology infrastructure, business environment, e-commerce adoption, legal and regulatory environment, supporting e-services, and social and cultural infrastructure. The International Institute of Management Development (IMD) [8] uses economic performance, government efficiency, business efficiency, and infrastructure as indicators for measuring world competitiveness. The World Economic Forum (WEF) [21] adopts two complementary approaches: the Growth Competitiveness Index (GCI) and the Business Competitiveness Index (BCI) to analyze global competitiveness.

It can be seen that ICT accessibility and utilization is the main concern in developing domestic information infrastructure and fostering global economic growth. Equal opportunity is critical for indicating the balance level of information society development and the potential of attaining digital opportunities. E-readiness and economic competitiveness are key criteria to measure the national capabilities and competence in the global economy. We therefore chose ICT diffusion, equal opportunities, information society and e-readiness, and national competitiveness as major dimensional constructs to form an integrated framework for illustrating DDs. ICT diffusion lays

the foundation for all other dimensions. Related indicators include the ICT penetration and usage rates and ICT investment level with levels of economic development. Observations of equal opportunities focus on the equally accessibility to ICT technologies and services among different groups of citizens, businesses, and public administrations. The information society/e-readiness measures include indicators in categories of e-commerce adoption and growth, business and legal environment, quality of supporting e-services, and social infrastructure. Additional indicators for global competitiveness include ICT and technology productivities, economic performance and growth, quality of government agencies and services, quality of business and business environment. Figure 1 depicts the proposed framework that serves as a blueprint for dealing with both the DDD and IDD issues.

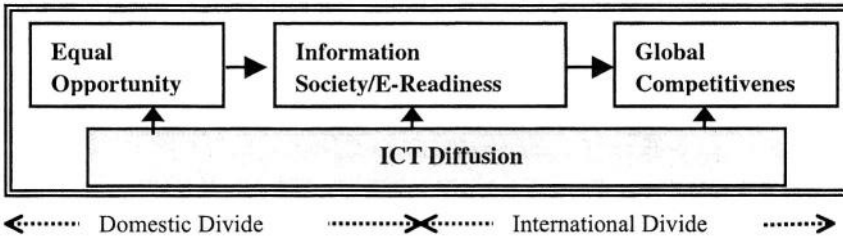

Fig. 1. The integrated framework for domestic and international digital divides.

3 Evidence and Comparative Analysis Based on the Framework

Applying the proposed framework to examine the DDD situation in Taiwan, statistical data related to ICT diffusion [4,5,14,17] show that the differences in household computers and use of the Internet between families with income at the top and the bottom 20% are always greater than 50%, and becoming worse. People living in Taipei and Kaohsiung cities have more chances of using computer/Internet devices compared with Taiwan provincial cities and counties as a whole. In addition, the disparities are shown in different regions, ages, and educational levels as well. The most Internet users are around the ages of 16 to 30 (58.7% and 44.4% in 1999 and 2000). Male uses Internet more often than female (53.8% vs. 48.2% in 2002), and people with higher educational degrees use the Internet more frequently (the gaps between college and high school Internet populations are about 10% to 20% in 2000).
Although the fast growth of Internet hosts (increased by 71% to 4 millions in 2002) has put Taiwan in the list of the top 15 countries with the most hosts, ranked only behind Japan in Asia, the average usage of Internet in small and medium enterprises is 79%, lower than 94% of the large enterprises.

As for the IDD situation, Table 1 shows that Taiwan is performing quite well in terms of the number of telecommunications equipment. The numbers are higher than the means of all other countries, and are even better than Singapore, Norway and Finland. Table 1 also indicates that Taiwan faces the problem of a slowing economy. When we compare the ICT indicators of Taiwan, SEA NIEs (average), NE countries (average), and the overall averages, the results indicate that DD exists between SEA NIEs and NE countries especially on the category of telephone lines, computers per

Table 1. ICT diffusion and GDP.

Country	Telephone lines/1000 subscribers		Cellular phones / 1000 subscribers			Computers per capita/1000 people			Hosts/100 inhabitants		Users/1000 inhabitants		GDP(US $ billion)			GDP per capita			ICT per capita
Year	2000	2001	2000	2001	2002	2000	2001	2002	2000	2001	2000	2001	2000	2001	2002	2000	2001	2002	2001
Hong Kong	572	583	749	846	912	414	389	434	3.36	4.4	323.53	427.37	136.2	161.9	163.0	24010	24090	24200	2109
Singapore	477	472	583	688	761	439	580	596	4.37	4.8	-	468.95	92.3	85.6	87.0	22949	20732	21429	2110
S. Korea	455	457	567	609	679	313	399	342	0.84	1.5	401.78	514.04	457.2	422.2	468.7	9668	8918	6681	-
Taiwan	598	588	750	881	881	336	394	314	4.92	9.9	314.24	351.53	310.1	282.2	281.5	13921	12595	12533	-
NIES avg.	525	525	662	756	808	376	441	421	3.40	5.1	346.50	440.50	249.0	238.0	250.1	17637	16583	16210	2109
Demark	709	735	653	719	790	561	609	658	6.26	10.5	486.89	532.01	160.8	162.4	172.4	30112	30421	31852	2911
Finland	551	551	752	831	865	573	614	662	10.22	17.1	462.43	541.24	121.6	120.9	131.7	23430	23295	25385	1938
Norway	755	754	702	751	787	572	610	657	10.09	6.7	489.98	512.52	162.3	163.7	191.7	36147	36219	42222	2572
Sweden	707	750	730	792	900	576	626	687	6.70	8.3	496.05	554.18	228	210.1	238.1	25705	23658	26966	2803
N. EU avg.	680	697	709	773	835	570	615	666	8.31	10.6	483.80	534.90	168.2	164.3	183.5	28848	28398	31606	2556

Data Source: Organized by this research from IMD (various years), ITU(2001, 2002), DGBAS Taiwan, KRNIC, IDA Singapore, Swedish Industry

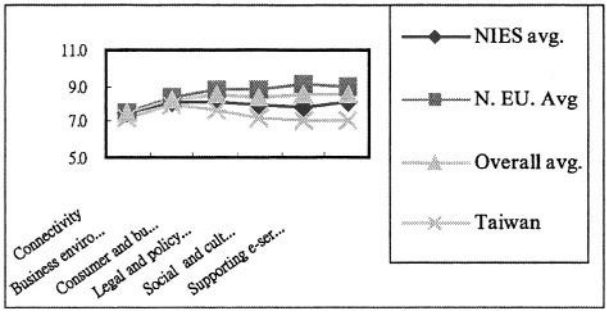

Fig. 2. Average e-readiness scores by category.

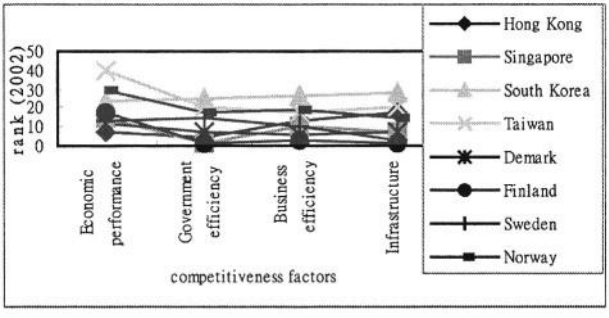

Fig.3. World competitiveness ranks by factors.

capita and Internet users. The 2002 ISI show that SEA NIEs are ranked behind the four NE countries (hk:11, kr:18, sg:13, tw:10 and dk:5, fi:8, no:2, se:l) [7]. The E-Readiness indexes from 2001 to 2003 revealed that all four NE countries have downward slopes on their ranks. Among them, Sweden (ranked 6,4,1 respectively) has performed the most praised whereas both Taiwan (ranked 16,20,20) and Singapore (ranked 7,11,12) seem to be eroding [6]. In Figure 2, it is clear that the average scores of SEA NIEs of all categories are not only below those of the NE countries, but also lower than the overall averages. Combining these two indexes provides a clearer picture that there is a gap, although not wide, between SEA NIEs and NE countries. In Figure 3, again, we notice that NE countries perform well almost in every competitiveness factors according to the 2002 world competitiveness yearbook by IMD and that Taiwan has to put more efforts on economic performance in particular [8]. Further comparing the competitiveness ranks with some ICT diffusion data of these selected countries, we notice from Figure 4 that in SEA NIEs, Korea and Taiwan are weaker in competitiveness; however, Taiwan performs better than Korea on ICTs. Norway is the only NE country not owning advantages either on competitiveness or on ICTs. Nevertheless, the NE countries are looking better on most of the indicators than the SEA NIEs.

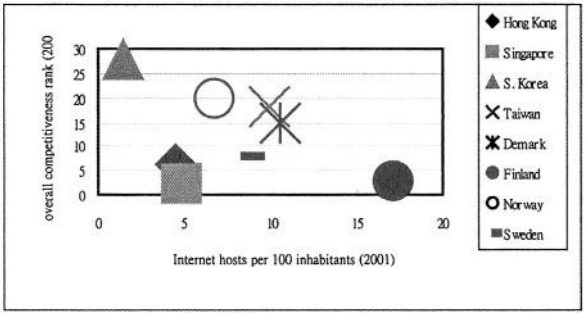

Fig. 4. Internet hosts vs. competitiveness.

4 Conclusions and Suggestions

In this paper we present an integrated framework for investigating DDs from both domestic and international perspectives. Empirical evidences and cross-country comparative analyses are provided regarding Taiwan's up-to-date domestic and international digital divides from the dimensions of ICT diffusion, equal opportunities, information society/e-readiness, and global competitiveness. Almost all the countries listed in this paper have sensed the consequences that DDs might bring and have initiated different projects to alleviate the gaps. For instance, the Taiwan government launched an "e-Taiwan project" in 2002 to embrace global e-trends and the knowledge-based economy, and to tackle problems such as the DDs [14]. The project contains five parts: e-Infrastructure, e-Society, e-Industry, e-Government, and e-Transportation. The main objective of the project is to transform Taiwan into a high-quality information society with highly competitive industries, highly efficient government, and highly effective ICT applications. In order to counteract DDs, the European Commission also supported various projects and programs proposed by its members. Some inter-governmental development programs have been carried out to avoid duplication and inconsistencies between government strategies and projects as well as to ensure efficient and effective national development [19]. Future studies will focus on expanding the conceptual framework and developing a measurement model to address and measure the DDs, as well as designing proper strategies and methods to bridge the gaps and to evaluate the effectiveness of related government projects.

References

1. Adams, O.: Reviews of NTIA's Falling through the Net: Defining the Digital Divide: A Report on the Telecommunications and Information Technology Gap in America. Reviews/Journal of Government Information, 27 (2000) 245-246.
2. Brown, C.L.: G-8 Collaborative Initiatives and the Digital Divide: Readiness for e-Government. Proceedings of the 35th Hawaii International Conference on System Sciences, (2002) 10 pages.
3. Corrocher, N. and Ordanini, A.: Measuring the Digital Divide: a Framework for the Analysis of Cross-Country Differences" J. of Information Technology, 17(2002) 9-19.

4. DGBAS: Special reports. Directorate General of Budget Accounting and Statistics, Executive Yuan, Taiwan, R.O.C. (various years).
5. ECRC-FIND: on-line sources. E-Commerce Resources Center (ECRC)/Focus on Internet News and Data (FIND), (various years) (http://www.find.org.tw).
6. EIU: e-Readiness Report. Economist Intelligence Unit, (various years) (http://www.ebussinessforum.com).
7. IDC/World Times: Information Society Index. The World Paper, (2002) (http://www.worldpaper.com/indexes/ISI/012002/TheWorldPaperISI2002.pdf).
8. IMD: The World Competitiveness Yearbook. International Institute for Management Development, Lausanne (various years).
9. Iyer, L. S., Taube, L., and Raquet, J.: Global E-Commerce: Rational, Digital Divide, and Strategies to Bridge the Divide. Journal of Global Information Technology Management, 5(1) (2002) 43-68.
10. Jalava, J. and Pohjola, M.: Economic Growth in the New Economy: Evidence from Advanced Economics. Information Economics and Policy, 14 (2002) 189-210.
11. Kim, M. C. and Kim, J. K.: Digital Divide: Conceptual Discussions and Prospect. Lecture Note in Computer Science, Vol. 2105, (W. Kim et al. eds.), (2001) 78-91.
12. Lu, M.: Digital Divide in Developing Countries. Journal of Global Information Technology Management, 4(3) (2001) 1–4.
13. Melver, W. J. Jr,: A Human Rights Perspective on the Digital Divide: The Human Right to Communicate. Proceedings of the DIAC 2000 Symposium, Seattle, Washington. (2000).
14. NICI: on-line sources. The National Information and Communications Initiative Committee, Executive Yuan, Taiwan, (2003) (http://www.nici.nat.gov.tw).
15. OECD: Understanding the Digital Divide. OECD Publications, France. (2001).
16. Paltridge, S.: Local Access Pricing and the International Digital Divide. e-OTI:OnTheInternet, (2000) (http://www.isoc.org/oti/printvrersions/1000paltridge.html).
17. RDEC: Reduce Digital Divide. The Research, Development and Evaluation Commission, Executive Yuan, Taiwan, (2003) (http://www.digitaldivide.nat.gov.tw).
18. Servaes, J. and Heinderycks, F.: The 'New' ICTs Environment in Europe: Closing or Widening the Gaps? Telematics and Informatics, Vol. 19, (2002) 91-115.
19. Swedish Industry: Telecommunications and Information Technology in Sweden. The Swedish Institute, (2003) FS 125 D, UED.
20. UNCTAD press release: E-Commerce to Continue its Leading Role in Economic Growth. The United Nations Conferences on Trade and Development, November 20, (2001) (http://www.unctad.org/en/press/pro135en.htm).
21. WEF: The Global Competitiveness Report. World Economic Forum, (various years) (http://www.weforum.org).
22. Wong, P. K.: ICT Production and Diffusion in Asia, Digital dividends or digital divide. Information Economics and Policy, 14(2) (2002) 167-187.
23. Yu, C. C. and Wang, H. I.: Digital Divide in Taiwan: Evidence, Comparisons, and Strategies. Electronic Government, (2004) (forthcoming).

Content Analysis of a Local Government Initiated Discussion Forum

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Abstract. This paper reports on content analysis performed on a local government initiated web site: **demokratitorget.no**. The expressed purpose of this web site is to increase citizen participation by using a discussion forum. This research reports on activity prior to the local and regional elections in the autumn of 2003. In order to analyse the content of the political discussions, it was necessary to develop a categorization scheme. Content is analysed based on scope, type of contribution, and intention. The results show that the primary use was to raise and comment on political issues. The discussion forum was also used to promote party political viewpoints, and to ask questions. The discussion forum generated only a few new ideas that could be translated into political decisions. On this basis, strategies for increased citizen influence are discussed.

Introduction

The web site **demokratitorget.no** was launched on August 13th, 2003, one month before the Norwegian municipal and regional elections. The web site is the result of cooperation between the municipality of Kristiansand and the counties of Vest- and Aust-Agder. The population of the target area is 262.414[1].

The most important goal of demokratitorget.no is to facilitate increased communication between politicians and citizens through questions and answers as well as exchange of opinions[2].

This paper reports on the use of the discussion forum prior to the municipal and regional election. The web site is still running, but the activity dropped dramatically after the Election Day.

The aim of this research was to find out for what purposes citizens and politicians used the discussion forum. Did they ask questions, provide answers and exchange opinions? Did they discuss issues related to the upcoming election? Did the politicians use the opportunity to promote views of their own parties? Did the forum generate ideas that could later be translated into political decisions?

OECD (OECD 2001) has published a model to show different degrees of citizen involvement and influence on policy-making. Adapted (by me) to municipalities this model contains the following levels of involvement:

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[1] Statistics Norway - 2003

[2] https://www.demokratitorget.no/om%20demokratitorget.aspx (in Norwegian)

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- **Information only.** The municipality produces and delivers information for use by citizens. In this case, there is no interaction between the citizens and the municipality.
- **Consultation.** A two-way communication where the citizens are asked for input on specific issues. The initiative is with the municipality. There is no mechanism to receive and evaluate ideas not relevant to the consultation theme.
- **Participation.** Citizens enter a partnership with the municipality, and participate in the political decision-making. This includes involvement in the process and content of policymaking. It acknowledges equal standing for citizens in setting the agenda, proposing policy options and shaping the policy dialogue - although the responsibility for the final decision or policy formulation rests with the local government. A discussion forum is one possible tool to facilitate such partnership.

The model has been elaborated upon by Westholm (Westholm 2002), who presents case studies to illustrate each level of interaction.

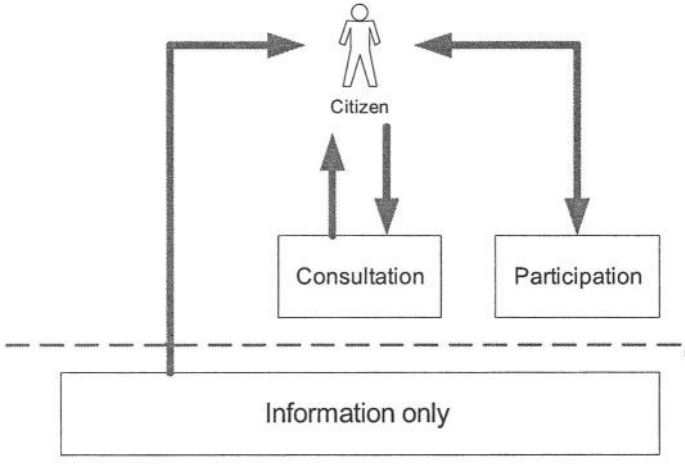

Fig. 1. Levels of interaction.

Related Work

Some researchers have reported on early trials of e-democracy projects related to cities and municipalities. Ranerup (Ranerup 1999; Ranerup 2000) reported on early trials on local government initiated discussion forums in the Swedish cities Göteborg and Sölvesborg. Her work was mostly concerned with how implementation issues, functional features and increased Internet access affected the on-line debate. She also proposed strategies to increase the usage of forums.

One recent paper by Tambouris and Gorilas (Tambouris et al. 2003) evaluated trials of an e-democracy platform used in Barcelona and Brent borough of London. This platform includes an e-forum application as well as tele-voting and tele-consulting.

In Barcelona the city administration distributed information to approximately 30.000 citizens. Only 200 expressed their initial interest and registered for the trials.

Two consultation and two voting (poll) issues were launched every week. The trials consisted of 17 voting issues, 17 consultation issues and one forum. The highest participation rate in one consultation was 34. The Barcelona City Council regarded the input produced by the citizens as extremely positive.

One lesson learned is that it is difficult to achieve a high participation rate. One reason stated is a lack of culture for participation. Another lesson learned is that the application must be very simple to use.

In Brent, 100 carefully selected citizens were chosen from a pool of volunteers. 44 citizens took active part in the trials. The paper gives no indication of this trial being successful, rather a failure, mostly because of the trial taking part during the summer.

The Webocrat (Paralic et al. 2002) system is developed within the EU-funded project Webocracy (IST-1999-20364) "Web Technologies Supporting Direct Participation in Democratic Processes". Webocrat is an open source implementation that provides advanced information retrieval mechanisms, publishing, discussions and polling. It is also possible to create user specific profiles that reflect individual interests. Webocrat also includes an alert mechanism based on either e-mail or a personal newsletter page showing current alerts.

Early trials performed on the Webocrat platform are described in a recent paper by Paralic, Sabol and Mach (Paralic et al. 2003). One trial took place in Wolverhampton, UK from mid-May to late August 2002. Discussions were set up for a number of different topics, and resulted in 72 postings. The site had 3300 visits during the trial period. A second trial took place in Kosice, Slovak Republic. The discussion module was not tested in this trial, but Webocrat received 16 messages requesting information on published documents. There is no information on the number of visits. Both trials were advertised using multiple channels.

The above-mentioned reports do not discuss the actual content of the political discussion forums. Wilhelm (Wilhelm 2000) has done some work on public sounding boards, doing content analysis on several USENET newsgroups. These newsgroups are open and unmoderated, and are not primarily designed to be meeting places for politicians and citizens.

Methodology

Whyte and Macintosh (Whyte et al. 2003) discuss the assessment of quality of deliberation. In their opinion, one of the more obvious characteristics of discussion forums is that 'threads' of conversation is available for analysis. The 'threads' of conversation is visible and contributions are made in the participants' own words. Even if this blurs the conventional distinctions between outcome and process, it makes various kinds of qualitative and quantitative analysis more feasible. They outline the following three analysis approaches: Survey analysis, thread analysis and content analysis.

Survey analysis uses survey questions to ask participants what they think of a discussion, theme or message.

Thread analysis uses quantitative measures to establish what themes are considered the most important by the participators. A large number of comments signal that many participants found the theme worthwhile to comment upon.

Content analysis can be used to summarize the discussions in a discussion forum. It is important that ratings should be assigned impartially, and it should be possible to audit how any particular comments has been rated/classified.

Whyte and Macintosh (Whyte et al. 2001) used a subset of Wilhelm's (Wilhelm 2000) categories to analyse several cases of e-consultation. The following categories were used:

PROVIDE – The comment is solely providing information in the form of facts or opinion.
SEEK – The comment includes evidence of information seeking in the form of queries or open-ended remarks
REPLY – The comment is a reply to a previous contribution.

Since this research aimed to uncover what the pre-election discussion forum was used for, these categories were too general. Therefore, it was necessary to develop another classification scheme based on three attributes: Scope, type and intention.

The scope is used to categorize relevance. Since the discussion forum was used prior to the local and regional election, it is relevant to ask if the discussions were on issues that could be dealt with by the local and regional government.

The three scopes used were:

- **Local** – issues decided upon by local or regional government. This includes issues where the local government has major influence on decisions made by others. A typical example is traffic safety issues, where the Public road administration normally listens to local government priorities.
- **National** – issues decided upon by parliament or national government
- **Other** – issues not decided upon by the political system

One aim of this research was to find out to what degree the discussion forum was used to submit new ideas, ask questions, and raise political issues. Based on the categories used by Whyte and Macintosh (Whyte et al. 2001), a new category IDEA was added:

- **PROVIDE** expresses a political viewpoint or a fact.
- **SEEK** is another way to start a thread. In order to qualify as a question, it must be obvious that an author has a sincere interest in getting answers. Rhetoric questions with the purpose of strengthen own argumentation do not qualify.
- **REPLY** is directly related to questions. If a contribution does not answer the question, it is classified as a PROVIDE.
- **IDEA** implies that the author has come up with an idea or proposal that may be raised as a political issue. In order to qualify as an idea, it must be within the scope of the local government, and be votable.

Another research question was to find out what intention the participants had. Therefore, it was necessary to establish a new set of categories to map intentions. A contribution may have several intentions. One example is a contribution that both introduces facts and gives the opinion of the author. The following intentions were identified:

- **Start debate** is an invitation for others to comment on an issue. In order to qualify, a contribution must ask for comments.
- **Seek information** is used when the author asks for specific information.
- **Introduce facts** is used when the author gives new, verifiable information on an issue
- **Promote party political view** is used if the author is affiliated with a political party, and refers to the viewpoint of the party.

- **Argue against** is used when the author disagrees with an earlier contribution.
- **Support view** is used when the author supports an earlier contribution.
- **Give opinion** is used when the author expresses an opinion that does neither disagree nor support an earlier contribution.

The rationale for including "Argue against" and "Support view" is that these categories give an indication on the "temperature" of the debate. A high number means more divergences between the participants.

Background Statistics

The discussion forum has a hierarchical structure. Every discussion consists of zero or more contributions. A thread is a contribution with added comments. Users may create new discussions and add contributions and comments. 21 different discussions were established during the election campaign period (August 13th to September 15th)., totalling 128 threads.

532 contributions and comments were made during the election campaign period. Politicians (authors identified as elected representatives or candidates) made 319 contributions. Citizens (authors with no known political party affiliation) made 211 contributions. The administrator made two contributions.

106 distinct authors were identified. 53 of these were politicians, 52 were citizens, and the last one was the administrator of the forum.

22 women made 145 contributions. 78 men made 378 contributions. Anonymous users made the rest. Women authored an average number of 6.6 contributions compared to 4.8 contributions for each man.

The most popular discussions were "Municipal and regional politics" (84), "Traffic" (83), "Democracy and Internet" (62), "Youth" (56) and "Education" (48).

This paper analyses three of the most popular discussions: "Traffic", "Youth" and "Education". The discussions were picked since they related to specific issues, and were among the five most popular discussions.

Who Initiated Discussions?

The following table shows who initiated the threads, politicians or citizens:

	Citizens	Politicians
Education	7	5
Traffic	9	9
Youth	2	5
All discussions	55 (33%)	72 (57%)

The following table shows the number of contributions made by each group:

	Citizens	Politicians
Education	16	28
Traffic	40	43
Youth	25	31
All discussions	213 (40%)	319 (60%)

This shows that politicians were the most active group, both to initiate new threads and to submit contributions. This may be explained by the fact that all politicians were asked to take part in the discussions.

Scope

This research was performed on data taken from the final month prior to the local and regional election. It would therefore be natural to expect most discussions to deal with local issues. Still 40% of the contributions dealt with issues outside the control of local politicians. The politicians were just as active debating these issues as they were with local issues.

The table shows the distribution of scope for each of the three conferences:

	Local	National	Other
Education	18	18	10
Traffic	52	20	11
Youth	36	10	9
All three	106	48	30

Type

The discussion forum may be used to ask questions and get answers. The following table shows to what extent the discussion forum was used for this purpose:

	PROVIDE	SEEK	ANSWER	IDEA
Education	32	9	7	0
Traffic	70	6	5	2
Youth	47	4	3	2
All three	150(80%)	19 (10%)	15(8%)	4(2%)

About 10% of all contributions were questions, and 8% was direct answers to questions. These numbers show that the forum is fulfilling its goal of facilitating questions and answers as well as exchange of opinions.

Only four contributions were classified as ideas. Active participation requires citizens to propose policy options. The four ideas presented were “Park and ride”, “City bicycles”, “Housing project for young persons” and an idea to subsidize taxi fares for youth Friday and Saturday nights (for traffic safety reasons).

Intention

One research question was to find out what intentions citizens and politicians had:

Intention	**Education**	**Traffic**	**Youth**	**All three**
Give opinion	12	29	6	47
Support view	4	11	17	32
Promote part political view	13	7	9	29

Argue against	4	12	13	29
Introduce facts	5	15	5	25
Start debate	5	9	6	20
Seek information	7	7	5	19

Most of the contributions were made to exchange political opinions. The number of "Support view" and "Argue against" gives an indication of the temperature of the debate. The discussion "Youth" scores high in this context. Both "Education" and "Traffic" was more of the question/answer/facts debates.

Politicians used the discussion forum to promote the views of their respective parties. Many contributions also introduced facts into the discussions. These contributions were often voluminous, and provided relevant insight to the readers. Facts were in almost all cases provided by politicians.

Discussion

Compared to other reports of political discussion forums, this forum showed that it is possible to get a rather good participation when the forum is used for a specific purpose – in this case as a pre-election discussion forum.

In order to do content analysis, it was necessary to develop a categorization scheme. All contributions of three discussions were analysed using this scheme.

A pre-election discussion forum allows citizens to sound their opinions and ask questions. Politicians answers questions and introduce facts into the debates. They also use the opportunity to promote the views of their respective political parties.

However, a discussion forum gives little influence on politics. Politicians commit to party programs, and these programs are written several months prior to the election. If citizens should have influence, they would need to sound their opinions earlier in the process. The discussion forum could certainly be valuable if the political parties made an effort to coordinate the timing of their program work, and invite the citizens to participate at that time.

The number of ideas that was within the scope of local/regional government and votable, was rather limited. Therefore, this forum did not act as a source for new ideas. One reason may be the lack of structure in discussion forums. Citizens are not asked to submit ideas. More information on the use of the discussion forum to submit ideas would be appropriate.

Future research will try to uncover methods to formalize a process for submitting ideas and comments in such a way that these ideas and comments ends up in the formal political decision making process.

References

1. OECD "Citizens as Partners - Information, Consultation and Public Participation in Policy-making," OECD, Paris.
2. Paralic, J., Sabol, T., and M, M. "First Trials in Webocracy," EGOV 2003, 2003, pp. 69-74.
3. Paralic, J., Sabol, T., and Mach, M. "A System to Support e-Democracy," EGOV 2002, 2002, pp. 288-291.
4. Ranerup, A. "Factors Affecting Discussions in on-line Forums in Local Government," *SIGGROUP Bulletin* (20:2) 1999.

5. Ranerup, A. "On-line Forums as an Arena for Political Discussions," Digital Cities, 2000, pp. 209-223.
6. Tambouris, E., and Gorilas, S. "Evaluation of an E-Democracy Platform for European Cities," EGOV 2003, 2003, pp. 43-48.
7. Westholm, H. "e-Democracy Goes Ahead. The Internet As a Tool for Improving Deliberative Policies," EGOV 2002, 2002, pp. 240-247.
8. Whyte, A., and Macintosh, A. "Education for Citizenship in Scotland: Electronic Consultation Study Evaluation Report," International Teledemocracy Centre, Napier Univ.
9. Whyte, A., and Macintosh., A. "Analysis and Evaluation of E-consultations," *e-Service Journal* (2:1) 2003.
10. Wilhelm, A.G. *Democracy in the Digital Age* Routledge, New York, 2000.
11. Yu, C. C. and Wang, H. I.: Digital Divide in Taiwan: Evidence, Comparisons, and Strategies. Electronic Government, (2004) (forthcoming).

Explaining Successes and Failures of e-Government Implementation with Micropolitics

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Abstract. The enabling potential of IT for reengineering administrative processes and service delivery will not be realized to any greater extent if basic problems of change management are neglected. There are numerous barriers to implementing innovative structures, represented e.g. by strategic deficits, not involved politicians, or organizational resistance. Micropolitics is a promising approach to clarify these issues. This contribution describes a framework based on distinguishing different micropolitical arenas, in each of which a different set of actors play different types of micropolitical games.

1 Introduction

In the process of the informatisation of the public sector, E-Government ushers in a new era of reform, which builds on the changes introduced by New Public Management. In order to perceive the reform opportunities, E-Government has to be put into a wider context. Instead of reducing this term to online access to public services for citizens and enterprises, we start from a broad definition where E-Government is perceived in the light of its enabling potential for innovation in the public sector [1]. Yet after some years of much talk and of massive investments in E-Government, it remains to be seen which of the various types of enabling potential for the modernisation of public administration will bring about success in the sense of innovations which promote effectiveness, efficiency, citizen friendliness and other goals of "good governance". The inability of governments to manage large IT projects has been pointed out as one possible source of implementation failure, which is particular to the public sector [2]. This contribution puts the focus on another important factor which determines success or failure of E-Government projects. It is argued that micropolitical games of actors in several distinct arenas have considerable influence on the outcome of IT-induced innovation in the public sector.

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This approach is part of an ongoing research project "Potentials of E-Government for Organisational Design", which investigates in depth modernization opportunities related to E-Government. With regard to the specific aims and requirements which distinguish the public from the private sector, this research projects seeks to assess the opportunities for reengineering the production and delivery of public services in an age characterised by the ubiquitous accessibility of information, people and IT resources [3]. To achieve its ambitious goals, this project follows a case study approach, putting into focus the instruments and concepts of E-Government at the working level. The main research objective is twofold. We aim to demonstrate organizational potentials for modernising public service production and delivery, but at the same time we investigate factors which hinder the full deployment of these potentials.

2 The Modernizing Potential

In accordance with our broad definition of E-Government as the latest stage of the informatisation of the public sector, we consider a wide range of enabling factors of IT [4]. At the same time, we take into account the astonishing variety of business processes in the public sector. Such processes range on a scale with fully standardized processes at its one end, and entirely open and discretionary processes, at the other. They may involve many actors with conflicting views and interests, and very complex decision-making and bargaining processes [5]. An interesting view on service delivery processes is to construct them simultaneously from the view of a citizen asking for a service and from the view of the service provider(s). Quite as in E-Commerce, this view reveals the importance of pre-service information and process transparency for citizens [6].

3 Micropolitical Arenas

E-Government projects as an organizational and technical innovation can be analysed in different stages. After the stage of "ignition", there is the stage of "concept development", which is followed by the "implementation" stage. Last is the routinisation stage which determines whether new practices become embedded in the daily operations and culture of an organization [7].

In each of these stages, different barriers to innovation can be identified. In a micropolitical perspective, the following barriers are particularly meaningful [8]:

- the framework of existing legislation,
- ICT and the level of use,
- knowledge about ICT in general,
- guidance by managers,
- arrangement of organizational development,
- budgets as an instrument or source of power
- mental doubts and resistance,
- cultural factors, and especially the division of labor between politicians and bureaucrats.

In two case studies under way, we are following the advice of Robey & Boudreau to introduce a "logic of opposition" into the research design of studying organisational consequences of IT [9]. One approach which allows for competing explanations instead of simple causal hypotheses is micropolitics. Describing organisations as "systems of exchange" [10], we use a micropolitical approach to analyse the innovation process of E-Government systems in these two cases. The strategies followed by organisation members to pursue their own interests stand central in this approach. In "systems of exchange" each organisation member (or group of members, called "party") interacts according to a special "logic of action", which results from his or her respective expectations, desires and values.

Referring to the assumptions of micropolitics and to the above-mentioned four stages of innovation we identified different constellations of actors ("arenas") in each phase of innovation: There are four distinct arenas: the arena of ignition, the arena of concept development, the arena of implementation and the arena of routinization. Each arena is characterized by several acting persons or parties, their expectations and interests, and their strategies to influence the results of the discussion.

The result of each arena is the starting point for the next one. To take an example actors in the "arena of ignition" may be political and administration leaders or consultants. Conceivably, the result of the ignition "arena" could be an "E-Government masterplan", which is influenced by those enabling potentials of IT, of which the actors are actually aware. This masterplan becomes then part of the framework for the further development of E-Government, and it will be interpreted and detailed by new actors in the "arena of concept development". The likely outcome will be a significantly different order of priorities by actors in the second arena than in the first. And in the third arena – implementation – similar divergences may again surface.

4 Micropolitical Assumptions and Games

Actors have various possibilities to influence organisational innovation processes by drawing on their respective sources of power. Important sources of power are control of scarce resources, control of knowledge and information, control of technology, control of decision processes, control of boundaries, the ability to use organisational structures, rules, and regulations to one's own advantage, the ability to cope with uncertainty, or even interpersonal alliances, networks, and control of "informal organisation" [11]. In this view, strategic action and power are not confined to management positions, but are of importance to nearly every member of an organisation.

In a social system of exchange, it is impossible not to act in a micropolitical way [12]. As a rule, actual behaviour follows interests, and therefore, micropolitical behaviour is tantamount to normal behaviour. Also conflicts are considered as more or less normal, not being *"... largely the result of misunderstanding, and if people only had more communication, more tolerance, and more patience, many (or all) social problems would disappear."* [13]

The description of organisations as political systems reveals the existence of rules to create and maintain order among their members [11]. "Routine rules" govern the everyday work, e.g. the actual process of decision making or the degree to which formal organisational regulations are accepted. These rules stabilize the working situation by reducing organisational complexity for the individual. Even the way actors re-

act to new ideas – nevertheless invented inside or outside the organisation – is aligned with these routine rules because of the majority actors' strong interest to maintain organisational stability and to preserve their power sources.

Comparing modernisation processes in three German local governments communities, Bogumil and Kissler used a similar approach in order to identify the specific rule sets required for organisational innovation. They distinguish three stages of modernisation [14]: In the stage of rule setting, the political game of maximizing votes is played. In the following stage of rule interpretation, bargaining games dominate, and in the phase of rule implementation, the so-called games of hierarchy are routinely observed.

In the logic of micropolitics, organisational change is equivalent to setting new rules for daily work processes and behaviour, e.g. by reordering or eliminating existing sources of power or installing new ones. To enable "real" transformation processes, so called "innovation rules", have to replace routine rules within the organisation. Such innovation rules are characterized by changes of actors' tactics and strategies, and perhaps the occurrence of new "players" or even the disappearance of established ones. The micropolitical hypothesis holds that an innovation rule system is a necessary condition for organisational change.

Analysing the innovation process of E-Government implementation in a micropolitical perspective, we try to explain whether observed successes or failures of E-Government projects resulted from compliance with "routine rules" or from the creation of new rules by an "innovation game". First results of our two case studies on the local government in Germany already provide interesting insights into the process of innovation in the context of E-Government. They may lead to a refined assessment of the necessity of innovation rules in transformation processes.

References

1. Lenk, Klaus; Traunmüller, Roland: Broadening the Concept of Electronic Government. In: J.E.J Prins (ed.), Designing E-Government, Amsterdam: Kluwer 2001, pp. 63-74.
2. The Hidden Threat to E-Government: Avoiding large government IT failures. OECD Public Management Policy Brief, no.8, March 2001.
3. Lucke Jörn von, Reinermann, Heinrich: E-Government – Gründe und Ziele, In: Reinermann, Heinrich, Lucke, Jörn von (eds.), Electronic Government in Deutschland, , Speyer 2002, pp. 1–19.
4. Petrovic, Otto: Lean Management und informationstechnologische Potentialfaktoren, In: Wirtschaftsinformatik, Vol. 36 (1994), pp. 580–590.
5. Lenk, Klaus: Prozessmodelle für E-Government, In: Kubicek et Al. (Eds.): Innovation @Infrastruktur, Heidelberg 2002, pp. 199–205.
6. Lenk, Klaus: Electronic Service Delivery - A Driver of Public Sector Modernization. In: Information Polity 7 (2002), pp.87-96.
7. Yin, Robert K. et al.: Tinkering with the System: Technological Innovations in State and Local Service, Lexington Mass. 1977.
8. Lucke, Jörn von: Regieren und Verwalten im Informationszeitalter, Berlin 2003
9. Robey, Daniel; Boudreau, Marie-Claude: Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. in: Information Systems Research, Vol. 10, No. 2 June 1999, pp. 167–185.

10. Bacharach, S. B.; Bamberger, P.; Sonnenstuhl, W. J.: The organizational transformation process: the micropolitics of dissonance reduction and the alignment of logics of action, in: Administration Science Quarterly Vol. 41 (1996), pp. 477–506.
11. Morgan, Gareth: Images of Organization, Sage Publications, Newbury Park, London, New Delhi, 1986.
12. Brüggemeier, Martin: Controlling in der öffentlichen Verwaltung, Rainer Hampp Verlag, München und Mering, 1998.
13. Pfeffer, Jeffrey: Understanding Power in Organization, in: California Management Review, Vol. 34 (1992), No. 2, pp. 29–49.
14. Bogumil, Jörg; Kissler, Leo: Verwaltungsmodernisierung als Machtspiel. Zu den heimlichen Logiken kommunaler Modernisierungsprozesse. in: Budäus, D.; Conrad, P.; Schreyögg, G.: Managementforschung 8, Walter de Gruyter Verlag, Berlin New York, 1998, pp. 123–149.

PARMENIDES: Facilitating Democratic Debate

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Abstract. This paper describes PARMENIDES, a system which facilitates structured debate about government policy.

1 The PARMENIDES System

The last two decades have seen a *deliberative turn* in the study of democracy in political philosophy [1]. Prior theories of democracy viewed ordinary citizens as no more than passive consumers of political information and argument, acting only when called upon to vote. In contrast, deliberative theories view citizens as producers of information, engaging as consenting and rational participants in reasoned argument with one another and with their political representatives. Thus, in this view, democracy is not simply a matter of periodic voting: it should also engage governments and the People in a process of continuous debate. Today, with the opportunities provided by the World Wide Web, communication is physically easier than ever before, but the long-standing problems that bedevil the effectiveness of communication remain. To be effective, communication must be clear, unambiguous and structured so that misunderstandings are minimised. In [2] we proposed a structure for persuasive argument that was intended to ease these communication problems, and to promote informed debate. In this paper, we describe a program which exploits this structure, and illustrate it with an example.

We start from an assumption that one party (say, the Government) has proposed an action or course of action, and presents a justification for this proposal to the other party, who may respond. The structure for the interaction between the two parties involves: a clear statement of the justification for an action, which makes explicit all the components of the reasoning underlying the argument; an opportunity to challenge any of the components and any of the inferential links between them; an opportunity for the proponent to respond to these challenges.

Within this dialogue structure, we see the justification for an action as involving the following argument scheme: an understanding of the current situation; a view of the situation which will result from performance of the action; features of the new situation which are considered desirable (the aspects which the action was performed in order to realise); the social goals which are promoted by these features (the reasons why they are desirable).

In [2], we advanced this structure for discussion and identified a number of ways in which it could be attacked. There, we identified fifteen distinct types of attack, several of

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Table 1. Table of Attacks

Attack	Variants	Description
1	2	Disagree with the description of the current situation
2	7	Disagree with the consequences of the proposed action
3	6	Disagree that the desired features are part of the consequences
4	4	Disagree that these features promote the desired value
5	1	Believe the consequences can be realized by some alternative action
6	1	Believe the desired features can be realized through some alternative action
7	1	Believe that an alternative action realizes the desired value
8	1	Believe the action has undesirable side effects which demote the desired value
9	1	Believe the action has undesirable side effects which demote some other value
10	2	Agree that the action should be performed, but for different reasons
11	3	Believe the action will preclude some more desirable action
12	1	Believe the action is impossible
13	2	Believe the circumstances or consequences as described are not possible
14	1	Believe the desired features cannot be realized
15	1	Disagree that the desired value is worth promoting

which had a number of variants according to the extent to which the attacker advanced a positive position in reply. Table 1 shows the attacks and the number of variants.

It is this variety of attacks which causes many of the problems in communication of views when using traditional means of correspondence. Our original intention was to implement a program controlling a computer mediated dialogue, in which the locutions would represent moves implementing the above attacks: this would ensure that each move was unambiguously identified with its intended effect. This program has been successfully implemented in JAVA, but evaluation has shown that, for casual users, many problems remain. Selecting the correct moves to realize a desired attack on a position is a task almost as difficult as correctly phrasing an attack in natural language. Essentially there is too much freedom of expression provided, and hence an overwhelming variety of options to select between. For this reason we have decided that if support is to be given to enable the general public to express their views as cogently as possible, some simpler form of interaction is required. These are exactly the problems encountered by earlier systems which have attempted to support democratic debate and dialogue. We address these usability problems by leading the user through a fixed series of moves; by constraining the choice of the user, the need for the user to understand the underlying model so as to make informed selection of moves is removed. Additionally, wherever possible statements are presented for approval or disapproval, reducing the problems associated with expressing the content of the various locutions. PARMENIDES is intended to realize these objectives.

The idea is to provide a simple web based interface which will guide the user in a structured fashion through a justification of an action giving opportunities to disagree at selected points. Each of these disagreements will represent one of the attacks above, so that the exact nature of the disagreement can be unambiguously identified. The users responses are written to a database so that information of what points of the argument are more strongly supported than others can be gathered. In the program described in this paper, PARMENIDES (Persuasive ARguMENt In DEmocracieS), we focus on

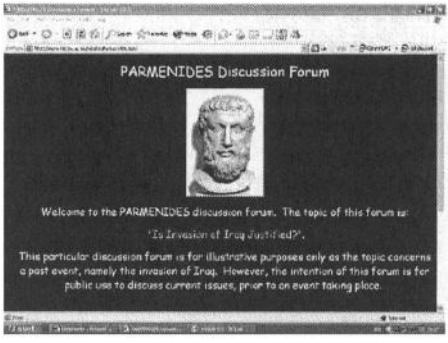

Fig. 1. Introductory screen.

negative criticism of the argument: in future work we will provide a similar interface to allow the construction of positive alternative arguments.

PARMENIDES is implemented using PHP scripts and can be used at `http://www.csc.liv.ac.uk/~katie/Parmenides.html`. The example debate concerns the invasion of Iraq in 2003. The aim of PARMENIDES is to present users with a position justifying a particular action and give them the opportunity to make a number of attacks on that position. We do not realize all of the attacks. Some of the attacks are directed against the soundness of the argument, and we here rely on the proponent of the position to produce only well formed arguments. Thus attacks 12, 13 and 14 are considered unnecessary, since we assume that the states of affairs and actions described are possible. Similarly we ignore attack 3: whether the features are entailed by the consequences is a matter of logic, and we rely on the proponent to produce a sound position. Attacks 7, 8, 9 and 11 involve the proposal of some counter position: here we do not provide facilities to allow the statement of alternative positions, but concentrate on gathering a critique of the original position. Finally we ignore attack 10: this is a subtle matter and required in some domains, but since it does not vitiate the proposed action it is not required here. This leaves six attacks which we wish to allow. After an introductory screen, Figure 1, which takes some information about the user and provides some explanation about the purpose and use of the system, the user is presented with a structured statement of the position to be considered. At this point users can simply accept the argument in which case they are sent to a farewell screen. Otherwise, the user is then lead through a series of forms where they are given the opportunity to agree or disagree with the following elements, which comprise the initial position:

- the social values of the position (Attack 15),
- the promotion of the values by the desired consequences of the proposed action (Attack 4). Here they also have the opportunity to state consequences of the action which they believe compromises the desired value (attack 8),
- the consequences of the proposed action (Attack 2),
- the suggestion of alternative actions to realize the desired consequences (Attack 5).
- the description of the current situation (Attack 1).
- the user is then taken to the exit screen.

The navigation above realizes six of the fifteen attacks possible against a position listed in Table 1. Each of these attacks proposes no positive information, and thus represents the simplest variant where several variants are possible. The six attacks represent a critique of the position proposed: if none of them can be made, then, provided the position is well formed, the position does represent a justification of the proposed action. Of the nine attacks not provided, four challenge the well formedness of the position (which we assume to be in order here), and, apart from the special case of attack 10, which does not dispute the action, the remaining attacks contest the action by developing a justification of an alternative action. We propose that these attacks are best provided by giving an opportunity to continue from the current exit screen, being prompted to extend the information already provided so as to develop a new position.

We are satisfied that PARMENIDES is usable by its target audience, and that it can effectively identify points of disagreement, and record them so that weight of opinion on various issues can be gauged. This is achieved without requiring the user of the system to have any particular familiarity with the underlying model of argument: the attacks are constructed from simple responses without any need for attacks to be explicitly formulated. Using PARMENIDES we can examine the acceptability of various parts of the position. For example, we are able to discriminate between those who support invasion for regime change from those who are concerned with international security. We can distinguish between those who believe that Saddam has no weapons of mass destruction from those who believe that he will disarm without invasion, from those who do not believe that he will use them. From this kind of information it is possible to see which elements of the argument need to be put more persuasively or better justified, and which elements could be emphasized to increase the acceptability of the argument.

The free text elements entered by the user are intended to be considered by a moderator who can consider whether they need to be added to the position. Thus if sufficient respondents see some particular circumstance as relevant it can be added to the list of circumstances displayed: if it is not believed by the moderator this is expressed by giving false as its default. We have envisaged use of PARMENIDES by the Government to justify its policy. A similar system could, however, be used by other bodies, such as pressure groups who could subject their own position to similar public scrutiny. The key advantage of PARMENIDES is that while it is firmly grounded on a model of argument, it does not require the user to understand and use that model; it therefore avoids the many usability problems encountered by previous systems with a similar ambition.

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References

1. J. Bohman and W. Rehg, editors. *Deliberative Democracy: Essays on Reason and Politics.* MIT Press, Cambridge, MA, USA, 1997.
2. K. M. Greenwood, T. J. M. Bench-Capon, and P. McBurney. Structuring dialogue between the People and their representatives. In R. Traunmuller, editor, *Electronic Government (EGOV 2003),* LNCS 2739, pages 55–62, Berlin, 2003. Springer.

e-Government in Australia: A Citizen's Perspective

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Abstract. A representative sample of Australian web sites was investigated for its responsiveness to a request from a citizen, their accessibility, public outreach, privacy and security, among other characteristics. This research study shows that Australian e-government web sites lack a customer orientation, that is, web sites that tailor their services and tools towards the customers' needs. Only a small percentage of web sites provided content in alternative languages (a limitation in a country that is characterised as multicultural), and a great majority of web sites did not respond to a simple e-mail of a citizen. Australian e-government websites are performing very well with almost 96% of all examined websites posting a clear privacy policy. In terms of security 62% of the web sites provided clear statements reassuring a citizen's concern for security.

Introduction

Although the euphoria of the dot com companies have passed, the idea that governments should be more accessible to the people through the Internet has increased. Many governments have already adopted web capabilities and the Internet to conduct their business. Some studies have already been conducted in Australia to examine the progress of online government activities mainly by government agencies and consultants. The research reported in this article was conducted from the perspective of a citizen. The study looks at material that would aid a citizen to find out information or a service if s/he would have a problem or need for a particular benefit.

The research study reported in this paper intends to measure the progress of a sample of 87 Australian electronic government services. The study has been conducted through the analysis of materials and features that have been made available on the Australian government websites. The main objectives of the study are:

(a) To measure the evolution stage of Australian electronic government's service: informational stage, access to downloadable forms stage, transactional stage, and transformation or integration electronic government stage. (b)To measure the extent of accessibility to Australian e-government web sites, in particular if the websites are not deepening inequality amongst some citizens with disabilities. (c) To analyze the availability of materials or features that an average citizen logging onto a public sector website would have. (d) To know how efficiently Australian e-government web sites respond to a citizen's request for information. (e) To know to what extent Australian e-government web sites respond to a citizen's concern regarding security and privacy policy issues.

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Governments have been struggling to find ways in which to serve their citizens in the most effective ways. The American government attempted to reinvent itself during the eighties to improve quality and performance of government activities [1]. Later in the early 2000 the Progressive Policy Institute of the U.S. reported on a number of strategies for change which they called principles for implementing digital government [2].

Australia, considered one of the leaders in the application of information technology to the government sector [3], also introduced a government online strategy in 2000 and continued with the Better Services, Better Government strategy in November 2003 [4]. The Commonwealth's intention is to move from an online phase to an e-government phase. This last phase implies the transformation of government procedures that will allow citizens and businesses to have better services.

All these initiatives regard a citizen as a customer and thus become the central focus in the development of government services and delivery. This new perspective challenges public officers to envision government in a different way [5], as a government that empowers citizens and provides the tool of empowerment on its web sites, namely chat rooms , online meetings, online voting, or at a higher level, virtual democracy.

E-government has been defined broadly as "including the use of all information and communication technologies, from fax machines to wireless palm pilots, to facilitate the daily administration of government [6]". However, the same document notes that the most popular definition of e-government is one that is driven exclusively by the Internet in order to provide citizens with access to services and ultimately to participation. It is this last definition that is entertained in this paper since an analysis of access to participation of citizens in Australia is also included.

There are some specific areas in the e-government delivery that this research is more concerned in. These are the concern for accessibility for people with disabilities and also people not literate in the official language in Australia, that is, English. Other aspects of special concern are security and privacy, information availability, electronic participation, and finally electronic responsiveness of government to citizens.

The concern for accessibility, sometimes addressed as digital divide, has been raised at many levels [7]. The concept of digital divide has been observed at the geographic level, income, race, age, education, and household level [8].

In the United States, government websites have improved very slowly in providing access to information in material other than English. Government websites that provided foreign language translation features in 2000 was only 4%, the following year it increased to 6%, and in year 2002 only increased by one percentage point [9]. In Spain, apart from the Basque region, only 4.4% of the websites offered other languages in the government websites [10]. A survey of Australian government officials at the federal, state, and local level concluded that a great majority of government websites did not cater for people who do not speak English [11].

Another concern of citizens is privacy and security [12]. E-government has created the potential to share information of citizens across different government agencies to provide a better service, however, governments must also put in place guarantees that data ownership remains in the citizens' hands. Citizens do not want personal information to be shared or sold to any third party.

Security has been considered one of the imperatives in e-government because of the amount of information governments handle and the sensitivity of such information [13]. Citizens are afraid that their records or any parts of the transactions on a gov-

ernment web site may be accessible to a third party and that hackers can break into government web sites and steal or alter data [14].

Responsiveness has been identified as one of the key indicators of quality of an online service in the private sector [15, 16]. Hence there is no reason not to believe that this factor could also be important in the delivery of e-government services.

All the previous concerns are addressed in our research study and are the centered pieces in this article.

Methodology

Information was gathered from a sample of Australian government websites using a questionnaire. The researcher logged on to the sample of Australian government websites and conducted a detailed analysis of features available on each of government websites. These features were classified in three types:

Features that would aid an average citizen using a government website. These features could assist or increase ability of citizens to obtain services from government websites. These were (1) the information available to contact a government agency. (2) Features that could assist special populations such as disabled persons and non-English speakers. (3) The visible statements of policies to reassure citizens who worried about privacy and security.

The researcher also registered the number of services provided by the online government department and classified them according to the stage of evolution such as information service only, service in the form of downloadable forms, and transactional services. It should be noted that online transactional services are defined as services for which there is no need for a citizen to go to a physical public office.

The researcher tested government responsiveness to a citizen's request by sending an email of the question "I would like to know the open hours of your organization during the week." and then measuring the time to respond. It was also tested by asking if the online government agency was integrated with other online government departments within and between portfolios.

Data Collection Instrument. The research utilized a structured questionnaire designed by Darrell M. West at Brown University [9] and complemented with a few questions measuring public outreach.

The questionnaire used in the collection of the data included 38 questions. The questions were classified to measure government online services performance in three main categories. (i) information available, (ii) services delivery and (iii) public access. (Questionnaire can be provided on request).

To measure accessibility by disabled people the Bobby approval, W3C tool or Section 508 compliant with text version was applied to the online government web sites. Bobby Approval means that the site has been judged for its disability access by a non-profit group that rates Internet websites for accessibility (http://bobby.watchfire.com [17].

Most questions in the questionnaire were designed as dichotomous close-end question, that is presence or absence of a feature ("yes" or "no"). A few questions required to enumerate the number of transactions offered on a website and to register the number of days for an agency to respond to the citizen's request.

Population. The population in this study comprised 697 Australian government websites. These websites were obtained from http://www.fed.gov.au , the Australian government portal in September 2003 (Channel Development Branch-The National Office for the Information Economy).

These websites were arranged into department and agencies otherwise called portfolios. For a list of the 16 portfolios please go to the Government online directory www.gold.gov.au.

The online addresses of every websites were obtained by accessing different Department's homepage. For example, to choose web sites from the department of agriculture, fishery and forestry the following portal was used: http://www.daff.gov.au. Once in this portal, an index of information and services is offered in the following web page http://www.daff.gov.au/index.cfm.

Sampling Method. A probability sampling design was used to obtain a representative sample from each government portfolio. The sample size obtained with the above sampling method suggested 87 Australian government websites. All the websites were proportionally allocated into an individual portfolio.

After calculated a proportion of sample size in each portfolio, a random sample was selected by using the Blind Draw Method [18].

Results

Status of e-Government in Australia. All of the sampled websites have reached the first stage of evolution, that is, provide information. A great majority (79.3%) also accomplished the second evolutionary stage, that is, provide access to downloadable forms. Of the sample that provided downloadable forms, 48 websites (55.2%) had an online form-submission function and 41 websites (47.1%) provided sufficient help functions such as a help menu and a guideline to complete the questionnaires.

Only a low proportion of e-government websites (6.9%) allow for a complete transaction online. A transaction was considered only when a citizen could obtain the whole service online without need to appear in a government office. Most websites that provided transactional services offered a mechanism for credit card payment and digital signature.

Only seven websites (8%) allowed citizens to use a credit card to complete a transactional service, and only 3 websites of a total 87 websites (3.4%) provided a digital signature access to complete an online transaction.

The majority of the websites that provided for transactions online offered only one service. There was only one website in the sample that provided 9 transactional services. An even lower proportion of e-government websites (2.3%) appear as integrated or in the transformational stage that is, e-government websites that link to other government agencies to provide a more integrative service to a citizen. A caveat is important in this regard. The calculations are based on responses from the web site contacted via email. However, a large percentage (57.5%) did not reply to the email.

In regard to contact details provided to a citizen, most websites indicated their physical location (an address), provided a telephone number and an email address. However, only a small percentage provided information about the office hours of operation (20.7%), and even fewer provided directions for getting to the institution (6.9%), let alone any indications of how to get by public transport (1.1%).

Contact Details on Website. Organization's Address 75.9%. Telephone number 95.4%. Email address 96.6%. Open hours 20.7%. Provided directions for getting to the institution by car 6.9%. Provided directions for getting to the institution by public transport. 1.1 %. There were 56 websites (64.4%) that provided a website map or a website index.

In terms of features that enhance a user's satisfaction in obtaining more effective information, 45 websites (51.7%) provided database information or database tools. All websites (100%) provided publications of some kind, 12 websites (13.8%) provided information in an audio form that citizens could listen to on the website, and 15 websites (17.2%) allowed citizens to watch and listen the information on the website.

To provide more quality of service, the government should inform a user of the waiting time or the estimated waiting time for completing a service so citizens can plan and manage their time efficiently. 13 websites (15%) provided a statement of the estimated waiting time. The rest of the websites (85%) did not provide an estimated time.

Availability and Content of Privacy and Security Policy on Website. 83 websites (95.4%) had an explicit privacy policy on the website. 94.2% (82 websites), explicitly stated that they prohibit commercialisation of data obtained from consumers, or that share any of the citizens' information with a third party without consent. Having said that, 92% of the websites stated they share a citizen's information with a law-enforcement agency.

Only four websites (4.6%) did not record a citizens' site visit such as the visit time and the page accessed, and 22 websites (25.3%) did not send a cookie to a citizen's computer for keeping a record of the web visit. 62% or 54 of the websites provided clear statement reassuring a citizen's concern for security.

Disability, Language Translation, Commercial Advertising and User Fees. Forty six percent of the sampled government websites met the W3C Disability guidelines. This was evaluated by running the e-government website on the http://www.cast.org/bobby.

Around 14% provided alternative language on their web sites and 3.4% had commercial advertising that presumably helped finance their web sites. A small percentage of e-government web sites (5.7%) require users to pay an extra fee for conducting services online.

Cross tabulation analysis (X2 [15] = 23.605, P = 0.072) indicates there is statistical significant relationship between portfolio and the Bobby approval. Both the Family and Community Services portfolio and the Prime minister portfolio complied 100% with the disability approval. In a third place followed the Attorney general portfolio with 83.3% of the sample and farther down the Transport and Immigration and Cultural portfolios with 66.7%.

Public Outreach. This section examines to what extent e-government websites extend their reach through a number of features. Only 18.4% of e-government web sites allow citizens to post comments or invite users to participate in discussions through bulleting boards, guest book, or user surveys. An even smaller percentage (3.4%) provides opportunities for citizens to dialogue or express their opinions. There are even fewer e-government websites (2.3%) that allow citizens to vote or to take part in a consultative referendum or hearings. The most common outreach mechanism used

by some e-government web sites (24.1%) was the newsletter and notifications via email.

None of the e-government websites that were surveyed offered the possibility to personalise the web site.

Only 14 websites (16%) clearly separated information according to different user's requirement, for example professionals, students, parents. Eight websites seemed to provide separate information for different user's requirement although there was not a clear label such as the previously cited. The remaining 65 websites (75%) did not categorize information according to different users' requirements.

The Turnaround Time for an e-Mail Response. Forty five websites (53.5%) responded in the same day to the researcher's simple email about office hours, 7 websites (8.3%) responded in the 2nd day, two websites (2.4%) responded after 4 days, almost 31% never responded and 4 websites (4.8%) did not allow a citizen to send an email or make an online contact with the government agency.

A cross tabulation between responsiveness and portfolio indicates statistically significant differences (Chi-Square's result (df=15) = 74.267, P = 0.102). More noticeable is the Family and Community Services portfolio with 75 % of web sites contacted that never responded, and 25% who replied to the email after 4 days. Only about 50% of the websites responded to the simple question related to business office hours in the following portfolios: Employment and Workplace Relations, Foreign Affairs and Trade, and the Prime Minister and Cabinet replied. In the majority of the cases e-government web sites never replied.

In regard to the second question posed to the sampled web sites, that is, whether they were integrated across portfolios to offer a seamless service to citizens, the reply rate was a mere 42%.

Discussion

At the core of the concept of public outreach is the intention that more citizens will participate in the governing processes of governments. Many have envisioned that internet technology would enhance democracy by permitting citizens to provide comments, allow for deliberation, and perhaps reduce the political intermediaries [1, 19]. This study shows that e-government in Australia is still far from reaching citizens, let alone involving them in discussions or a dialogue. A mere 3.4% allowed opportunities for dialogue on features like chat rooms, although an 18% provided area to post comments. The results are very similar to studies conducted by Brown University that concluded that of 1, 813 websites analyzed in the United States, only 1% provided chat rooms, 15% allowed for comments and 0% allowed for personalization [9]. Similar conclusions were arrived at from a survey of 55 of the most populous cities in the United States (Tat-Kai Ho 2002). The lack of possibilities for citizens to participate run contrary to one of the important reasons to visit a government website [20]. The study indicated that 32% of those that visited a government Web site in the state of Georgia, the United States, did so with the intention to express an opinion or to make a complaint (16%).

It is noted elsewhere that despite all the progress on e-government, out of 173 of the United nations' 191 members that operated websites in 2003, only 15 governments in the world accept Internet comment on public policy issues[21].

Clearly, governments online have concentrated their efforts to offer services in the first two stages of e-government development and have paid little attention to the highest one that is virtual democracy. Having said that, the development does not need to be linear. Governments could be developing transactional services and at the same time provide for more participatory features on the their web sites.

When we add to the above information the fact that only about 14% of the Australian e-government web sites provide language translation or alternative languages in a country that is characterized as multi cultural, one can strongly conclude that e-government websites in Australia with reference to public outreach leaves a lot to be desired. Government agencies should realize that increasing online participation for democratic purposes can generate a new spirit of transparency about governments, therefore providing and creative incentives for citizens to participate online should boost public trust.

In respect to testing for disability access, less than half of the sampled e-government websites passed the W3C disability guidelines or Bobby approval. The percentage in Australia is substantially higher than electronic government web sites reported in the United States with only 28% of some form of disability access. Notwithstanding the comparison, Australian e-government web sites may be marginalizing some part of the population that is operating in contexts very different from the web site developer. That is, some people may not be able to see, hear, move, or may not be able to process some types of information easily or at all. Both language and disability, can jeopardize evolution of e-democracy. If some people are marginalized because they cannot read or express themselves or provide input to government, it is possible that the government agenda will be biased and moved by a small elite.

The results obtained in this research study in regard to the level of evolution among e-government web sites seem to differ substantially from other reports. For example, a study conducted by [22] found that 43% of Australian government websites offered online services. An online service was defined as a transaction that was carried out fully online. The difference between this and the American study may be due to the sample size and sample selection. In West's study, a sample of 1,197 was taken to represent 198 countries. If a simple equal distribution of the sample is performed (1, 197 / 198) among countries, the country sample could be 6.

According to a report based on information reported by 131 Australian government agencies online conducted by the National Office of the Information Economy (NOIE) in 2001, indicates that of 1,474 externally directed services (that is, services to citizens and businesses) 20% were transactional [23] and 10% were integrated either in information or transactional services. A transactional service was described as a service that involves an exchange of information between an agency and an individual Internet user. This definition differs from West's study that guided the present research. A service is deemed to be a transaction that occurs completely online. Services are assumed to provide features where citizens or businesses apply for online and receive a product or benefit in return [9].

When services require payment, Australian e-government websites do not provide, in a majority of the cases, payment facilities. The percentage of government websites that allows payment with credit card and have provided a digital signature were 8% and 3.4% respectively. These features could facilitate user to complete the transactional service online without travelling to the government agencies. Digital signatures help government agencies to identify a user and ensure that they are servicing the

right person. Hence, perhaps the low number of transactional services encountered among e-government websites.

A more recent consultancy study that analysed e-government benefits in Australia based on reports from 38 government agencies seems to corroborate the results advanced in this research. The consultants concluded: "the services provided to date have tended to be relatively simple (immature) and have tended to be characterised by information provision and downloadable forms rather than complex interactions [24]:3)".

It is apparent that level of e-government services may be misinterpreted and can be biased. Regardless of the biases present, one must realize that a transition to more mature e-government services require increasing the complexity and infrastructure in several dimension namely, inclusion of authentication procedures, provision of secure web sites, payment facilities, automated processes and increase agency collaboration and infrastructure. As indicated in this study, many of the sampled web sites do not have these facilities therefore it is difficult to believe they have achieved a more mature level of development.

Government agencies must bear in mind that perhaps not all government agencies online need the same level of sophistication or even offer transactional services.

Without doubt Australian government agencies have progressed consistently towards the objective of providing all appropriate services online by January 2002 [23], however, they have not reached the mature stage in these services yet.

The results in this study with regard to a citizen-centred view of services provision indicate that Australian e-government web sites are still far from having a customer orientation. For example, the data in this study demonstrate that very few e-government websites provide the opportunity to personalize the web site, something that commercial web sites are increasingly applying to improve customer satisfaction. We also observe from the data that most e-government websites do not target information according to the needs of the different segments, and they are more organized about their own organizational structure. An exemption to the previous comment is the Australian government portal www.fed.gov.au that does provide target information according to different publics' needs, namely, students, individuals, businesses, non-residents. This conclusion is line with results from the survey of 38 Australian government agencies conducted by external consultants for NOIE (DMR 2003).

Further evidence of an agency-centred view is the lack of responsiveness on the part of e-government agencies. It is worrisome to observe the response rate to a simple email question, and more so when one realizes that two of these portfolios Family and Community Services and Employment and Workplace Relations are departments from which citizens obtain several services. Results from the survey in the United States indicate that the response rate is very similar to that achieved in Australia. Only 55 percent replied in the U.S. with an average of 35 % responding within a single day. In this last indicator Australia fares much better with 53% response in the same day (West 2002a).

These percentages reflect that technology does not necessarily accompany attitude and that government agencies regardless of IT development may still preserve the aloofness manifested sometimes in their branches. It is surprising notwithstanding that government agencies do not realize that increasingly, citizens demand easier access to services and at the same time a 24-hour service 7-days a week. A study cited by Steve Clift indicates that seven out of eight Canadian citizens expect a surface mail reply within two weeks, but when it comes to an email, 90 percent of citizens expect it

within four hours [25]. Another study published by the Congress Online Project reports that American citizens are increasingly upset by the low responsiveness of their congress representatives towards e-mails [26].

If the reasons citizens go to a government web site are similar to the reasons behind going to a branch, then one could agree that consumers expect to have their problems solved there and then. The results in this study imply that while the web and the e-government web sites support meaningful two-way communication, the realization of that potential among Australian e-government websites is a long way off.

Consideration of data security and protection of individual privacy are assuming increasing importance [27], and without doubt two of the main citizens' concerns in the United States and the world [25].

Australian e-government websites are performing very well with almost 96% of all examined websites posting a clear privacy policy. Most Australian e-government websites prohibit explicitly the commercialisation of data obtained from citizens, and it is only in one specific instance that government agencies exchange information with another namely, law-enforcement agencies.

Security is still a major concern among citizens therefore e-government websites must make it clear the steps they take in order to insure security. Every now and then citizens may need to access their personal data collected by government agencies. For example a citizen may need to update the income and asset entries in order to claim certain benefits. These changes will require a secure computer-mediated environment that guarantees users that they are the only ones, after a process of authentication, that can manipulate data in the first place, and secondly, that nobody else will have access (infiltrate) to that particular environment that may capture the data for fraudulent purposes.

62% of the web sites provided clear statements reassuring a citizen's concern for security. It may be obvious to say that the more security is available the more possible it will be to provide more sophisticated transactions and complete solution-based services by offering electronic signatures and data integrity, and encryption.

In relation to security and privacy, Australian government web sites are performing much better than American counterparts. In a State and Federal e-government report, West noted that 34% of web sites had a visible security policy, up from an 18% the previous year (West, 2002a).

Conclusions

Even though Australian e-government websites compare well in general with one of the most advanced countries like the United States, there is still plenty of room for improvement. This research study shows that Australian e-government web sites lack a customer orientation, that is, web sites that tailor their services and tools towards the customers' needs.

Although specific features of Internet technology have proved successful and useful for private companies such as personalization and interactivity, Australian e-government websites are not using them much to communicate and provide space for a dialogue with the citizens.

In relation to responsiveness, government websites need to be more responsive to citizens. It is critical to communicate with consumers especially online where the expectation is that consumers will receive a response within 24 hours.

Finally, a multi-cultural country as Australia should provide more opportunities to segments of the population that do not have a good command of English, alternative languages will prove useful.

Perhaps an important aspect to investigate is the perception of the responsiveness of government and how that perception will affect the use of government services. From this study, the overall conclusion is that although the Internet and its technology can expedite communication, technology applied by government will not necessarily expedite responsiveness to citizen's requests.

This study echoes the conclusion of one of the American e-government scholar: "Agencies are still in the process of putting basic information on the web and institutionalising secure methods and authentication so that web-based payments become possible and personal, documents, such as social security benefit information and tax files, can be transmitted safely over the Internet (Fountain 2001:201)".

It also appears that what was an expectation among the European private sector that it would be the government that will set the example of e-commerce, now only 32% believe the government has acted in this capacity [28]. It is more common to see businesses making use of more sophistication online than governments. Will governments adapt?

References

1. Tat-Kei Ho, A., *Reinventing local governments and the e-government initiative.* Public Administration Review, 2002. **62**(4): p. 434–445.
2. Hyde, A.C., *If there must be one, let it be Bill Gates.* The Public Manager, 2000. **29**(1): p. 61-62.
3. Crowe, D., *Australia lags e-government leaders,* in *Australasian Business Intellig.* 2003.
4. (NOIE), N.O.o.t.I.E., *Integrated services.* 2004, NOIE.
5. Osborne, D. and T. Gaebler, *Reinventing government. How the entrepreneurial spirit is transforming the public sector.* 1992, reading, MA: Addison-Wesley.
6. Moon, J., *The evolution of e-government among municipalities: rhetoric or reality?* Public Administration Review, 2002. **62**(4): p. 424-434.
7. OECD, *OECD Communications Outlook .The International Digital Divide.* Information Society, 2001. **1**(5).
8. Bucy, E., *Social Access to the Internet.* Press/Politics, 2000. **5**(1): p. 50-61.
9. West, D., *State and Federal E-government in the United States, 2002.* 2002a, Brown University.
10. Criado, J.L. and M.C. Ramilo, *E-government: An analysis of website orientation to the citizens in Spanish municipalities.* International Journal of Public Sector Management, 2003. **16**(3): p. 191-218.
11. Teicher, J., O. Hughes, and N. Dow, *E-government: a new route to public sector quality.* Managing Service Quality, 2002. **12**(6): p. 384-393.
12. Friedman, B., P.H. Khan, and D.C. howe, *Trust Online.* Communications of the ACM, 2000. **43**(12): p. 34-40.
13. Attal, J., *The e-government imperative,* in *Government Procurement.* 2002.
14. Annonymous, *The new e-government equation: Ease, engagement, privacy, and protection.* 2003, The Council for Excellence in Government.
15. Griffith, D.A. and R.A. Krampf, *An examination of the Web based strategies of the top 100 U.S. retailers.* Journal of Marketing Theory and Practice, 1998. **6**(3): p. 12-23.

16. Zeithaml, V., A. Parasuraman, and A. Malhotra, *Service quality delivery through Web sites: A critical review of extant knowledge.* Academy of Marketing Science, 2002. **30**(4): p. 362-376.
17. Chisholm, W., G. Vanderheiden, and i. Jacobs, *Web Content Accessibility Guidelines 1.0.* 1999, W3C.
18. Burns, A.C. and R.F. Bush, *Marketing Research: Online Research Applications.* 2003, New jersey: Pearson Education.
19. Moore, R., *Democracy and Cyberspace. Digital democracy: discourse and decision making in the information age,* D.B. Loader, Editor. 1999, Routledge: London. p. 39-62.
20. Thomas, J.C. and G. Streib, *The new face of government: citizen-initiated contacts in the era of e-government.* J. of Public Administr. Research & Theory, 2003. **13**(1): p. 83-112.
21. Swartz, N., *E-Government around the world.* Information management Journal, 2004. **38**(1): p. 12-13.
22. West, D., *Global e-government 2002.* 2002b, Brown University.
23. (NOIE), N.O.o.t.I.E., *Government online survey results-round 4.* 2001, NOIE.
24. DMR, C., *The e-government benefits study.* 2002, NOEI: Canberra.
25. Noble, P. and A. Brack, *E-democracy around the world: A survey for the Bertelsmann Foundation.* 2001: South Carolina.
26. Congress Online Project, C.
27. Accenture, *egovernment leadership - realizing the vision.* 2002.
28. Accenture, egovernment, the commitment continues. 2001.

Towards a Privacy Audit Programmes Comparison Framework

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Abstract. An essential aspect of every e-governmental environment is the privacy of data handled by public administration bodies using electronic means. In order to audit the privacy compliance of data processors with data protection regime, various data protection bodies have developed appropriate practices, methods and methodologies. Unfortunately, the scene for privacy audits is far from being idyllic. The goal of this paper is to present the audit approaches adopted by various data protection bodies in public administration domain, provide a detailed review and set criteria useful to create a comparative framework for these approaches. The criteria forming the framework have been selected according to key findings of a research conducted by auditors of Hellenic Data Protection Authority (HDPA).

1 Introduction

The growth of the Internet and the eGovernment, and eBusiness applications has dramatically increased the amount of personal information collected about individuals by corporations and the governments. In order to face privacy invasion, many countries have adopted laws that protect individuals' privacy (e.g. EU Directives no.95/46, 58/2002). In most countries with an omnibus data protection or privacy act, there is also a governmental official or agency that oversees enforcement of the act [1]. Irrespective of its powers, any data protection body should employ suitable mechanisms and tools for overseeing compliance with data protection regime. Furthermore, it should empower citizens to electronically confirm privacy compliance using electronic means. Privacy audit programmes is the most widely used mechanism for this purpose. Due to its recent emergence, privacy audit has not gained much attention from governments around the world. As a result there are not well-established methodologies. Various privacy bodies adopt different approaches to privacy audit process. In addition, existed privacy audit practices and methods usually do not take into account web-based transactions.

On June of 2003, Hellenic Data Protection Authority (HDPA) recognized the need to develop a privacy programme for carrying out law compliance inspections. The first step realized towards a new privacy audit programme, was the identification of the privacy audit approaches adopted by privacy bodies around the world. For this reason, a questionnaire was sent to 15, within EU, countries. Six of them answered to the initial call. It should be noted that a previous research conducted among EU countries [2], displays areas of interest similar

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to the HDPA's one[1] . It is interesting that some of the HDPA's research key findings have also confirmed by [2]. Input from countries outside EU was collected via their Internet sites. The research involves the following countries: Greece, the Netherlands, United Kingdom, Australia, Finland and Sweden. The results of the research are presented in this paper.

2 Key Findings of the Research

Having collected the answers, HDPA's auditors studied the different approaches and made some observations. The main results of this preliminary study are:

1) With regards to the adoption of a privacy audit methodology, countries have been divided in two major categories[2]: a) those not adopted a privacy audit methodology but they use questionnaires to identify the risk involved in every day to day organizational practices; and b) those adopted a privacy audit methodology.
2) Although parts of the applied methodologies have obviously been influenced by standards (BS 7799 [3]), no one has explicitly referred a standard in mind, among those with a selected methodology, when designed the audit methodology. There are guidelines announced by EU and organizations (e.g. ISACA, OECD), evaluation criteria (e.g. TCSEC, ITSEC, Common Criteria), international internal audit standards (e.g. COSO [4], AICPA [5]) and security management standards (e.g. BS7799, ISO) that have been neglected when designing methodologies.
3) With respect to the philosophy of audit process, two major categories identified: a) "black box" approaches an/or practices (e.g. Greece, Sweden) which focus on personal data life cycle (collection → processing → transmission → destruction) as depicted in most data protection regimes; and b) process driven methodologies which focus on the structure of business processes and procedures. These methodologies, except from obligations posed by the law, try to evaluate the risk involved in processing of personal data during day to day operation of audited organizations.
4) In general, no specific provisions are held by privacy bodies with regards to Internet and on line services. Some of them have documented special controls for EDP systems, but they fail to identify special online privacy issues such as cookies, on line advertisements, web bugs, on line profiles, program downloading etc.

At this point, the presentation of most important findings of applied privacy audit approaches review has been completed. In the consequence, the results of this preliminary study have been examined in order to extract criteria for evaluating applied programmes followed by privacy bodies in public administration. These criteria are presented in the next paragraph.

3 Towards a Comparative Privacy Audit Framework

The observations presented during the previous section, are useful for specifying the requirements from a good privacy audit programme. These include:

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[1] Although [2] focused on complaints resolution, few areas of interest intersected these two researches. Whenever this is the case, we will note this fact.

[2] This has been also confirmed by [2].

1) Methodology vs best practices. The major advantages of best practices, against privacy audit methodologies, are: a) they are less time consuming; and b) they are easy to understand. On the other hand, methodologies are: a) easily standardized, b) based on scientific foundations; and c) prune to audit risk minimization.
2) Standardization. There are five different levels of abstraction involved in every privacy audit: Business process level, Process level, Application level,Data storage level, Information infrastructure level. There are widely accepted standards, including those referred at section 3, for every level of abstraction.
3) Philosophy of privacy audit approach. By their nature, laws consider organizations as "black boxes". Although laws impose obligations on input and output procedures, they do not on the internal processing of data by the black box. As a result, a good privacy programme should take into account both "black box" and process oriented techniques.
4) Lawyers vs computer experts. It is the authors' point of view that inter-disciplinary skills from these professions are needed to carry out a privacy audit.
5) On line services criteria. These practices should include special Internet privacy issues, including those presented in section 3, not provided by traditional audit methodologies.
6) Assurance levels. It is the authors' point of view that the identification of assurance levels of auditing is flexible strategy to manage audit resources.
7) Self-assessments. As explained during the previous paragraph, self-assessments are good for organizations because they prepare them for the forthcoming privacy audit.
8) Computer Aided Privacy Audits. In order to perform the audit, auditors should assisted by automated tools. Typical examples of computer aided privacy and risk analysis methodologies are [6], [7].
9) On line privacy seals. At the 21st International Data Protection Commissioners' Conference, the Commissioners agreed that there was a need to act in unison to address online data protection issues in light of the global nature of the Web. It was felt that a preliminary assessment of the major Web seal programs would be a useful contribution to the global debate over online privacy [8].

Having described the basic criteria, a table constructed depicting the respondent countries' privacy programmes with these criteria (see Table 1). Wherever 'No' is filled, this means that the selected country approach does not satisfy the criterion while 'mix' means a combination of the values described in the criterion.

Table 1. Review of applied privacy audit methodologies.

Country / Criteria	Greece	Netherlands	U.K	Australia	Sweden
Methodology based	No	Yes	Yes	Yes	No
Use of standards	No	No	No	No	No
Philosophy	Black box	process	mix	mix	Black box
Lawyers/computer experts	mix	lawyers	lawyers	Computer experts	mix
Online criteria	No	No	No	Yes	No
Assurance levels	No	No	No	No	No
Self-assessments	No	Yes	Yes	Yes	No
CAAT	No	No	No	No	No
Privacy seal	No	No	No	No	No

4 Conclusions

HDPA intend to use the aforementioned criteria in order to evaluate existent privacy audit programmes and decide which one will use as a guide. In order to achieve this, a number of open for further research issues, not covered by this paper, should be considered:

1. Some criteria involve parameters which should be further considered. For example, the formulation of "assurance levels" is not a trivial task because it depends on selected variables.
2. Staffing issues and the relationships with private sector external auditors and/or consultancy-audit firms may affect the adopted methodology. For example, if a privacy body decides to outsource technical audit, the need for computer experts is minimized.
3. Every criterion should be labeled with a weight corresponding to the significance to the overall evaluation of predefined privacy audit approaches. Criteria weights should be calculated according to appropriate scientific methods.

The above open issues are typical examples of those not yet answered by the staff of HDPA. The evolution of a new privacy methodology is an ongoing, time consuming process and every step forward should be made under thorough preparation and carefully design. Within this context, the privacy audit review and the specified criteria constitute the first but critical step towards a new privacy programme.

References

1. Electronic Privacy Information Center, "Privacy & Human Rights: An International survey of privacy laws and developments", EPIC-Privacy international, 2002.
2. "Information on the powers of European Data Protection Authorities (DPA) concerning requests for information put to a controller, complaints, audits and sanctions, and on their implementation", V International Complaints Handling Workshop, Dublin, 14-15 March 2002.
3. "BS7799-1: 2000 Information security management – Part 1: Code of practice for information security management", British Standards Institution, 2000.
4. The Committee of Sponsoring Organizations of the Treadway Commission (http://www.coo.gr).
5. American Institute of Certified Public Accountants, Inc. and Canadian Institute of Chartered Accountants, "Suitable Trust Services Criteria and Illustrations Suitable Trust Services Criteria and Illustrations for Security, Availability, Processing Integrity, Online Privacy, and Confidentiality", 2003.
6. UK Central Computer and Telecommunications Agency, "CCTA Risk Analysis and Management Method: User Manual", HMSO, Version 3.0, London, 1996.
7. "COBRA™", C&A Systems Security Ltd, 1991.
8. Cavoukian A., Crompton M., "Web Seals: A Review of Online Privacy Programs", 22nd International Conference on Privacy and Personal Data Protection, 2000.

Trust in e-Government Cooperation

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Abstract. The past years a general acceptance emerges that the real added value of e-government developments should be realized in chain integration and network cooperation rather than within separate government organizations. The focus of research is shifting towards the conditions under which network cooperation can arise and prosper. In this article we examine the role that trust plays between potential network partners while creating network cooperation. This is done in a case study about a successful, inter-organizational ICT solution in the Dutch social security sector. The case suggests lines of action that might help other governments to succeed in realizing E-government network cooperation.

Towards a Copernican Change in the e-Government Approaches

Scientific research and government attention were in the early years of e-government development primarily focused on ICT-developments within separate government institutions. Soon however individual governments were confronted with high ICT investments that did not meet the expectations of high added value to citizens on a local level. Because public issues are broader than the boundaries of individual organizations, fragmented ICT (of individual organizations) can only partially lead to solutions. This becomes even more clear now social problems are more complex and dynamic. To solve these social problems E-government has to trespass the borders of the individual organization. The perspective from a single public organization should therefore be replaced by the perspective from the social problem at hand. In stead of putting the earth in the center of our universe we should put the sun in the center. By changing this perspective Copernicus helped the world into the age of enlightenment and on track to the modern societies we are part of today. By effectively using shared services, shared databases, information standards and information resources a revolutionary progress can be noticed as a long list of examples show by now. No wonder that the attention of the scientific world is also attracted towards the role of networks and the way they support social and technological developments.

Government Characteristics Complicate Network Cooperation

Although the chain, or network, perspective at E-government appears to be attractive to many, realizing cooperation in government production chains or networks is a

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different ball game. The system of government in most countries is such that the protection of the autonomy of individual government bodies is very strong. Because each one has a legal monopoly in its designated functional or geographical domain, they do not know strong incentives to cooperate. They are rather encouraged to stick to their domain borders and to prevent other government organizations to interfere in their affairs. Most cooperation initiatives in the field of e-government have for that reason to deal with the fact that often none of the government organizations in the network has enough influence to enforce the required sharing of autonomy or the cooperation around a certain social theme. This means that cooperation within a chain or network requires both long and tiresome negotiations and considerable compromises to the initial aims. Network cooperation processes therefore rarely seem to be rational, know a high failure rate and the benefits often do not exceed the costs. There are only a few possibilities to speed up network cooperation:

1. Central government intervenes; This happens often by proclaiming new laws and regulations, by changing the (system of) financial incentives or by taking up the steering wheel themselves (centralization). Central governments are in general however very cautious to use their legal authority to breech autonomy of other government institutions. Most of them have learned from previous experiences that enforced cooperation between government agencies has a high failure risk. They rather see that cooperation emerges naturally between chain partners.
2. Chain partners trust each other enough to cooperate without an external incentive. They share the same values and beliefs. They are open enough to each other's needs and do not threat each others existence. Trust is the key in such thinking.
3. A strong external incentive forces chain partners to cooperate. There are many examples that, when a crisis emerges, partners - even in government and politics - are reluctant to overcome their differences and close the lines against a common enemy. A great example of a crisis, that lead to autonomy sharing in the field of e-government, is the recent integration of intelligence services in the United States due to the 911 events. The external incentive may often as well be the reason for central government to intervene.

Since options 1 and 3 are never the first choices to make when looking for network cooperation, the real challenge in e-government is to create sincere trust between potential network partners (option 2).

Trust in the RINIS Network

If trust is essential for breakthrough e-government we have to learn how trust can be created to realize inter-organizational ICT solutions. In this paragraph we explore the role of trust in the realization of a successful ICT solution in de social security sector, the Dutch RINIS network. RINIS is short for Institute for the Routing of (Inter)National Information Streams. In the beginning of the 1990s, it was felt within various organizations in the field of social security that it was necessary to facilitate the exchange of information in order to fight fraud. The Dutch social security sector suffered from a considerable amount of fragmentation between institutions and was therefore not capable to act effectively against misuse of collective provisions by citizens. While client information was not shared between parties, the sector as a

whole could not generate information necessary to trace fraud. For example: a citizen could at the same time get an unemployment benefit of one organization and be registered as employed at another organization. Although the partners in the field subscribed the need for joint action, the risk of losing power restrained partners from actually working together. They feared a weaker position. A breakthrough was caused by a small group of chief executive officers[1], who believed in cooperation and trusted the others not to act opportunistic. These managers were long time acquaintances, dating back to former employment relations. They had positive experiences in working together. They shared the same values and knew the competences and reputation of the other. They developed in just a few evenings of brainstorming the idea of inter-organizational exchange of information in order to fight fraud: the RINIS initiative was born. RINIS was developed resting on four pillars: (1) the use of authentic sources of information, (2) the RINIS architecture of exchange of information between parties, (3) the RINIS organization, which authorizes information exchanges and (4) the use of standardization in data communication. From the start RINIS proved to be a successful ICT solution, which contributed to a considerable reduction of abuse of community provisions. Executive organizations were able to check clients' information before deciding on their request for a benefit. It became almost impossible to obtain a benefit on false grounds. At the same time the benefits for the participating organizations were considerable. They were able to fulfill their tasks more effective en efficient: Effective because they had the information to take the right decision and efficient because due to the use of ICT they could handle more cases with the same capacity. The mutual trust between initiators grew and the collaboration became more intensive. At the same time the success of RINIS attracted other organizations to participate. Their trust in the RINIS network was based upon various factors:

- RINIS had a *good reputation.* Initial successes led to the fact that a common believe and trust in the institute emerged.
- The *independent role* of RINIS. The institute is an independent foundation and this contributed to the faith that the institute would not favor one network partner above another.
- The experiences with RINIS showed that *risks* for organizations *were limited;* there was no big loss of autonomy and the investments were minimal. For example: every participating sector is free to determine its own system for routing messages within the sector. Exchange takes place via a reference index.
- The *equality ofparties* within the network. One of the initiators of RINIS said during one of the interviews we conducted for the case study: 'if the Ministry of Internal Affairs would have had a dominant position in the network, the whole project would probably have failed. The executive organizations would not accept a determined influence of the Ministry. The network would suffer from distrust between parties and decisions would not or wearisome been made'.
- The *conditions* for participating are *clear.* The concept is simple and agreements are transparent. With other words: the partners know what they can expect. They trust not to be confronted with unforeseen facts.

[1] Involved were the chief executive officers of three executive organizations: the Social Insurance Bank, the Industrial Insurance Boards and the TICA (an umbrella organization).

The RINIS network has gradually grown to be an internationally accepted best practice of information exchange between partners in social security, in spite of the modest ambitions compared to social security information exchange networks in other countries (e.g. the Belgium Cross Road Bank). Although the reach of the initiative was small in the beginning, the cooperation was so successful that it grew rapidly. The example they set and the transitional effect of trust in the network gained the faith of other potential stakeholders. Now also health care organizations, the judicial sector and the educational sector cooperate in RINIS. The mission of RINIS, that started as supporting the fight against social security fraud, is now broadened to support a wide range of public tasks. Central government announced recently to institutionalize parts of the initiative by introducing a law to create a general citizen service number. This number makes it easier for government agencies to connect each others registrations and to exchange information.

Analysis and Conclusions

The RINIS case is a typical example of a bottom up initiative to profit from network cooperation. The case shows us that trust can make the difference between the establishment of successful information sharing solutions in networks or no coopera-tion at all. Whereas the partners of the social security sector for years were not willing to cooperate, a small group of managers with a high degree of mutual trust succeeded in initiating and implementing an information network. The role of central govern-ment is in the RINIS case one of institutionalizing cooperation after the cooperation has been established bottom up. The case study supports the assumption that there is a natural growth path towards mutual trust. This path exists of the following phases, comparable to the cycle people go through when they choose a life partner:

- Acquaintance phase (getting to know each other, discovering if potential partners share the same values);
- Courtship phase (learning more about each other by doing projects together);
- Commitment phase (doing the vow: formalizing and broadcasting the cooperation, institutionalizing parts of the cooperation);
- Interdependencies phase (high transaction costs prevent partners to quit the cooperation);
- Integration phase (original identity becomes less meaningful).

The growth path assumption, or courtship model as we call it, can help potential network partners to grow trust among each other. Although some phases can be accelerated, bottom up cooperation is most of the cases a gradual process, that takes time and long term commitment. It might however be sometimes the only road towards successful E-government cooperation.

Securing e-Government

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Abstract. This paper is engaged in research in security, peculiarities and implementations of security requirements within governmental structures. Based on three interaction points (citizen to government C2G, government to government G2G and government to citizen G2C) appropriate examples were chosen, security implementations analyzed and special attributes investigated. It points out some restrictions and difficulties while building up a secure public system.

1 Introduction

One aim of E-Government is to make the co-operation between citizens and authorities as easy and effective as possibly using a set of tools and techniques. The idea of an easy to use, simple access point for all citizens is demanding both from the technical as well as from the social side. The security aspect of online exchange of "governmental" collected data is especially challenging. Even though several different E-Governmental approaches have made some big steps in improving their security (not only in technical matters) [1], some of the on-going projects are hard to finalize. Some approaches make use of process descriptions gained from careful analysis of relevant processes. Other approaches concentrate on a well-defined subset of the whole set of relevant security aspects [2,3].

1.1 Security Issues in e-Government

"One stop Government" should reform the usage of the E-Government application, as it will serve as a single point of contact for access to both citizens and agencies accessing information from other governmental offices. This is, seen from the technical side, a challenging setup as the required security measures are quite diverse and complex as well as of utmost importance. Some examples:

- Deny citizen 1 access to citizen 2's data.
- Deny agency A access to the subset of data stored by agency B.
- Allow agency A access to citizen 1's data as stored by agency B after it got the citizen's approval.

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From the technical security viewpoint, such restrictions are hard to enforce which is especially true in a governmental environment, as a democratic nation has to be extremely careful to maintain a trusted relationship with its citizens [4 17]. To enable the complete range of functionality within the E-Government applications, it must be clear for the user that although all information is exchanged between the different agencies, the information cannot be intercepted, corrupted, copied or modified. This paper examines the E-Government approach as discussed in Austria[1] with its three pillars: Portals, ELAK and e-Delivery (see Fig. 1). These three E-Government implementations were chosen in order to emphasize the different requirements and implementation needs and to indicate the variable relations and attributes interacting people have to a system.

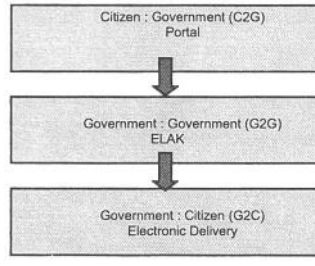

Fig. 1. Overview of interaction points within an E-Government structure (three Austrian implementations (Portal (e.g. 'help.gv.at'), 'ELAK' and E-Delivery) were chosen as example).

2 e-Government Portals

The idea of portals in the context of E-Government was introduced several years ago. This approach has been extended in order to solve some security problems by replacing the single portal by introducing a network of portals [5]. This is a good opportunity to look at an approach that focuses on only a selected number of security aspects while ignoring the rest.

The main idea behind "One stop Government" is to enable a citizen to handle all their activities using a single point of contact with the Government that offers all services. Such single points are mostly implemented as portals (see Fig. 1). A portal is more than a simple web site offering some services it also has links to different web sites specific for individual governmental agencies. It is more like a kiosk that is located at a central point and that enables its users to use electronically handled services within a governmental structure. This also involves electronic access to processes that require interaction with more than a single agency including also the aspects of passing by authorization and authentication data. This requirement introduces the additional notion of inter-agency data exchange which adds a whole new dimension to security concerns. Another task of a portal is to help its users with emergency questions and to guide him to the desired information and/or process.

Technically, this requires all offices to be interconnected and to be able to exchange data between each other. Of course, this flow of information has to be re-

[1] http://www.cio.gv.at

stricted and modifications have to be clearly marked to show the history of the document changes. Such modification tags must be used and published other requirements are interchangeable document formats (XML), secure transmissions or enforceable rules on usage restrictions [6,7,8]. On the positive side, portals also have the advantage that they facilitate the communication between different agencies.

From the security viewpoint, this requires well-defined access rights within the different organizations. Additionally, a detailed security policy has to be defined and introduced that is uniformly checked for all parties. Another requirement is that most of the data traffic has to be encrypted regardless of the type of data being exchanged. It also has to be ensured that the tampering or corrupting of the transmitted data is impossible which again makes an identification system mandatory. The traceability of online transactions must be given in order to allow later investigations to be replayed step by step.

2.1 Portal Network

A single portal that serves as a gateway to everyone has some drawbacks that grow with every new user or agency that tries to access it. The "federation of portals" [5] presents an approach that tries to improve on these deficiencies by introducing a portal network. In this approach the notion of a single portal is replaced by a network of portals that communicate with each other. Every agency maintains its own portal that allows the access to the others in the network. This has several advantages:

- The user management lies with the portal of the individual user's agency, i.e. there is no central instance that knows about all users. Inter-portal communication is based upon one portal trusting the other regardless of the actual user. This allows every portal to define the set of allowed operations for another portal on a bilateral base. The actual user management is handled – technically and organizationally – directly where it occurs within the agency.
- The same user authentication scheme can be used for inter-agency communication (portal to portal), such as internal communications, signatures...

The idea of a portal network allows the smooth solution to quite a number of issues that are rather challenging on the level of a portal. On the other hand, this "minor" change in the idea of a portal introduces a set of new pre-conditions and restrictions:

- A portal does not know about external users, but only about other portals. In other words, a portal does not authenticate a user but the user's portal. This means that all users of another portal have the same authorization rights [9].
- The "process" of exchanging authentication information between the portals grows exponential with the number of portals in the network (it requires some kind of portal directory).
- The notion of the portal network does not include individual users, but just portals.

The above shows, as an example, that by focusing on just a sub-set of the relevant security issues, one does not only ignore others, but actually introduces new problems and additional restrictions. This does not mean that the idea of a network of portals failed but on the contrary, the goal for an easier to handle user management for inter-agency communication is actually achieved [10]. However, it shows that this gain is brought about with new restrictions in other areas.

2.2 Electronic Filling in Government

A further aspect of E-Government is the Government's internal handling of files. This includes the handling of a file within a single agency, as well as the handling of files in inter-agency processes. Starting with a German example [11], the Austrian ELAK project has been started [12] (see also [13] for the Swiss approach) to fulfill the needs of modern Workflow communications and operations. It defines interfaces and procedures as well as formats used for the electronic handling of their files (XML). The defined XML structure contains entries for recipients and attachments, as well as formal descriptions of the process that the electronic file has to follow. Even though some of these entries are modified and time stamped by the respective offices, the structure ignores the desire for security and privacy [14] of the individuals handled by the electronic file. Of course, one can argue that this missing security is not only introduced by moving from a paper based file to electronic filing. However, due to its electronic nature, e-files are more easily subjugated to automated electronic tampering or eavesdropping. This is especially true if such a global approach is chosen as this substantially simplifies the crossing/merging of data collected by one or several different agencies.

On a technical level, the prevention of such illegal accesses – which are actually often seen as "simplifications" by its users – is difficult to achieve. There is a diverse set of restrictions that have to be imposed on the use of documents:

- Read access. The system has to ensure that only authorized persons are allowed to see the content of a document. Typical solution: encryption.
- Write access. The system has to ensure that only authorized persons can change the content of a document. Typical solution: access control schemes. [15]
- Print access. The system has to ensure that only authorized persons can print a document, i.e. convert the document into a non-digital and/or non-protected state. Typical solution: digital rights management (DRM).
- Forwarding allowed. The system has to ensure that documents are only forwarded to correct recipients, i.e. a user in the middle of the process that handles the document should not be able to freely extend the set of valid recipients. Typical solution: DRM
- Time constraints. The system has to offer a mechanism that allows time based management of the other access rights, i.e. the possibility to automatically remove a user from the valid user list after a given point in time or after the document process stepped over a well-defined step. Typical solution: DRM
- Sequence constraints. The system has to offer a mechanism that allows the management of the access restrictions based on the current process state. Typical solution: DRM
- Traceability. The system has to offer a mechanism that allows a dedicated user group to trace the changes that were made to a document, i.e. to check who changed what and when. Typical solution: DRM

The current ELAK proposal does not specify any of these restrictions. This greatly impairs the security of the overall system. As a possible approach to a technical feasible and secure solution we suggest using a digital rights management system (DRM) for documents. However, currently there is no system on the market readily available that fulfills all of the above requirements.

2.3 e-Delivery to Citizens

This section focuses on the e-delivery project introduced by the CIO (chief information office) Austria [16]. Electronic delivery is appealing for every administration, as, once the infrastructure is available; it considerably simplifies the delivery of all mailings to its citizens (see Fig. 2). In this setup, a government agency sends the document to an instance of an (Austrian) E-Government basic module ('MOA-ZS'), which is performing necessary operations on the delivery data like querying the central delivery service directory if electronic delivery is possible or not, signing the transmitted data (while using another basic module so called 'MOA-SS[2]'), encrypting the documents, … . This basic service uses the central delivery service directory ('head of delivery') which is addressing also the directory services of other delivery services beside to determine the delivery service that is actually responsible for the recipient.

Once all actions performed on the documents to be delivered, the citizen will find an (encrypted) message in his delivery inbox and is getting notified through SMS or E-Mail to achieve the documents.

From the security point of view, such a scheme is difficult to achieve. There are several involved parties, guaranteed delivery requirements, delivery notifications, a provable source as well as private content. The Austrian approach [16,17,18] describes a scheme that meets the above requirements. The main 'drawback' of this scheme is that it requires additional infrastructure, but security has its price; e.g. an online directory with information on all citizens registered to a delivery service, a citizen card based concept[3] (e.g. smart card or also the approach of Austrians greatest mobile-provider for 'mobile'-signatures) containing an unique ID for every citizen ....

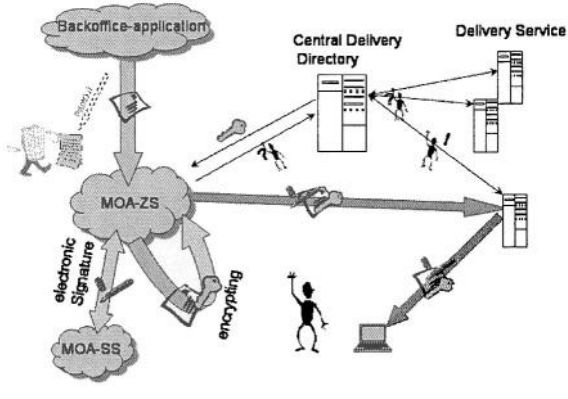

Fig. 2. Overview on e-delivery.

Additionally it should be considered that the supposed structure is not only a pure governmental implementation but does involve also different business partners, who may have a different approach implementing security.

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[2] http://www.cio.gv.at/onlineservices/basicmodules/moa/

[3] http://www.buergerkarte.at

Conclusion

Subsuming all introduced implementations which are stable and pass trough a sustained improving processes are innovative and sophisticated and satisfy the main security requirements. Some progressing demands are still in phase of design or not considered due to low priorities of business cases in combination with still ongoing implementations. Due to the multi layer approach of sustainable, governmental implementations the immediate effect for people using such multifunctional systems will become visible after some practical working experience.

References

1. R. Hörbe, Portal Verbund: White Paper, 28. Feb. 2002, www.cio.gv.at
2. DOMEA concept; www.kbst.bund.de
3. General Information on ELAK, www.cio.gv.at/elektronischerAkt/, or www.elakimbund.at
4. www.isb.admin.ch/internet/gever/business/01160/?lang=de
5. www.cio.gv.at/it-infrastructure/delivery
6. P. Reichstädter, E-Signatures for Delivery in E-Government; proc. E-Government 2003; p. 260-265.
7. P. Reichstädter, A. Hollosi, Model and processes of electronic delivery in E-Government; www.cio.gv.at/it-infrastructure/delivery/spec.
8. C.C. Albrecht, How clean is the Future of SOAP? In Com. of the ACM, Feb. 2004, Vol. 47, Nr.2, p66-68,
9. R. J. Bayardo, R. Srikant, Technological Solution for Protecting Privacy; in IEEE Computer, Sep. 2003, p.115-118.
10. R. Bhatti, E. Bertino, A. Ghafoor, J.B.D. Joshi; XML-Based Specification for Web Services Document Security; in IEEE Computer, April 2004, p.41-49.
11. C.M. King, C.E. Dalton, T.E. Osmanoglu, Security Architecture, 2001, p.93ff, RSA Press,
12. S.J. Vaughan-Nichols, XML Raises Concerns as it gains Prominence; 2003, in IEEE Computer, May 2003, p.14-16
13. S.Kleijnen, S. Raju, An Open Web Service Architecture, in ACM Queue, Vol.1 Nr.l, p40-46, March 2003
14. R. Görtz, J.Stolp, Sicherheit effektiv integrieren; in IT-Security 01/02-2002, p20-38
15. M. Kahmen, Authentifizierung- Wer braucht sie?, in IT-Security 05/2002, p18-20
16. R. T. Mercuri, Analyzing Security Costs, in Com. Of the ACM, June 2003 Vol.46, Nr.6, pl5-18
17. H. Wang, C. Wang, Taxonomy of Security Considerations and Software Quality, in Com. Of the ACM, June 2003 Vol.46, Nr.6, p75-78
18. P.E. Hart, Z.Liu, Trust in the Perservation of Digital Information, in Com. Of the ACM, June 2003 Vol.46, Nr.6, p.93-97

Trust and Security. Digital Citizen Cards in Poland

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Abstract. The idea of smart cards used in public administration has been developed to disseminate e–communication between citizens and public authorities as well as to secure more control for a state over a citizen (citizen surveillance). Except of traditional identification tools they are to include a digital certificate useful in e–banking, e-transaction, e-voting etc. However, the exercise of services of non – public bodies employing PKI for digital citizen (ID) cards may cause concerns of illegal abuse on data gathered on a card and illegal activities may abuse privacy of a data subject. Especially when according to existing law they have been accessible only to public administration bodies. Citizen card is a combination of cryptography elements and an electronic signature. Its peculiarity lies in the fact that a card structure depends on a secret key issuer that defines the range of access to all its components. That is why an issuer must properly protect not only public interest but the private interest of a card holder as well.

Introduction

That is nothing insightful today to say that Internet means a lot for economic growth, administration, human development and democracy. Therefore networks especially those used in public life must be trustworthy and secure, otherwise their growth and development might be simply unnecessarily impeded.

Effective security system used for any computer networks should be based on legal regulations, industry (entities) self-regulations and technical standards consistent for all. Only these elements together may create a policy environment ensuring a kind of security and trust. E-citizen cards are, by definition, a central item for an identification of an acting person in both, public and private environment, including networks. Cards can be used for an e-commerce as well as in an electronic communication with administrative authorities[1].

Citizen cards may assume different forms but basically they are distinguished because of their use as a communicative tool either in public administration or in e-commerce. The problem of a card security consists in several major issues which include proper provisions for security, confidentiality of data and data integrity. Other crucial issues are an authentication of an acting person and authorisation of a card. From the technical point of view those problems can be significantly minimised or even excluded by using cryptography systems and digital certificates.

Citizens must prove their identity on a network but obviously in that case not by showing a traditional ID. The solution could be a citizen ID smart card. The idea of e-

[1] Menzel ,T., Reichstadter P.: The role of citizen cards in e-government, Chief Information Office, Ministry of Public Services, Austria.

R. Traunmüller (Ed.): EGOV 2004, LNCS 3183, pp. 342–346, 2004.

ID was strongly developed in Austria[2]. The minimum requirements for e-cards concentrate primarily not on a description of a type of the card or its kind, but on the security of its application by citizens. In Poland, according to the normalisation programme executed by the Computer Science and Telecommunication Board of the Polish Standards Committee, it has been planed to create norms in the field of identification cards for the years 2004 - 2005. Among them we can identify the ones pointed mostly to the outward features of a card[3]. Other norms are focused more on the technical aspects[4]. Polish norms aim at standardization of premisses regulating the identification of issuers (application and registration procedures)[5].

Electronic ID consists of two parts: a plastic card and a microchip called "microcontroller"[6]. Security of a digital card should be necessarily guaranteed by some sophisticated elements. The use of just a digital signature does not unquestionably guarantee that a specified message comes from a person who poses to be such. From a legal point of view it is important to make sure that a person who acts by making a specific statement provided with a digital signature will not be able to evade it[7]. Distinctly from a personal signature a digital one is not inseparably connected with an undersigner. A personal signature is naturally connected with a physical person and always possible to connect it with a specific person by the features of an undersigner. That is not so obvious in case of a digital signature which is exceptional and unique but in that case a connection with a signatory does not result from biological circumstances.

No technical means in the realm of security will turn out effective without a proper legislation. Specific technical solutions need legal significance. That was a goal of Polish Electronic Signature Act (ESA) of September 18, 2001[8] implementing the Directive 99/93/EC[9]. According to a principal rule of the Polish civil law declaration of will can be expressed by any act of a person if it sufficiently discloses its decision to call the specified legal consequences (Article 60 of the Polish Civil Code[10])[11]. Ac-

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[2] There was created a programme called *"Concept Citizen Card"* pointed to develop an electronic identification card for citizens' use by means of an electronic signature in a PKI.

[3] For example EN 1375:2002 which concerns Intersector integrated circuit(s) card additional formats – ID–000 card size and physical characteristics.

[4] For example ENV 1257:1994 concerned with the Rules for Personal Identification Number handling in inter-sector environments, ENV 1284:1996 concerned with the inter-sector rules for locking and unlocking of integrated circuit(s) cards, ISO/IEC 10373 – 3:2001 concerned with the tests methods of the identification cards – Integrated circuit(s) cards with contacts and related interface devices, ISO/IEC 10373 – 5:1998 concerned with the optical memory cards, ISO/IEC 10373 – 6:2001 concerned with the proximity cards and ISO/IEC 10373 – 7:2001 concerned with the vicinity cards.

[5] http://www.pkn.pl/PPN/ProgramPracKTnr172.htm

[6] http://www.e-gov.pl

[7] Konarski, X.: Internet i prawo w praktyce, Warszawa (2002), 71–77.

[8] Dz.U.2001.130.1450.

[9] Directive 99/93/EC of the European Parliament and the Council of Ministers on a Legal Framework for Electronic Signatures, OJ L13, 19.1.2000, 0001-0016.

[10] PCC, Dz.U.1964.16.93.

[11] That means that an electronic form of will declaration is enumerated as the one of the acceptable ways to disclose a legally valid will. Thus, the Polish legislator determined an existence of a possibility to declare a will by using a computer or a particular software.

cording to Z. Radwański[12], a new contents of Article 60 is broad enough to make a legal interpretation suitable for the aim of new technologies, so that it would include not only an electronic signature but also any other electronic declarations of will having a legal importance.

From the technical point of view, a digital signature is signed in the form of a sequence of bites (zeros and ones) on a computer's memory without any material features. For that reason, ESA has included the amendment of the PCC expressed in Article 78 p. 2[13]. According to the mentioned above regulation it is possible to recognise a document which is electronically signed as having the same legal validity as a written when it provides the same function as a written document.

Alles Liebe above suggests that Poland is already prepared to introduce administrative procedure on ID smart cards in practice. But the Polish law in the range of ID does not comply with it yet. Polish Identity and Population Register Act of April 10, 1974[14] introduces the main rules of the citizens' identification which are not compatible with the needs of technologically modern ones[15]. However, according to the ID exchange procedure provided in the Cabinet Regulation of November 21, 2000[16], to obtain a new ID card a citizen shall lodge an application including his/her old ID card. Thus, a lack of integrated citizen files kept by a government local body makes it impossible for the same person to apply to another administrative body than the one dealing with ID exchange, thus producting over-bureaucracy.

Another important issue is how to point an independent and trustworthy authority capable of proceeding on a key certificates' issue. That could be for example an outsource (not public) subject which would be technically able to guarantee a proper data transfer protection inside and outside[17]. Generally, a certification authority must be

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[12] Radwański, Z.: Elektroniczna forma czynności prawnych, Vol. 22, Monitor Prawniczy (2001).

[13] Świerczyński, M.: Podpis elektroniczny – Unia Europejska a Polska, Edukacja Prawnicza (2000): To make it reasonable an electronic signature shall meet four basic conditions: first - authenticate a person who use a signature (authentication), second - prevent from changing of data (data integrity), third - author can not deny his/her act of signing, fourth – make possible to enable a third party to verify data.

[14] Dz.U.2001.87.960.

[15] According to those, the ID card is issued after payment being calculate as an equivalent of its issue costs. Polish Cabinet Regulation on ID Cards' Payment of November 30, 2000 (Dz.U.2000.105.1110) in Article 1 amounted that payment on 30 PLN (about 6 EURO). Taking into consideration all specialist security provisions, technologically advanced, which would be probably installed on an electronic citizen card, the cost of its issue seems to be pretty unreal in that amount. Moreover, the citizens could deny a payment as an undue. Another issue is a scope of the personal data gathering on the ID card according to the Identity Act. They are detailed and include: name, surname, parents' names, maiden name, date/place of birth, address of registration, gender, height, eyes' colour, the General Electronic Citizen Registration System (PESEL) number, issue date, validation date, photo and owner's signature. Each time when data change, a citizen shall replace his ID card. That regulation would not be necessary if IDs card are smart.

[16] Dz.U.2000.112.1182.

[17] In Poland such an entity is for example the *Unizeto Centre* in Szczecin (Poland) which is legally authorised to certify the electronic signatures. The company exists from 1965, previously as the Data Centre (budget entity). At first it has served only to the public institutions like Social Insurance Board (ZUS) and Polish Standards Committee. In 2000 the Unizeto Centrum Certification Authority has started provide commercial services in the field of issue

seen as a trustworthy third party and give such a provision which would at least guarantee security for an administration designed to protect data in the field of public interest. The most relevant issue which appears is ensuring guarantees of security during the certifing process, not after its termination or while using a certificate[18].

Today, operating with a stealing digital card has become common which is so important especially in the context of a state guaranteed protection. To be able to faultlessly identify a personal biometrics could be a solution for the administrative reasons - a print finger (like in Hong Kong) or an eye retina structure analysis. This method might turn out equally useful for payment cards constituing at the same time ID cards as well as any other electronic cards. Biometrics indicators may almost perfectly define that a person who owns a card is the one who makes use of it.

Despite of all arguments against the enforcement of the digital citizen cards many european countries have developed the idea of their practical use[19]. In December 2001 Estonia introduced legal regulations which imply that each person above 15 years old has to possess an electronic ID card[20]. From the security point of view as little data as necessary should be gathered on the card. But from the practical point of view, the more data have been gathered the more useful the card becomes. In Europe the first conception prevails therefore data gathered on a card shall include only information of a card holder plus a key for authentication and an electronic signature. But it is not a world wide rule. In Asian countries conception of an universal ID card is predominat one[21]. Poland, as a member of the European Union, has to follow a way which the EU goes[22]. It means for Poland that it is only a matter of time where and how the cards will be applied.

To sum up, there is a great future for e-ID in Poland which definitely simplify a daily life but also cause new difficulties in the aspect of security. In context of administration, it is indispensable to uniform technology (system) used in public life in order to avoid interruption in communication between citizens and official authorities as two ends of interfaces but also between different official authorities themselves.

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and management of public key for individuals. In December 30, 2002 the company was entered as the 1st Polish Qualified Certification Authority into the register of qualified authorities to provide certification services connected with e-signing. In 2003 the first public key qualified certificate in Poland was handed over to the Prime Minister held at the Office of the Prime Minister. http://www.certum.pl; http://www.unizeto.pl

[18] Certification authority is supposed to be also a body which guarantees the authenticity of a certificate holder, in that case - a citizen.

[19] Presently, legally valid electronic ID cards may be brought into effect in all the states which ratified the Schengen Treaty according to http://www.e-gov.pl/index.php

[20] The Estonian card improve the identity of its holder and also can be used to put an electronic signature. Information as an e-mail address, residence permission or work permit are also gathered on the card.

[21] For instance in Malaysia an electronic citizen card includes apart from necessary data also driving license, medical information, immigration information and in some cases also a credit card and electronic cash.http://www.signet.pl/archiwum/110.html.

[22] According to the European Commission (EC) initiative of December 1999 called "e-Europe Smart Card" (eESC) the EC announced the eEurope 2002 bearing the name "Open Smart Card Infrastructure in Europe" (OSCIE). It resulted in the working paper called "Electronic Identity (White Paper) V 0.5" of November 2002; Council Resolution on the implementation of the eEurope 2005 Action Plan from January 28, 2003, 5197/03.

Security is not only the question of legal regulations. There is a great part for computer security system makers and users to operate in more secure manner. Main concerns concentrate on the issues like what is better – single functionality of a card or a structure which would enable inserting supplementary applications. Supplementary possibilities always elicit supplementary danger. In aspect of e-ID cards a public sector has to be placed equally as a market player.Any deadlock of e-governments projects concerning development of ID cards would be definitely helpful to create common standards.

References

1. Świerczyński, M.: Podpis elektroniczny – Unia Europejska a Polska, Edukacja Prawnicza (2000)
2. Menzel, T., Reichstadter, P.: The role of citizen cards in e-government, Chief Information Office, Ministry of Public Services, Austria
3. Konarski, X,: Internet i prawo w praktyce, Warszawa (2002) 71-77
4. Radwański, Z.: Elektroniczna forma czynno ci prawnych, Vol. 22, Monitor Prawniczy (2001)
5. http://www.pkn.pl/PPN/ProgramPracKTnr172.htm
6. http://www.e-gov.pl
7. Electronic Signature Act (ESA) of September 18, 2001, Dz..2001.130.1450
8. Directive 99/93/EC of the European Parliament and the Council of Ministers on a Legal Framework for Electronic Signatures, OJ L13, 19.1.2000, 0001-0016
9. Identification Documents and Population Register Act of April 10, 1974Dz.U.2001.87.960
10. Cabinet Regulation on ID Cards' Payment of November 30, 2000, Dz.U.2000.105.1110
11. Data Protection Act of August 26, 1997, Dz.U.2002.101.926
12. http://www.certum.pl
13. http://www.unizeto.pl
14. http://www.signet.pl/archiwum/110.html
15. European Commission White Paper on Electronic Identity V 0.5 of November 2002
16. Council Resolution on the implementation of the eEurope 2005 Action Plan from January 28, 2003, 5197/03

Innovation Needs in the e-Government Scenario: A Survey

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Abstract. The paper discusses the results of a survey about the actual situation of ICT and its implications in the Italian E-government scenario. The investigation is part of a larger research effort promoting and evaluating holistic approaches for Local Public Administrations. The research focus is about the mutual dependencies between normative aspects and ICT solutions, evaluated on small and medium Municipalities even with no remarkable aptitude to innovation. The research findings depict the strength and weakness of the current tendency to stress only one dimension in innovation, like technology in front-office services or normative in bureaucratic procedures.

Introduction and Background

In recent years the diffusion of communication networks and distributed applications allowed the development of new interaction paradigms in Public Administration to organize public governance for better serving citizens and enterprises on a comprehensive scale. As a consequence, the basic outline of an e-government vision has recently emerged both in USA and in Europe (CSTB, 2002), but much remains to be done, to create innovative services within a coherent system of juridical and economical rules based on these new technologies and concepts.

Some argue that private-sector management methods can be applied to government, to make more efficient, effective and responsive to citizens public agencies. Others suggest new ideas about governance, stressing collaborative relationships, network-like arrangements and hybrid public-private partnerships to enable more effective problem solving and greater citizens' participation in public affairs than in the past (Koppel, 1999). Examples of e-services are, among many others, the European Project "eGOV" (Traunmuller, 2001), the Italian Public Administration Network (Batini, 2002), the experiences about the Municipal Transformation in Norway (Beck, 2002).

Surveys (West, 2000) made on US federal and local agencies, for example, show that even if many governmental units are putting online a wide range of materials the design of those applications is still at the down. The primary reason of this backwardness has been identified in the lack of a holistic approach (Lenk, 2002) to put up and to maintain the new online services without overloading existing staff and structures. The design of effective online services in the public sector, in fact, involves organizational, legal, financial and ICT (Information and Communication Technologies) aspects at the same time. The holistic model should better support such a process and

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serve as a communication language among experts from the different areas. In this scenario in 2001 the Software Engineering and Telemedia Lab and the Legistic Lab of the University of Lecce decided to start a joint research in collaboration with the Italian Ministry of Innovation and Technologies (MIT, 2002), and other private and public partners, with the aim, among others, to develop a new ICT-aware normative approach, able to fully exploit the novel technologies to achieve the administrative goals and to apply it "real" LPAs, and not only to best-in-class.

The main results of the research achieved in the first year (Carducci, 2003) refer to creation of an effective approach to manage the local tax for the owning of Real Estates (ICI) in Italian Municipalities. It is based both on a suitable reform of the local taxation rules from a normative perspective and on the definition of an appropriate set of databases, Web services and Web applications, named VIOLA (Virtual Incomes Office of Local Administr.), to allow citizens to assess/update their fiscal position, to ask the Administration about dubious cases, to pay taxes or to dispute them.

The focus of the research is on LPAs, because of their very poor performance in several key sectors: in Italy, for example, the official evasion figure of estate tax is around 30% while the fiscal contentious between citizens and LPAs has reached a critical level (Ministero dell'Interno, 2002). In the research we focused our attention on core services (e.g. fiscal services, Municipal-knowledge based services, governance services etc.) rather than only on front-office services (like most municipal Web sites), because we feel that in general new services are unsatisfactory for both citizens and administrators, if solely justified by the adoption of the ICTs. This paper, referring specifically to the 4th point of the research, is about a survey to evaluate and qualify the innovation needs and the innovation aptitudes of the Italian Municipalities, with particular attention to ICT and juridical aspects of Municipal core services. The survey also aims to better understand the main differences among best-in class, average and worst-cases, in order to extend the above mentioned approach to a larger number of Italian LPAs.

The paper is structured as follows. In Section 3 we discuss the research methodology of our investigation. Section 3 presents the findings and Section 4 concludes the paper and depicts some further research developments.

The Survey: Methodology and Goals

The entire survey was conducted between April and June 2003. Findings were gathered via questionnaires and phone interviews, with the aims of retrieving both quantitative data, useful for statistical analysis, and explicatory facts (meta-data) about the local scenario inside the general changing context. The quali-quantitative approach (Denzin, 1994) has been required by the nature of the research: observing innovation phenomena in relationship with the revision of the Constitutional principles of autonomy and the opportunities opened by ICTs. In the survey we used both objective verifications (there is/ there is not) and metadata ("I'm aware about…", "I can explain how..."), as suggested by EC (European Commission, 1998). The questionnaires, submitted to the General Municipal Secretary of each involved LPA, have been set in order to define the context and to match the innovation needs asked in the Municipal organization with the those perceived by the users (citizens and firms).

The Municipalities contributing to the survey have been reached in two phases:

1. after some dissemination activity, a first questionnaire has been submitted to small and medium Italian Municipalities adhering to the research on voluntary basis;
2. a second questionnaire has been submitted to the most innovative Italian Municipalities, coming from both the first phase questionnaire and from an ad-hoc inquiry.

The former questionnaire (called "exploratory investigation" in the following) identifies the "innovation need level" in the local Agency, i.e. the native predisposition to exploit innovation opportunities and the "actual demand" of change. The latter questionnaire ("focused investigation" in the following) aims at show the level of coherence between normative innovation and ICT innovation inside the local Agency, in relation to the benefits perceived by users (citizens and business). In the focused-investigation a specific section is about the local taxation as "engine of innovation", in the sense that innovation can reduce fiscal evasion and increase fiscal incomes (self financed innovation) and it produces "sample lessons" of rationalization of the legacy. During the investigation, 44 questionnaires/interviews have been made overall Italy. Useful answers for this survey come from 36 Municipalities, corresponding to about 5 millions Italian citizens, out of a total of 57.321.070 at the end of 2002, split in 18 exploratory and 18 focused investigations.

Findings and Discussion

Both exploratory and focused investigations are structured in sections. The main results for each section are reported and discussed in the following.

Exploratory Investigation

The Municipalities adhering the Minister's Agreement to participate to the survey were 21, but three where too late in the submission. The remaining 18 Municipalities, spread out over the nation, count about 415.000 citizens, 3.250 employees and 80 managers.

As shown in Table 1, the Web is widespread, but only for informative purposes.

Table 1. Communication channel.

Have an informative Web site	16 on 18
Use Short Message System and / or other multi-channel services	None
Use ICT to define and foster territorial development strategies	11 on 18

1) Security and digital authentication

One Municipality uses the digital signature and two are experimenting it. The others are still waiting. None of them uses the smart card to provide services to citizens and about one third is experimenting the use of the Electronic Identity Card in 2002-2006.

2) Normative and regulatory innovation

The normative update is usually related to personal data security. Twelve Municipalities out of 18 haven't changed their norms according to the new Title V of the Italian Constitution and almost all don't know the Impact-Evaluation Techniques for new regulations, introduced with the Law 50/1999. Fourteen of them don't use tools to monitor and update their normative activity.

3) Information heritage
The digitalization of the Municipal information heritage is overall good in sectors, like Demographical services, taxes and engineering offices, but it is unsatisfactory in offices like Administration and the juridical office infrastructures, territory and document management offices. Nobody systematically monitors the service level deployed to citizens by the ICT office nor allows citizens and enterprises to consult Municipal databases online, not exploiting the chance to let users update their own information. Information-integration and data-quality are not common issues.

4) Taxation as innovation engine
Taxation is usually managed internally, with the support of ICT systems, but without significant normative reforms with respect to the pre-ICT fiscal process. The "litigiousity" rate (number of appeals per 10.000 citizens) varies between 0,4 and 50 with the means of 13. The main subject is the Municipal Tax on Real Estates.

5) Innovation perception and actions
10 Municipalities out of 18 don't declare significant innovation plans and usually they are not able to quantify the expected benefits. They don't distinguish between technological, normative and organizational innovation.

Focused Investigation
Twenty-three Municipalities were selected to participate in the deep investigation, but five were unavailable. The whole investigation counted 4,5 millions of inhabitants, about 46.000 employees and 640 managers.

Table 2. Communication channel.

Have an informative Web site	17 on 18
Frequency of update of the Web site	Real time or weekly
Who usually manages the web site	Internal person
Number of email per person, per month	20
Provide services via call center	8 on 18
Testing Short Message System or other multichannel services	5 on 18

As shown in Table 1, the Web is widespread not only for informative services. Two Municipalities let users compile online their demographical certificates and four deliver fiscal services connected to Municipal databases. Very few Municipalities design the Institutional communication and services with a "user centered" approach. Most of the Web sites reflects the internal structure instead of the service function, annulling the benefit of the Web. A special case is the Municipality of Bologna providing the same services via different channel. Almost all municipalities have strategic plans about the use of new technologies to promote and develop the territory and local SMEs.

1) Security and digital authentication
Five Municipalities have never used and/or tested the digital signature. Few experiences have been surveyed in the use of the National Services Card[1] mostly concen-

[1] The National Service Card is a smartcard with less functions than the Electronic Identity Card (EIC). It has been introduced in the transition period until the diffusion of EIC is completed.

trated in demographical, electoral, police ticketing, fiscal services. Fifteen have already experimented EIC (E-Identity-Card) and pioneers started in 2000 – 2001.

2) Normative and regulatory innovation

As shown in Table 3, normative innovation and ICT innovation are incoherent.

Table 3. Normative and regulatory innovation.

Change internal norms according to the Law 212/ 2000	13 on 18
Never used tools monitoring contents and results of information requests and communications	12 on 18
Never used monitoring tools about contents and results of fiscal contentious caused by their own fiscal management	7 on 18
Modified normative according to the new Title V of the Italian Constitution	8 on 18
Aware of the Regulation Impact Evaluation Techniques	4 on 18
Created tool to monitor and update their own normative activity	7 on 18

3) Information heritage

Optical filing is still not so diffused. Moreover even if archives are mostly digitalized, they are not available online and only three Municipalities state they are able to process data in real time. The questions related to the management and the supports used for data archives have revealed the management of fiscal audit is critical (six still use paper supports), as well as the documental management (8 use paper supports). Data quality, one of the foundation of data certainty, is a special topic for very few skilled people. All the Municipalities state they have faced the data quality problem, but they are not able to quantify the benefits, unless to use of indirect indicators like the improved relationship with users and the increase of entrances. No standard has been defined about data quality indicators and they have developed proprietary data quality tools.

4) Taxation as innovation engine

Taxation is usually managed internally, with the support of ICT systems. The "litigiousity" rate (number of appeals per 10.000 citizens) varies between 0 and 200 with an average rate of 30. The main subject is the Municipal Tax on Real Estates. PAs use systems to detect fiscal evaders based on the cross matching of data flows coming from internal and external sources. The evasion level they perceive is about 10-15% for the Municipal Tax on Real Estates and it is about 10-20% for the Municipal Tax for garbage, which are considered the Municipal most profitable taxes. These figures are only estimated because they don't use tools to get the actual evidence. The economical benefits from the use of fiscal evaders detection systems have been roughly quantified in terms of a considerable increase of fiscal local entrances. All the surveyed Municipalities with innovation paths in local taxation gained positive figures: the evasion figure got back of 10% of the revenue (with peaks of 20%). All have quantified the results in terms of recovered revenue, without considering other indirect or hidden costs related to the procedures of evasion recovery.

5) Training

All Municipalities annually plan their training activities for the entire Administration, mainly focused on computer skills, normative updates and change management. The training of the political class begins to be widespread. The training activities are usually split as follows:

- Most of employees attended at least 20 hours of refresher courses in the last year.
- About 50% of the managerial staff attended more than 20 hours of refresher courses in the last year.
- Only 3 Municipalities proposed classes with more than 20 hours to politicians in the year.

E-learning is a new entering tool in Public Administration.

6) Municipal ICT infrastructures

The main software applications are sold together with annual maintenance contracts. Most of them are proprietary and custom applications, provided by business vendors. Accounting applications are used in less than one third of surveyed Municipalities, while two third adopted "The Computer Registration" and workflow systems. From the analysis of ICT providers' contracts the size of vendors is proportional to the size of Municipalities provided.

Table 4. Municipal ICT infrastructures.

Internal ICT competence center	Yes
Common application architecture	Client/Server
Number of computers for employees	7/10
Dominant software	Ms Windows and MS Office
Local Area Networks	All Municipalities
Intranet	5/18
ICT expense for citizen	0,8 and 20 Euros

7) Innovation perception and actions

Even the most advanced Municipalities match innovation with ICT, though their proposals and actions are very interesting, like the creation of the broadband local infrastructures, the development of very complex transaction services based on the Web, the plans to provide families and schools with PCs, the diffusion of the digital signature and the Electronic Identity Card, etc. They have shown several difficulties and deficiencies about questions on the most recent juridical questions and hot normative topics (like the impact of the new Title V of the Italian Constitution on the Municipal life).

Town Web Sites

The main impression from the Web sites evaluation is the lack of linkage between front end and back end and the presence of several initiatives without a unique thread. The result is that most of the Web sites let users download modules and application, but it is necessary to go to the front office to apply for them. The usual digital communication channel with PA is usually the email to the webmaster or the marketing and communication office. Municipalities feel the Web channel as an additional cost, sometimes to be paid back with the support of users. This approach demonstrates the lack of an internal organizational and normative revision, consequent and/or originated by the addition of the Web system in the Administration.

Conclusions and Further Works

In Italy the main feature of innovation is its development as "leopard spots": very qualified experiences have been produced only in some limited areas. These experi-

ments have shown the potential benefits of innovation, but they have been the alibi of some bureaucrats to delay a diffuse, drastic and comprehensive improvement of the whole system. The most evident limit of the development of innovation based on experiences of excellence is the difficulty to reuse the same model in contexts. This difficult diffusion and transfer on a larger scale is the main reason of the failure of those experiences trying to promote only excellent samples without creating the condition for the dissemination. The difficulty is even more significant when it is related to Local Public Administrations, like Municipalities, very numerous and intrinsically different. The qualitative situation[2] coming out from the exploratory survey shows:

1. inconsistent and uncoordinated development of incompatible solutions: local agencies execute several hundred different types of processes, reflecting a specific working or business process. Most of the processes are still not supported by ICT and most of the solutions are incompatible with modern technologies and no more maintained after the advent of Euro. Databases are incomplete and incompatible and contain redundant data.
2. lack of horizontal and vertical communication: local Gov agencies don't communicate each other and with hierarchically superior counterparts.
3. outdated organization solutions: Many organizational acts stems from times when paper was the only communicational and archival medium.
4. inefficient usage of ICT: Administrative districts are relatively well-equipped with information technologies (IT). However, because of the versatility and incompatibility of solutions, the available equipment is not used effectively and the results are far below the expectations of investments in ICTs.
5. ICT Outsourcing: most of the Municipalities can't own internal ICT department able to trigger innovation off, due to their small size, or to the inadequate number of employees compared to the requests.

The originality of this research is represented both of quali-quantitative approach to describe the state of art in Italian e-government, and the mutual interaction between ICT and legal aspects. Administrative procedures can be radically improved by exploiting ICTs only if new regulation and simplification techniques are adopted. It is very interesting to observe, as in (Carducci et a., 2003), that the user centered approach in designing e-services and on-line applications is the corresponding facet to this perspective in the software development communities. To validate the approach the investigation is continued with the research experience in the Municipality of Taviano with the aim at supporting LPAs in reducing the normative and informative asymmetries in local taxation. It is an accredited experience both as Case Study in the IFIP I3E Conference 2003 and as European best-practice in E-Europe Award 2003. Only by this kind of approach it is possible to combine Legal Drafting and engineering techniques, which must be able to design, develop and test normative and technological tools in an integrated fashion. A direct consequence of this is that norms must take technologies into account while technologies support law deployment.

We are planning to extend the validation of the model and the tools in order to tune and customize them to different contexts and sizes. Moreover this experience of holistic model can be extended from the local taxation to other functions in the LPA, having already verified the citizens' goodwill to pay according to indicators of regulation and reorganization of informative processes.

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[2] All quantitative data is available at http://dii.unile.it/mininnovazione/

References

1. Denzin N.K., Lincoln (eds.) Y.S., Handbook of Qualitative Research, London, Sage (1994).
2. European Commission, The Green Book on the Information in the Public Sector in the Information Society, COM (1998), p. 13.
3. Carducci M., Bochicchio M., Longo A., "Reducing Normative and Informative Asymmetries In Fiscal Management for Local Administration", Ed. R. Suomi, C. Passos, M. Mendes, R. Monte, San Paolo (Brazil), Sept 2003, pp. 19-34, Proceedings of I3e 2003: the 3rd IFIP Conference on eCommerce, eBusiness and eGovernment.
4. West D.M., "Assessing E-Government: The Internet, Democracy, and Service Delivery by State and Federal Governments, 2000" Brown University, Sept. (2000).
5. Koppel, J. G. S. The challenge of administration by regulation: preliminary findings regarding the U.S. government's venture capital funds. Journal of Public Administration Research and Theory, 9, 641-666, 1999.
6. CSTB, NRC. Information Technology Research, Innovation, and E-Government. National Academy Press, Washington, D.C., 2002; www.nap.edu/catalog/10355.html
7. Lenk K., Traunmüller R., Electronic Government: Where Are We Heading?, in Traunmuller R., Lenk K. (Eds), EGOV02, LNCS 2456, pp. 1-9, 2002, Springer-Verlang Heidelberg, 2002.
8. Ministero dell'Interno, Analisi Gestionale e Finanziaria degli Enti Locali, Ufficio Studi della Direzione Centrale della Finanza Locale, Roma, (September, 2002).
9. Traunmüller R., Wimmer M.A.: Web Semantics in e-Government: A Tour d'Horizon on Essential Features. Proc. of the WISE'01 Workshop on Web Semantics, Kyoto (Dec. 2001).
10. Batini C., Mecella M., Cooperative Processes for e-Government, in: ERCIM News No 48, Special Theme: e-Government, January 2002, pp. 38-39 (ISSN: 0926-4981).
11. Beck E.: E-Govemment and Municipal Transformation: Some Experiences, in: ERCIM News No 48, Special Theme: e-Government, January 2002, pp. 21-22 (ISSN: 0926-4981).
12. MIT, "e-Government, la parola magica che apre al futuro - L'innovazione tecnologica applicata alla pubblica amministrazione al servizio del cittadino", 2003-12-01, http://www.innovazione.gov.it/ita/news/2003/como/scheda.shtml

Electronic Government: Scope and Scale of Process Change

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Abstract. Unnoticed for quite some time, electronic Government (e-Government, e-Gov) projects have only recently been observed to induce changes to government business processes. So far, the strategic approaches and objectives pursued in such projects have not been studied. In the private sector, business process change (BPC), in turn, has been widely practiced and researched. In this exploratory study, the existing literature on BPC-related strategic approaches and objectives is used as a point of reference for assessing the scope and scale e-Gov–induced BPC. On a grand scale, the strategic approaches and objectives were found very similar to those used in the private sector, although they differed in many details. The existing knowledge it is concluded can help inform and guide e-Gov projects with a BPC impact.

Introduction

E-Government arguably leads to BPC (Balutis, 2001; Beaumaster, 2002; Ho, 2002; Layne & Lee, 2001; Relyea, 2002; Scholl, 2003a), the extent of which has not been documented in the literature. BPC in government may follow paths and patterns similar to BPC observed in the private sector (Scholl, 2003a), in which case the wealth of literature as well as practical lessons learned in that sector could benefit the unfolding of e-Government-induced BPC. This paper focuses on the findings in the area of e-Government strategy and objectives and their relation to BPC. The paper is organized as follows: First, a short review of the private-sector-related literature in the area of strategic thrust in BPC is recapitulated (Scholl, 2003a). From this literature, four themes are derived for inquiry in an e-Government context (ibid). Second, the design of the exploratory study is detailed. Then, the results for each theme are summarized and discussed in context and relationship to each other. The paper concludes that empirical evidence exists for assuming e-Government to strategically lead to BPC. Also, some private-sector-based lessons learned seem to apply.

Strategies and Objectives in Private-Sector BPC

Holistic Approach. After the fading of the myths (Davenport & Stoddard, 1994) as well as in the face of legions of staggering failures (Hammer, 1996), BPC, once promoted as sort of panacea and as a revolution from the top (Stoddard & Jarvenpaa, 1995) marking a fundamental departure from the organizational past and immediately leading to radical change and process improvement (Champy, 1995; Hammer &

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Champy, 1993), has more recently been pursued in more incremental, well orchestrated, and inclusive ways (Grover, Teng, Segars, & Fiedler, 1998; Kettinger, Teng, & Guha, 1997) employing a holistic view of the organization (Gunasekaran & Nath, 1997; Pardo & Scholl, 2002). If many variables interact and concurrently are subject to change, so the rationale, then the manageability of this process and its ultimate success have to heavily rely on cooperation and collaboration of involved stakeholders and organizational systems (Scholl, 2003a).

Long-term Orientation and Flexibility in Planning. The deeper and wider the BPC, the longer and more flexible the project needs to be planned, which follows immediately from the previous theme. Leadership needs to understand the dynamics and develop a vision for those long-term and disruptive processes (Gunasekaran & Nath, 1997). Projects of this nature command high degrees of uncertainty and risk and cannot be planned in an extrapolative, straightforward fashion. Hence, such projects need much more coordination and communication than linear projects (Mitchell & Zmud, 1999).

Intertwining of Business and ICT Strategies. In practice, business strategy and information and communication technology (ICT) strategy co-evolve (cf., (El Sawy, Malhotra, Gosain, & Young, 1999)). The more emphasis is put on the tight co-evolution of those strategies, the better the business architecture and the ICT systems can be co-designed (Giaglis, 1999). However, due to different life cycles of the two components, this may prove a challenge in practice (van Wingen, Hathorn, & Sprehe, 1999). That notwithstanding, empirical evidence suggests improved success rates in change and redesign projects, once those two strategies are intertwined [Mitchell, 1999 #40;Teng, 1998 #86.

Modesty in Scope and Objectives. More modest BPC projects (in scope and objectives) it has been found have higher success rates [Kallio, 1999 #36]. This explicitly dismisses the notion of a clean slate in BPC originally advocated (Hammer & Champy, 1993), which has proven ineffective in various ways (O'Neill & Sohal, 1999). Deep change, hence, can be attained by means of a sequence of smaller projects. And yet, even modest BPC can affect any combination and depth of organizational tasks, structure, ICT, and culture (Stoddard & Jarvenpaa, 1995).

In summary, the literature identifies four themes driving strategy and objectives in private-sector BPC. That literature suggests that successful BPC projects typically require a holistic strategic approach, have to be long-term oriented, while flexible in planning and implementing.

Research Question and Study Design

Study Question. E-Gov projects seemingly induce BPC in the public sector. However, assuming the BPC-related strategies and objectives to be identical to those employed in the private sector would be too bold an assumption, in view of the many known differences between the two sectors. Assuming, on the other hand, those practices to be completely idiosyncratic, would be an equally bold assumption given the many interactions and exchanges between the sectors. Informed by the private sector literature, this study, hence, was chartered to explore the strategies and objectives employed in completed e-Gov projects with a BPC impact, asking particularly:

(1) To what extent do strategic approaches and objectives in the context of e-Gov-induced BPC differ from those in the private sector?
(2) If those differ between the two sectors, how do they differ?

For answering the two research questions, each theme was summarized in one statement, in order to be used for probing in a semi-structured interview format. The statements read:

Theme #1 *(Holistic Approach)***:** Electronic Government requires a holistic view of the (governmental) organization, its culture, systems, processes, and stakeholder.

Theme #2 *(Long-term Orientation and Flexibility in Planning)***:** Electronic Government requires long-term view and flexible planning due to the iterative and disruptive nature of the change process.

Theme #3 *(Intertwining of Business and ICT Strategies)***:** Agency[1] Electronic Government programs and agency ICT strategies must be intertwined.

Theme #4 *(Modesty in Scope and Objectives)***:** Modest objectives and scope more likely lead to electronic- government project success than aggressive objectives and wide scope.

Sampling Method. The purposive sampling (Ritchie, Lewis, & Gillian, 2003) employed in this study focused on senior public managers who had supervised at least one major e-Government project. Study participants were recruited by email and/or phone and selected from official lists of top-ranked electronic government projects in New York State and Washington State. Priority was given to managers who had supervised very large projects.

Data Collection. Data were collected via a semi-structured interview format using the aforementioned four statements. In a series of twenty-three semi-structured interviews, thirty senior-level government managers from thirteen New York State agencies, and on the West Coast from four Washington State agencies, two King County (WA) agencies, and two City of Seattle agencies were asked to comment on the statements one at a time. Interviews were conducted with single individuals, with groups of two, and, in one case, with a group of three individuals. The interviews were conducted in person or over the telephone. Probing questions were asked. The interviews were audio taped and transcribed for analysis.

Data Analysis. In four passes, the data collected were analyzed. First, two researchers independently read the transcripts, one statement at a time assigning levels of agreements or disagreement on a Likert scale to each statement of every transcript. The Likert scales were then compared and discrepancies of magnitude (defined as a variance >1 on the scale) were discussed and resolved. In the second pass, the two researchers read the transcripts again, now one unit of data at time. In an open coding process, each unit of data was assigned to a preliminary category or sub-category whose dimensions and properties were developed from the data. New categories and sub-categories were introduced, in case existing categories did not apply independently. In a subsequent pass, an axial coding process was applied, during which the converged categories (emphasized in SMALL CAPITALS below) and subcategories were

[1] Here, the term agency acts as a placeholder referring to an agency, department, office, or other entity at any level or in any branch of government.

analyzed regarding their inherent structures and processes leading to paradigms, whose internal relationships were identified wherever possible. In the final pass, a selective coding process was performed, in which the resulting concepts and theories were related to each other.

Results[2]

In this section, the results are presented for each theme.

Holistic Approach. The vast majority of practitioners described a holistic strategic (or "enterprise-type") approach to e-Government projects, particularly, those with a BPC impact, as absolutely critical to project success. Only such an approach would allow understand the interaction of the system components, for example, multiple agencies, over time, a number of practitioners maintained. Among the various ASPECTS of this approach, many interviewees emphasized that e-Gov was about change and about redefining the service portfolio, and not just about automating old processes over the Internet. Hence, for effective change it was said a deep understanding of the underlying business needs and of the existing business process was critical in any e-Gov project. Since processes, business needs, and people were interwoven in many ways, the identification and involvement of salient constituents ("STAKEHOLDERS") was seen as important part of a holistic strategic approach, in which citizen orientation had the highest priority. This approach also encompassed establishing the link between stakeholders, their needs, and the technology implemented it was said. E-Gov leads to more integration requiring more standardization and collaboration between the parties involved according to quite a few interviewees. TOP MANAGEMENT SUPPORT was seen as important aspect of the strategic approach.

Long-term Orientation and Flexibility in Planning. Many practitioners maintained that in e-Gov BPC projects the long-term view came coupled with small-step projects, and vice versa, as a typical APPROACH. Novelty escaped traditional planning it was said, and e-Gov projects presented a new frontier. Hence, small steps best supported the exploration of the e-Gov potential, so was the rationale. E-Gov was not just about "webifying old processes," as the practitioners pointed out, but rather created a strong need for BPC, also providing a broader, more generic and systemic perspective on the business. Some practitioners were amazed about how much they had learned in those projects including about the existing business processes. Some others saw strong evidence in their practice that through e-Gov BPC projects old information systems and applications would be abandoned in the long run and be replaced by new systems, which better supported the new business model. Arriving at streamlined and redesigned processes was best done by involving stakeholders and by being open to their suggestions they said. E-Gov BPC projects typically endue an emerging project plan and implementation strategy. A benefit of the small-step approach it was said was to show short-term, "opportunistic," and tangible benefits and improvements to stakeholders. Also, dealing with the challenge of cultural resistance to change and building

[2] I am indebted to my assistant Thomas K. Richards at the Information School who helped conduct the interviews, organize the equipment, and who prepared the transcripts over numerous hours, He was also instrumental in organizing and conducting the data analysis and coding.

new relationships was easier through the small-step approach it was noted. Opportunistic wins could be thrown away later at relatively low cost, if they did not fit the strategic direction, according to quite a few interviewees. A large number of practitioners emphasized the iterative nature of the change process. The sum of carefully directed and re-directed small-step projects would result in an overall sweeping change over time it was said. Flexibility was seen as a key prerequisite for e-Gov BPC project success by a large number of interviewees. The long-term perspective provided for the tactical flexibility without compromising the direction of change it was emphasized. Similar projects might advance at different speeds depending on the particular locale some interviewees remarked. Through the long-term orientation important and necessary infrastructure extensions could be provided for early on, it was also highlighted. In some areas, e-Gov BPC projects affected a standardization of processes, procedures, and systems it was reported.

Intertwining of Business and ICT Strategies. The ICT strategy should mainly rest on the business STRATEGY it was repeatedly said. E-Gov projects seemingly played an important role in the intertwining of the two co-evolving strategies. Interestingly, it appeared in a few remarks that the e-Gov strategy had been mainly business- and not ICT-driven and had only recently been better integrated with the overall ICT strategy. In fact, it appeared that in quite many cases, agency e-Gov teams operated fairly independently from the IT/legacy departments. Many practitioners acknowledged that, since e-Gov induced BPC, it would require an enterprise architecture, which integrated mission, objectives, information, technology, and outcomes. At the technology side it was said that the intertwining of strategies also necessitated a set of consistent policies regarding infrastructure, security, firewalls, portal functionality, payments, appearance, and online help. FRAMEWORKS for interfacing and interoperability, although demanding to develop, paid off after some time according to quite many interviewees. With advancing towards transaction processing and interoperability in e-Gov BPC projects actually three strategies needed intertwining it was said. The attempts for intertwining those three strategies (ICT/legacy, e-Gov, and business strategies), however, apparently also were sometimes impeded by existing, stovepipe-type communication structures and also via political pressures to rush without thorough strategy development and integration it was said.

Modesty in Scope and Objectives. A foremost argument for advocating modesty in scope and objectives in e-Gov projects was MANAGEABILITY according to a majority of practitioners. Large projects it was said were difficult to manage, were less specific in scope, and would pose a higher acceptance threshold. In contrast, small projects, it was reported, had a narrow focus, shorter timelines, incremental and modular design, flexibility to act and react quickly, and allowed for gradual learning both internally and externally resulting in superior manageability compared with large projects. A whole host of tactical considerations favoring small e-Gov projects was given including (1) short completion times to foster the perception of project success, (2) tangible products and benefits to sell the project, (3) demonstrating feasibility, and (4) iteratively involving stakeholders and creating ownership. One practitioner bluntly held, "When you want to discover America, the first day you just get out of port." Another important argument in favor of modesty in scope and objectives revolved around the notion of RISK maintaining that smaller projects (1) had higher success rates, (2) commanded larger support bases, (3) better matched goals to resources, (4) were less

costly in case of failure, and (5) were better shielded against scope creep. Finally, although modesty in project scope and objectives was strongly supported, most practitioners pointed at the role of LEADERSHIP in providing vision, direction, and even stretch while orchestrating the interplay and advancement of smaller projects towards higher aims. It was repeatedly said that a "grandiose vision," which stimulated people's attention and imagination, was needed to guide the small projects and provide the context. The tendency towards too modest projects could be mitigated through some higher-level coordination it was said.

Discussion and Conclusion

This study has sought rich qualitative data for elucidating and better understanding the strategic approach and the objective in e-Gov-induced business process change projects. Frameworks and concepts formulated in the context of private-sector BPC guided the study in this effort. With the results regarding those areas in e-Gov BPC in hand, those frameworks and concepts may in turn now be cautiously assessed for their suitability and applicability to a public-sector context, which is briefly undertaken in the first portion of this discussion. In the second portion, the approaches and practices found are discussed in more detail.

The Suitability of the Private-Sector BPC Literature. Based on the results, a preliminary assessment of that suitability and applicability seems in order. If there is some indication that the frameworks and concepts from the BPC literature apply, the utilization of that rich literature in the context of e-Gov projects would appear as most recommendable, such that expensive lessons learned elsewhere may not be lost. When analyzing the results quantitatively, there was overall support for all four statements (e.g., statement #1=93.5%, #3=87.0%, #4=80.4%, #2=78.3%). In other words, the strategic approach and the objectives in e-Gov-related BPC are seemingly shaped through the following concepts:

1. A holistic approach seems to matter to highest degrees.
2. Intertwining business and ICT strategies seems to matter to very high degree.
3. Modesty in scope and objectives seem to matter to a very high degree.
4. Long-term orientation and flexibility in planning seem to matter to a high degree.

The identified approaches and concepts used in private-sector BPC appear to play a significant role also in the public sector. Hence, the private-sector literature might be utilized both as a guide and a point of reference in a more systematic fashion in e-Gov-related research and practice. This result also provides a partial answer to the first study question: The extent of differences in BPC-related strategic approaches and objectives appears to reside, if so, in details rather than on a grand scale or in principle.

Characteristics and Uniqueness of E-Gov BPC Approaches and Concepts. In this section, it is discussed how the e-Gov BPC approaches in the public sector differ from private-sector BPC. By and large, our results show, the differences are minor. However, in e-Gov projects typically a higher number of primary stakeholders with "go/no" powers seem to participate as a norm. Power appears to be more distributed in the public sector than in the private sector.

Hence, e-Gov BPC projects seemingly necessitate far higher degrees of consensus and support from salient stakeholders than typical in the private sector leading to higher ownership. Distributed control and accountability, however, comes with more distributed sharing of burden also leading to more ownership in process, project, and outcome. Due to its mostly consensual nature and also due to numerous legal, statutory, and regulatory requirements, e-Gov BPC projects take longer to complete than similar projects in the private sector, however, obviously with the benefit of much less staggering failure rates (in fact, reports on e-Gov project blunders seem to be still in short supply, if any). Public-sector projects (including E-Gov projects) thus may have some insightful lessons in stock, which may help inspire private-sector BPC practice as well.

In summary, as stated above, the differences between private- and public-sector BPC appear to be minor, and rather in degree than in kind. Hence, lessons learned may be shared between the sectors. The private-sector BPC literature may benefit from stakeholder approaches practiced in the public sector. Future research will seek more qualitative data regarding current BPC practices in both sectors, but also quantitative accounts on the basis of larger samples also for a more detailed comparison.

References

1. Balutis, A. P. (2001). E-Government 2001, Part II: Evolving Strategies for Action. *The Public Manager, Summer 2001,* 41-45.
2. Beaumaster, S. (2002). *Local Government IT Implementation Issues: A Challenge for Public Administration.* Paper presented at the Proceedings on the 35th Hawaiian International Conference on System Sciences, Hawaii.
3. Champy, J. (1995). *Reengineering management : the mandate for new leadership* (1st ed.). New York: HarperBusiness.
4. Davenport, T. H., & Stoddard, D. B. (1994). Reengineering: business change of mythic proportions? *MIS Quarterly, 18*(2), 121-127.
5. El Sawy, O. A., Malhotra, A., Gosain, S., & Young, K. M. (1999). IT-intensive value innovation in the electronic economy: Insights from Marshall Industries. *MIS Quarterly,* 23(3), 305-335.
6. Giaglis, G. M. (1999). Integrated design and evaluation of business processes and information systems. *Communications of AIS, 2*(1), 1-33.
7. Grover, V., Teng, J., Segars, A. H., & Fiedler, K. (1998). The influence of information technology diffusion and business process change on perceived productivity: The IS executive's perspective. *Information & Management, 34,* 141-159.
8. Gunasekaran, A., & Nath, B. (1997). The role of information technology in business process reengineering. *International Journal of Production Economics, 50*(1997), 91-104.
9. Hammer, M. (1996). *Beyond reengineering : how the process-centered organization is changing our work and our lives* (1st ed.). New York: HarperBusiness.
10. Hammer, M., & Champy, J. (1993). *Reengineering the Corporation: A Manifesto for Business Revolution* (First ed.). New York: HapperCollins Publishers.
11. Ho, A. T.-k. (2002). Reinventing local governments and the e-government initiative. *Public Administration Review, 62*(4), 434-444.
12. Kettinger, W. J., Teng, J. T. C., & Guha, S. (1997). Business process change: A study of methodologies, techniques and tools. *MIS Quarterly*(March), 55-80.
13. Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly, 18*(2), 122-136.
14. Mitchell, V. L., & Zmud, R. W. (1999). The effects of coupling IT and work process strategies in redesign projects. *Organization Science, 10*(4), 424-438.

15. O'Neill, P., & Sohal, A. S. (1999). Business process reengineering: A review of recent literature. *Technovation, 19*(1999), 571-581.
16. Pardo, T. A., & Scholl, H. J. J. (2002). *Walking atop the cliffs: Avoiding failure and reducing risk in large-scale e-government projects.* Paper presented at the Proceedings on the 35th Hawaiian International Conference on System Sciences, Hawaii.
17. Relyea, H. C. (2002). E-gov: Introduction and overview. *Government Information Quarterly, 19*(1), 9-35.
18. Ritchie, J., Lewis, J., & Gillian, E. (2003). Designing and selecting samples. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice : a guide for social science students and researchers* (pp. 77-108). London ; Thousand Oaks, Calif.: Sage Publications.
19. Scholl, H. J. J. (2003a, January, 6-9). *E-Govemment: A Special Case of ICT-enabled Business Process Change.* Paper presented at the 36th Hawaiian International Conference on System Sciences, Waikoloa, Big Island, HI.
20. Scholl, H. J. J. (2003b, September 1 to 5). *Electronic Government: Make or buy?* Paper presented at the EGOV 2003, Prague, The Czech Republic.
21. Scholl, H. J. J. (2004, May 24 to 26). *E-Government-induced business process change (BPC): An empirical study of current implementation practices.* Paper presented at the Submitted to the 5th Annual National Conference on Digital Government Research: New Challenges and Opportunities, Seattle, WA.
22. Stoddard, D. B., & Jarvenpaa, S. L. (1995). Business process redesign: Tactics for managing radical change. *Journal of Management Information Systems, 12*(1), 88-107.
23. van Wingen, R. S., Hathorn, F., & Sprehe, J. T. (1999). Principles for information technology investment in US Federal Electronic Records Management. *Journal of Government Information, 26*(1), 33-42.

Reorganisation of Government Back-Offices for Better Electronic Public Services

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Abstract. In a report recently completed for the European Commission on the reorganisation of government back-offices, eight major strategy options currently being pursued within the most advanced European eGovernment initiatives are identified and analysed as representing successful approaches in applying ICT to government. A clear and direct relationship was found between the benefits derived from digitising government back-offices and improvements in quality and transparency for users of eServices.

Major Good Practice Strategies

This paper reports on the results of one of the first surveys at European level (Millard et al 2004) to systematically research how public agencies are using ICT to reorganise, and the impact this has upon how electronic public services are experienced by citizens and business. The survey examined over 2,500 examples of the best eGovernment initiatives across EU-15, Norway and Iceland, and identified eight major strategy options currently being pursued within the most advanced initiatives in using ICT both to improve services and to reorganise back-offices.

Strategy 1: Digitisation of Largely Unchanged Back-Offices

Rapid progress in eGovernment often depends on whether or not there is a history of back office integration and cooperation, particularly if this incorporates interoperable legacy technology. Where this history has resulted in existing back-office(s) and legacy technology which are relatively well integrated and functioning successfully, it may not be necessary to undertake significant organisational or even technological changes when introducing eServices. In many cases, it can be quite easy and quick to simply digitise existing workflows and organisational inter-linkage, and/or just erect a virtual front office using web technology on top of the existing legacy technology in the back-office, or even some combination of both. In all such cases, the existing back office integration is more or less cemented as is. For relatively modest investment, this can lead to significant savings, improved jobs, better, faster and more transparent user services, and better user interaction, for example by giving the user greater access and more responsibility and control.

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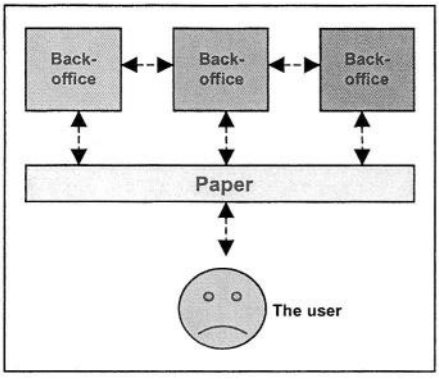
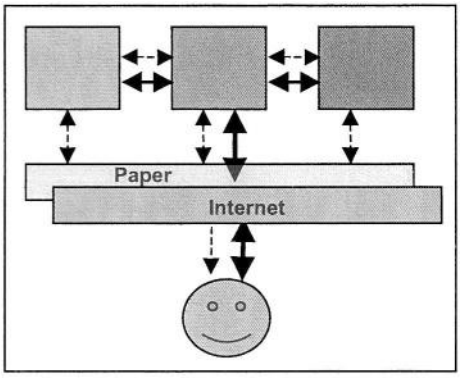
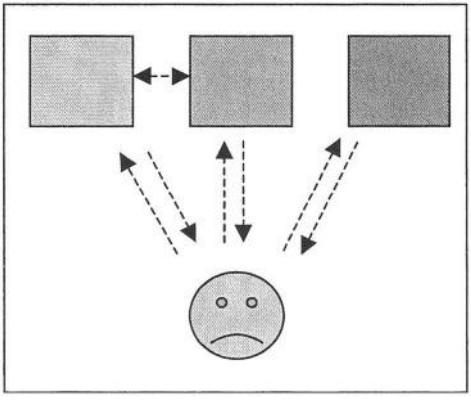


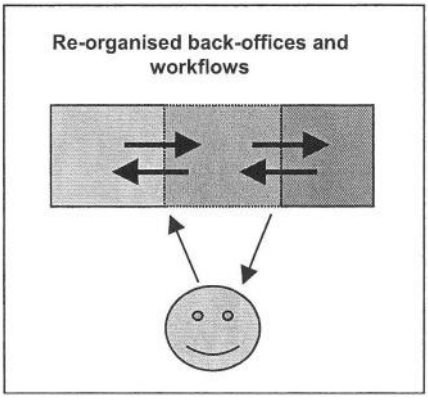


Strategy 2: Deep Reorganisation of Back-Offices

As described in strategy 1, the history of back office integration and cooperation is an important consideration when introducing on-line services and seeking to reap rationalisation and quality benefits. A given organisational configuration is often directly reflected in the technology which supports it, indeed they are normally mutually dependent, so a deep change in one would typically require a deep change in the other, thus making change even more challenging, potentially difficult, time consuming and expensive. However, deep change may be necessary if the back-offices are malfunctioning to any significant degree and/or the service is not living up to acceptable standards or is not meeting user demands. Whether or not deep change is occasioned by such a crisis, or propelled by central government initiatives or other irresistible drivers, the rewards can, on the other hand, also be considerable.

Contemplating a deep reorganisation of back-offices, and the concomitant front-office changes that go with them, can enable, indeed is often driven by, a complete rethink from scratch of the whole system and philosophy of service design, production and delivery. This may be the result of badly integrated back-offices, at least in relation to the needs of digitisation, or where the legacy technology is unsuitable (or too expensive) for continued use when improving services.

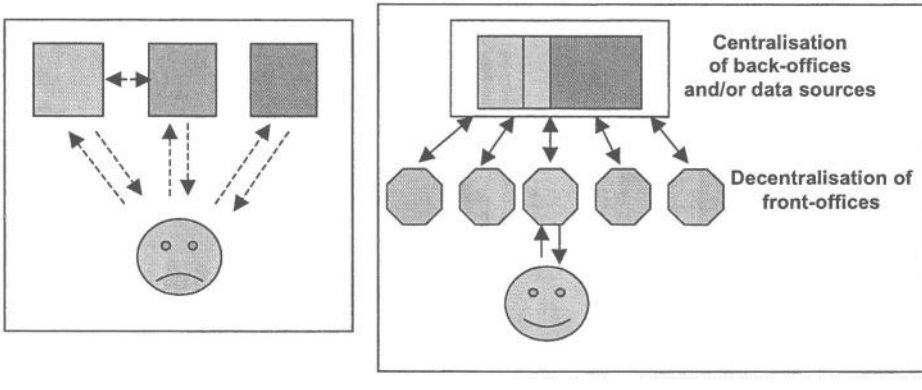




Strategy 3: Centralisation of Back-Office and De-centralisation of Front-Office Functions

An important strategy in eGovernment, driven by the need to increase efficiency whilst providing a more effective, higher quality service, is to centralise some or all back-offices and/or their functions (e.g. data-storing). Such concentration can provide strong rationalisation benefits which focuses expertise, reduces errors and time delays, and is able to exploit economies of scale which a large number of de-centralised units undertaking largely similar functions cannot hope to emulate. There may be legal or political barriers to such centralisation, as well as intractable problems resulting from a long tradition of separate operation and identity, but where these can be overcome, centralisation can provide significant cost savings and better services. A centralised back-office can sometimes appear in the guise of a 'middle-office' or 'shared service centre'.

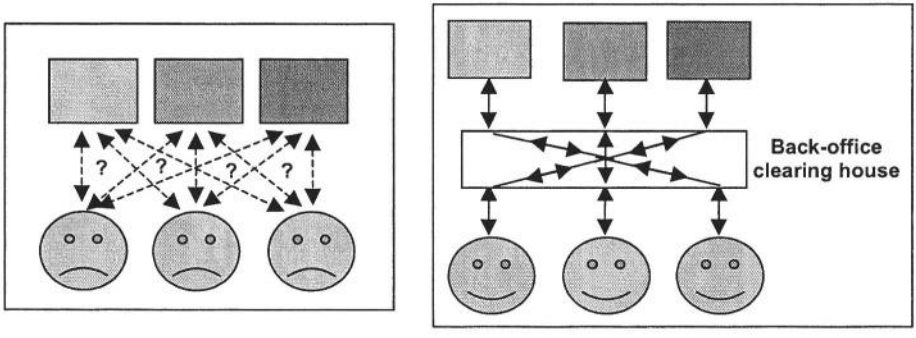
A concomitant to centralisation of the back-office is de-centralisation of the front office. Occasions when the latter can provide benefits often depend upon the type of service, and particularly whether there are direct user benefits resulting from multi-channel and devolved delivery. Such a situation can arise, for example, when an on-line service delivered from a centralised back-office or data-source is complemented by a series of local front-offices providing face-to-face support and advice, as well as necessary local knowledge. It can also be important to satisfy the interests of local democracy and subsidiarity, so that service delivery is adapted to suit local conditions. A centralised on-line service complemented by local refinement need not, of course, only be based on in-person delivery, as the interests of local relevance and local democracy could also manifest themselves in locally adapted on-line services.



Strategy 4: Back-Office Clearing House

An alternative to data source centralisation is the creation of a back-office clearing house. Whereas a centralised database of data sources contains the pooled data, and thus consists of both intelligence and raw data, a clearing house enables data exchange and data interoperability by providing intelligence which registers and routes data remaining in existing databases. The clearing house thus ensures data exchange compatibility where this does not exist, and thus may be a cheaper solution than the

wholesale centralisation of data sources where data standards, languages, semantics and syntax are incompatible and need to be able to communicate. A separate back-office clearing house can sometimes appear in the guise of a 'middle-office' or 'shared service centre'.



Strategy 5: Generic Types of Interaction Between User and Agency

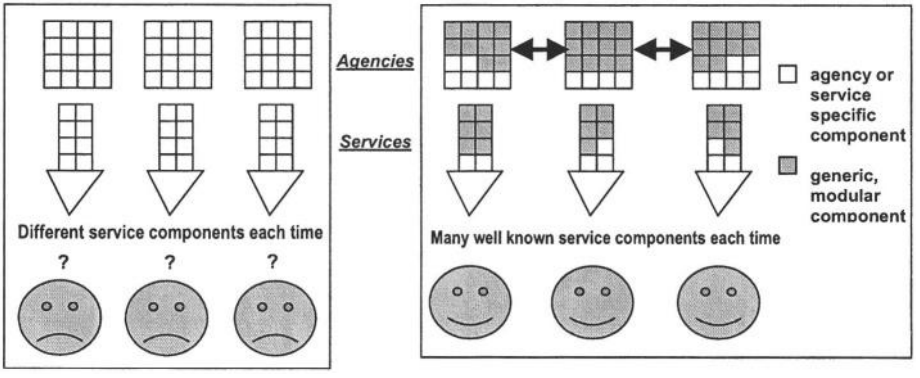
Many interactions between the user (represented by the front-office) and the agency (represented by the back-office) exhibit a large number of similar, if not identical, features. For example, at the front-end, web-functionality, accessing both general and specific information, accessing, completing and returning forms, making enquiries, identity management, making payments, etc. Similarly, at the back-end, agencies often need to provide all of the aforementioned, as well of course as digitising and rationalising work processes, providing security and data protection, implementing and exploiting knowledge management concepts, using standards in architectures, data formats, languages, semantics and syntax, linking to other back-offices and agencies, taking account of the needs of staff and of their skills and training, etc. There is a whole raft of potential similarities across many different types of on-line service, how they complement traditional services, and how back-office reorganisation takes place.

If given service or set of services does not share such similarities at the outset, it is likely to do so as a result of the re-think, re-design and digitisation which takes place. Indeed, this is an important driver of the digitisation re-think.

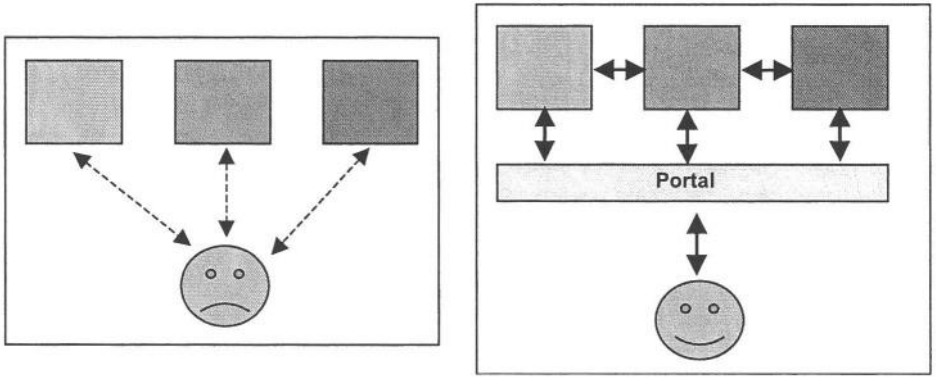
Economies of scale, as well as of scope, can thus provide many qualitative and efficiency benefits by standardising some common features to achieve savings, simplicity, ease of maintenance and upgrade, ease of use (whether by end users or staff) and re-use of successful features. These obvious benefits give rise to the development and use of generic types of interaction between a user and an agency, enabling the implementation of consistent services very fast and cost effectively. These systems can thus be made available at a relatively low price, and can also be designed to be locally customisable to fit any local systems.

Strategy 6: Portals

One of the major eGovernment trends of the last few years has been the development of portals. A portal, normally a web-site, provides users with an overview of, and



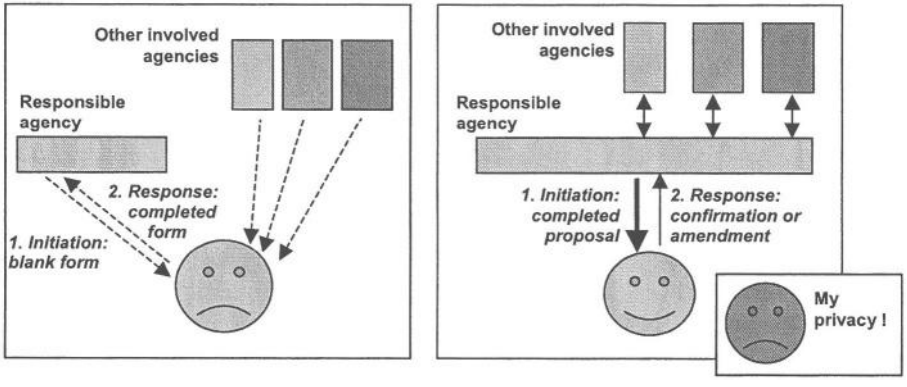
access to, related services, typically as a one-stop-shop rather than the user having to visit a separate web-site for each service. Services in the portal are normally related to each other in some way, so that typically the user will need, or will wish, to use two or more of them to fulfil a particular requirement. An advantage of portals is often that what previously were separate services now appear as one service concept consisting of a number of steps or options. It is also more apparent to the user when his or her data, once given, are re-used in each of the steps without the necessity of keying them in again. A portal also enables horizontal services, like payment and security (authentification management), to be easily accessed from whichever service, or combination of services, are being used.



Strategy 7: Pro-active Services

As back offices become more and more integrated and able to share data and resources, it becomes possible to offer users a pro-active service, i.e. a service for which the relevant agency takes full responsibility to initiate, deliver and fulfil. Thus, the input and responsibility required from the user is minimised and may even disappear altogether. This can be a huge advantage for the user, both because it removes the need to remember when, where and how the service should be used, but also because it saves time and effort. It can also be an advantage for the user where services are

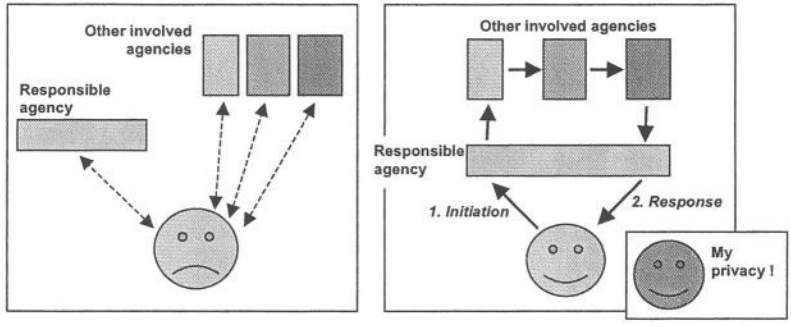
based on, what for the lay-person, can appear complex legislation, multiple rules and difficult to understand procedures, requiring expertise rarely possessed by the average citizen. For the agency, the ability to offer pro-active services can also bring important benefits. The agency can be assured that the service is activated at the right time and place, is efficiently and expertly fulfilled with no or few errors, and is not delayed by waiting for users to fulfil certain responsibilities or provide certain data.



Strategy 8: User Self-service

As shown in strategy 7, as back offices become more and more integrated and able to share data and resources, it is possible to offer pro-active services which require little or no responsibility from, or action by, the user. Another important strategy resulting from these same developments shows how it is also possible to offer the user, not less but, greater responsibility and control over a given service. This maximises transparency for users so they have direct access to, and control over, certain data and service components, because these data are now electronically accessible wherever they are within the public sector, making it possible for users to access and use them on their own initiative. Thus shifting responsibility and control for a service either to the agency or to the user are both enabled by digitisation and interoperability, and whether one or the other takes place is now a policy, rather than a technical, decision within the prevailing legal, institutional and cultural framework.

Shifting responsibility and control to the user can provide significant advantages, both because doing so enables users themselves to decide when, where and how the service should be used, and also because they can determine the precise features of the service they wish to exploit. It also enables users themselves to follow the progress of service implementation from initiation to fulfilment, for example by using transparent tracing and tracking functions. For the agency benefits include the likelihood that some tasks, such as data input and checking, are significantly reduced, thereby saving staff and other resources, as well as, in certain pre-defined circumstances, relief from the obligation of having to supply the service at all, given that the onus for service initiation is on the user.



Conclusions

Overall, the study reported on in this paper demonstrated that there is a clear and strong link between reorganising government back-offices and the electronic public services experienced by users. Back-office reorganisation thus matters a great deal: within public sector agency(ies) by reducing costs, increasing productivity, more flexibility, simpler organisational structures, greater interoperability, improving staff working conditions, etc. at the front-end for users by reducing the number of offices to visit, faster, cheaper more accessible services, fewer errors, more transparency, new possibilities, better service fulfilment, greater ease of use and greater user control.

The first strategic decision is whether existing coordination and integration between offices and agencies involved in producing a service can be improved without structural changes, for example, by only adding or changing an electronic gateway and electronic data interchange, or whether some degree of reorganisation seems to be necessary. (Strategy 1). However, as a first step in a long term strategy, this may be a good starting point to achieve quick results, as well as providing a platform for further steps. In most cases, however, structural reorganisation was considered necessary to improve cost effectiveness and/or the quality of service. As several offices and agencies are invariably involved, this becomes a complex process of inter-organisational change, which is highly dependent on the character and the traditions of the organisations involved, their legal and cultural environment, and many other factors. If structural changes are necessary, three basic strategies or models have been identified for improving coordination and integration between different back-offices:

1. Centralisation of previously separated back offices by placing them under one common management, as well as by integrating data bases. (Strategy 3)
2. Integration of previously separated and differentiated workflows into one inter-organisational workflow to which all agencies involved are obliged to adhere. (Strategy 2)
3. Setting up a clearing house as an additional office between existing agencies and offices to provide services such as the conversion of data exchange formats, integrate data bases, etc. (Strategy 4).

In relation to improving the quality of services and the user-orientation of the front-offices, another set of three structural strategies has been identified:

1. There is a tendency to combine and integrate services of different back offices with one face towards the user in portals which attract attention, give orientation, provide contextual information as well as common auxiliary (or horizontal) services. (Strategy 6)
2. As many services are built from very similar elements, standardisation of modules is a strategy which improves cost effectiveness as well as making services easier to use so that the user does not have to completely re-learn from scratch how to use a service they are using perhaps only once a year. (Strategy 5)
3. The third strategy is to improve user orientation by bringing front office functions closer to the user by decentralising services and/or moving them into physical offices which users frequent for other purposes. (Strategy 3)

The above three back-office and three front-office strategies are not mutually exclusive. For a given service, all three back office strategies may be applied and may be supplemented by different combinations of front office strategy. A decision also has to be taken about where the initiation of the service process should start, who is in control of the data, who has responsibility for service levels, availability, etc. Two different process-driven strategies are being used in this context:

1. In the proactive mode, the agency takes more and more responsibility and control and is more likely to initiate a service by collecting data and submitting declaration or application proposals to the user which s/he only needs to confirm. This implies a high degree of centralisation of data and may come into conflict with privacy interests and obligations. (Strategy 7)
2. The alternative option is to hand more and more responsibility and control over to the user so that they themselves are in a position to initiate a service and determine how it is used. (Strategy 8)

References

1. Millard, J., Iversen, J.S., Kubicek, H., Westholm, H., Cimander, R. (2004) "Reorganisation of government back-offices for better electronic public services – European good practices (back-office reorganisation)", EC eGovernment Unit, Brussels, January 2004: http://europa.eu.int/egovernment and http://www.beepgovernment.org.

e-Government Impacts at the American Grassroots: An Initial Assessment

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Abstract. Considerable hype often surrounds the potential of the Internet and the World Wide Web. This hype extends to governmental use of the web for the delivery of information and services electronically 24 hours per day/seven days per week (a.k.a., electronic or e-government). For example, Fountain (2001) argues that use of the web will literally transform government, especially by integrating governmental information and services in ways hitherto unimaginable. It will also reduce paperwork, decrease costs, and promote greater governmental efficiency and effectiveness. These and other claims about e-government are often made with great enthusiasm and optimism but with scant empirical data to back them up. In this paper, I apply a dose of what Pippa Norris (2001) calls cyber- realism to the actual results of use of the web by grassroots or local governments in the U. S. I begin by reporting findings from two surveys of American local governments conducted in 2000 and 2002 (D. Norris, Fletcher and Holden, 2000; Holden. D. Norris and Fletcher, 2003; and D. Norris and Moon, 2004 forthcoming). Next, I present data from focus groups that I conducted in late 2002 with COIs and other top officials of 37 city and county governments from across the US[1].

Initial e-Government Impacts – What the Surveys Tell Us

Surveys conducted in 2000 and 2002 found that 83.6 and 87.7 percent, respectively, of American local governments with populations of 10,000 or more had official sites on the web through which they delivered governmental information and services (D. Norris and Moon, 2004, forthcoming). At this writing, it would be reasonable to assume that adoption among these governments has exceeded 90 percent, and that nearly all but the smallest of local governments now have official sites on the web. Nevertheless, e-government remains in its youth, if not its infancy, at the local level. Extrapolating from the 2000 survey data, more than two thirds of local government web sites (68.5 percent) are seven years old or less today (D. Norris, Fletcher and

[1] This research was supported by a grant from the Digital Government Program of the National Science Foundation (award number: EIA-0131554-2). Although 37 governments participated in the focus groups, two of them sent two participants each. Hence, the number of respondents reported in Tables 2 and 3 equals 39.

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Holden, 2000). Because local e-government is young, any assessment of its impacts must be considered initial and, therefore, preliminary.

Nevertheless, the survey data provide an interesting window into the impacts of local e-government in the U. S. (Table 1). The first notable finding is that relatively few local governments reported any impacts at all. Less than three in ten local governments (28.9 percent) reporting any impacts at all in 2002 (up from 21.9 percent in 2000). Second, not all reported impacts were in directions suggested by the hype surrounding e-government. That is, they were other than positive. For example, in 2002 28.9 percent of the governments said that e-government actually increased demands on staff while only 15.0 percent said that it reduced time demands on staff; only 6.9 percent said that it reduced administrative costs; 1.1 percent said that it reduced the number of staff; and 0.8 percent said that it produced new revenues. Moreover, the fractions of governments in 2002 that said that business processes were being re-engineered (21.3 percent) or were more efficient (17.2 percent) because of e-government scarcely signal the transformation of government predicted by the hype.

Table 1. How has e-government changed your local government? -- The survey data.

	2000		2002	
	No.	%	No.	%
Increased demands on staff	344	21.9	616	28.9
Changed role of staff	323	20.5	570	26.8
Business processes are being reengineered	283	18.0	453	21.3
Business processes are more efficient	214	13.6	367	17.2
Reduced time demands on staff	135	8.6	319	15.0
Reduced administrative costs	79	5.0	147	6.9
Reduced number of staff	11	.07	23	1.1
Increased non tax based revenues	10	.06	16	0.8

Source: 2000 and 2002 ICMA/PTI surveys of U. S. local governments (see D. Norris and Moon, 2004, forthcoming).

Survey data, however, cannot tell the whole story. This is because surveys are not well suited for achieving depth or for probing for detail. Thus, I turn to evidence from the focus groups.

Initial e-Government Impacts – The Focus Group Results

The first responses (Table 2) are from closed ended questions that I asked of the focus group participants. Here, note that the top two positive impacts reported (each achieving unanimity or near unanimity) were increased contact with citizens (39) and re-engineering of business processes (36). Other significant positive impacts included increased efficiency of business processes (31) and that e-government met or exceeded initial expectations (28). Two reported impacts should be considered neutral – changed role of IT staff (38), and changed role of line staff (34). In discussing these two impacts, the focus group participants felt that the primary change in the role of IT staff was that they now were involved in creating and maintaining web applications versus supporting legacy applications. Additionally, the participants felt that as the result of e-government, IT organizations have become more end-user centric and

operate on more of a "service" orientation. (Interestingly, this continues a trend in IT department orientation begun by the PC revolution.) The principal change for line staff is that many of them are now involved in providing and managing content for their departments' web pages.

Table 2. E-Government Impacts: The Focus Group Data.

(Responses to closed ended questions – n=39)

Increased citizen contact with government	39
Changed role of IT staff	38
Business processes are being re-engineered	36
Changed role of line staff	34
Business processes are more efficient	31
Added costs to IT	30
Met or exceeded initial expectations	28
Added costs to line departments	27
Increased work for IT on staff	24
Increased the number of staff in IT	12
Produced new revenues	9
Reduced number of staff in line departments	1
Increased work for staff in line departments	0

Although not part of this set of questions (and, therefore, not found in this table), nearly all of the participants also said that e-government is a net add-on to what local governments currently do – not a substitution for it. E-government is just *one more way* to deliver information and services. This can also be seen clearly in the participants' responses to the following closed-ended questions: e-government added costs to the IT function (30); added costs to line departments (27); and increased the work load of IT staff (24). (At the same time, however, the participants did not believe that e-government had increased the workload in line departments.) These results (increased costs and work load) must be viewed as negative impacts and are certainly contrary to the litany of the hype.

Another potential positive impact e-government is said to be the substitution of technology for staff and, thus, reducing both staff and workload. According to the focus groups, this has not occurred. As shown above, 24 respondents said that e-government has increased the workload in IT departments. Moreover, 12 respondents believed that it has resulted in increases in the size of IT staffs. Further discussion revealed that in several other governments, IT staffing needs had also increased due to e-government. However, for budgetary or political reasons, it had not been possible to add positions to the IT department. Only one respondent noted that e-government had permitted a reduction in the number of staff in other departments.

The portrait that emerges from the focus group participants' responses to the closed ended questions indicates that while e-government appears to have produced some positive impacts in its early days, the number of positive impacts is relatively small. At the same time, however, several other expected positive impacts have not occurred and some negative impacts have occurred.

I also led the focus groups through extensive open-ended discussions of e-government impacts during which I also asked them to note their greatest disappoint-

ments with and their most pleasant surprises from e-government. The results are displayed in Table 3. There was a strong consensus (28 participants) that a major and important positive impact resulting from e-government was its citizen centric-ness. These participants believed that e-government served citizens well by making governmental information and services available electronically 24 hours per day, seven days per week. As several said, now citizens can be on line instead of having to be in line. They also felt that e-government promoted greater openness and responsiveness of government. For these reasons, they felt that e-government was popular with citizens.

Table 3. E-Government Impacts:The Focus Group Data.

(Responses to open ended questions – n=39)

Positive Impacts		
Citizen centric, openness, responsiveness, popularity	28	
BPR, productivity, efficiency, effectiveness	7	
Improve government image	6	
Speed or ease of e-government implementation	6	
Services 24/7	4	
Other	21	
Total	73	
Negative Impacts		
Internal governmental issues impeding e-government		19
Time to market		8
Vendor problems		7
Workload and cost		7
Slow citizen uptake		6
Legacy system problems		5
Marketing difficulties		5
Privacy and security issues		4
Other		30
Total		91

Beyond this single area of consensus, however, responses regarding positive impacts and pleasant surprises did not show any particular pattern. Seven participants gave answers that could be interpreted as suggesting that greater efficiency of government, often through business process re-engineering, was a positive result of e-government. Six said that a positive impact of e-government was that it helped to improve the image of government to citizens. Six focused on the ease of implementing e-government applications (versus legacy applications) as a pleasant surprise. Four pointed to the availability of services 24 hours a day seven days a week as a positive result. All other responses (21) were too scattered to categorize.

Regarding negative impacts and disappointments, nearly half (19) of the participants registered their disappointment that internal governmental barriers (most often turf, departmental autonomy, and lack of inter-departmental cooperation) impeded e-government. While not a direct consequence of e-government, these impediments nevertheless made e-government implementation and diffusion within individual governments more difficult. Other negative impacts or disappointments included: time to market (8), by which these participants meant that they were disappointed

with how long it took to roll out e-government applications[2]; vendor problems (7), meaning primarily that the IT vendors were not fully ready to support e-government applications; slow citizen uptake (6)[3]; problems integrating legacy systems with e-government (5); marketing difficulties, meaning difficulty getting word out to internal and external publics about the availability and potential of e-government (5); and privacy and security issues (4). Other responses (30) were too disparate and unrelated to categorize.

Conclusion

Based on data from surveys and focus groups conducted in 2000 and 2002, it is possible to draw a few conclusions about the initial impacts of e-government at the American grassroots. First, the survey data indicate that few governments are reporting many impacts at all. That should not be surprising since at this writing more than two-thirds of local government web sites are seven years old or less. Second, and as I have reported elsewhere, most local governments' e-government function remains fairly basic, principally involving the delivery of information and a few services. Moreover, few governments support online transactions (either financial or non-financial), and the movement toward developing transactional capability is slow (e.g., D. Norris and Moon, 2004 forthcoming). Therefore, the vast majority of grassroots governments have had insufficient experience to report many impacts. Additionally, although not within the scope this paper, a great majority of the focus group participants said that their governments do not formally track the results of e-government initiatives. Thus, they may have some difficulty knowing impacts.

Third, at least among local governments at this writing, there is no credible evidence that e-government is transformative. This is true despite the fact that many focus group governments reported that e-government is being used to facilitate business process reengineering. Such reengineering, however, is of internal processes and is being done to achieve efficiencies, not to transform governments.

Instead, e-government is an add-on to and not a substitute for what local governments already do. It is one more way to deliver services and information. Additionally, matters like turf, departmental autonomy, and lack of interdepartmental cooperation within and among governments continue to impede the development of a more integrated electronic delivery of governmental services and also hamper further e-government development and diffusion. More negative impacts were reported the enthusiasts and optimists might wish, including increased costs and work loads. And promised positive impacts like staffing reductions and increased revenues have not occurred.

Fourth, contrary to the cries of some critics, e-government is not all doom and gloom either. As seen above, e-government is producing at least some positive impacts and not all of the predicted negative impacts have occurred. For example, problems relating to privacy and security do not appear to have resulted from e-

[2] Note, however, that most felt that contrary to legacy applications, e-government applications were much easier to develop and roll out.

[3] Note that this is contrary to the view that e-government increased citizen contact and citizen centric-ness (but only five respondents so reported and most were from jurisdictions where citizen uptake of e-government had not been stellar).

government. Surely, local governments need to guard the security of their data and protect the privacy of users of their web sites. But, for the most part, the focus group participants felt that these were not issues of grave concern and were being handled adequately.

Fifth, although few governments reported positive impacts, at least some of those reported by the focus group participants appear to be significant, indeed. These include increased citizen contact, business process re-engineering, improved business process efficiency, and the citizen centric-ness of e-government. If these preliminary conclusions hold in the future, although e-government may not be transformative, it may nevertheless augur quite well for improved governmental information and service delivery. Note, however, that the focus group governments were "leading edge" adopters of e-government and, as such, would be expected to report more positive impacts.

What can we expect in the future? These initial findings suggest at least the following. Local governments will continue to adopt e-government until all but the smallest of them have official sites on the web through which they deliver information and services. Local e-government will continue to evolve, albeit slowly, away from being primarily informational. Local web sites will expand the number of transactions that they provide. The sites will also continue to develop greater sophistication in other areas – e.g. greater content and better content management, greater content and service integration, improved internal web site logic and easier navigability, greater use of graphics, more extensive development of true portals, and others.

As e-government changes over time – and nearly all of the focus group participants said that e-government is a "moving target" – its impacts can also be expected to change as well. While some of the initially observed impacts can be expected to hold true in the future, some will fall by the wayside, and other, often unanticipated impacts will be occur. Therefore, it will be important to continue to examine e-government at the grassroots both to track its evolution and impacts and to provide hard evidence to scholars and decision makers regarding this important new means of governmental information and service delivery.

References

1. Fountain, Jane E. 2001. "The Virtual State: Transforming American Government?" National Civic Review. 90(3): 241-251.
2. Holden, Stephen H., Donald F. Norris and Patricia D. Fletcher. 2003.
3. "Electronic Government at the Local Level: Progress to Date and Future Issues." Public Productivity and Management Review. 26(3): 1-20.
4. Norris, Pippa. 2001. The Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide. New York: Cambridge University Press.
5. Norris, Donald F., Patricia D. Fletcher and Stephen H. Holden. 2001. Is Your
6. Local Government Plugged In? Highlights of the 2000 Electronic Government Survey. Washington: International City/County Management Association.
7. Norris, Donald F., and Kenneth L. Kraemer. 1996. "Mainframe and PC Computing in American Cities: Myths and Realities." Public Administration Review. Vol. 56, No. 6 (November/December).
8. Norris, Donald F., and M. Jae Moon. 2004 (forthcoming). "Advancing E Government at the Grass Roots: Tortoise or Hare?" Public Administration Review.

Towards Flexible Geographic Information Infrastructure for e-Government

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Abstract. There is general agreement that spatial data and Geographic Information (GI) systems are important components of e-government infrastructure, both at central and local levels. However due to the complexity of the issue some fundamental problems have not been solved so far. In this paper the current state of GI system implementation is reviewed and technology neutral architecture of a GI system based on XML and recommendations for implementation of such a system is described.

1 Introduction

From the beginning of the existence of GI Systems (GIS) there have been activities which have encouraged the development of infrastructures to exchange geospatial data on the national level. The main goal was to specify standards, policies, and procedures that could help to share data between organisations, which give reference to the location. This kind of platform was named the National Spatial Data Infrastructure (NSDI, cf. [1]). In the process of building it many setbacks occurred which can be divided in the following two groups [2]: – semantic, schematic and syntactic heterogeneity, – heterogeneity of geospatial technologies. The GIS community has addressed the former category of difficulties by developing standards for data transfer[1], but this approach does not solve the problem. Proposed standards are large and difficult to implement. The latter category is also addressed, but the heterogeneity of existing system creates additional barriers for the smooth implementation of NSDI [4].

In our opinion the emerging standards based on XML provide new opportunity to solve existing problems, as well give us new horizons to future solutions.

2 Conceptual Development of NSDI

The first advocates of NSDI were government agencies, both at federal and local levels. They have maintained, for their own needs, information systems such as

[1] One example is SDTS (Spatial Data Transfer Standard) from US, which is defined as: "general-purposes, GIS-vendor-independent, intermediary for transferring geographical data between differing GIS software" [3]. The others are ALK from Germany and FEIV from France.

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property registry or road network management, which were obliged by law. After first implementation in the government environment other users have appeared, for example environment protection agencies and commercial organizations, like logistics firms.

Although the use of NSDI by various organisations seems to be unconstrained, the reason for building it is simple. The government organisation, knowing that local agencies create most geospatial data, offer them financial incentives in exchange for data. Another reason is promoting the re-use of data, which can eliminate the process of creating duplicated dataset. Examples of local registers of geospatial datasets are: a cadastral system, road network management, addresses, administrative boundaries, etc….

Dispersion and technological diversity of such registries create difficulties in the smooth exchanging of geospatial datasets, which encourage development of NSDI on the national and local levels. Interesting analysis of the experience in building national infrastructure in eleven countries can be found in [1].

3 GML: Proposal for Spatial Data Transfer

It was mentioned in section 1 that existing standards, such as SDTS, ALK and FEIV, for geospatial data exchange are hardly implemented by GIS packages. The main source of failure is associated with the extremely high cost of implementation of such complex specifications. The solution lies in incorporating broadly accepted XML standards.

The answer of the GIS community is the Geography Markup Language (GML), which is an XML-based encoding for the storage and exchange of geographic information, including both the spatial and non-spatial properties of geographic features. GML is based on the abstract model of geography developed by the OGC [5]. GML versions 2.0 and 3.0 [6] are based on W3C Schema [7] and define three base schemas for encoding spatial information.

The core concept of GML as a XML-based format is to separate content from presentation. In consequence spatial information can be reused, integrated and presented in many various ways. Compatibility with W3C core technologies, namely XSLT and SVG, is an additional advantage allowing seamless integration of non-spatial data. As the Internet is now the main-stream of publishing output of the data from various domains adaptation to globally accepted standards results in easy integration with non-spatial data and gives the possibility to use high quality and publicly available applications and technologies.

4 Heterogeneity of Geospatial Technologies

The variety of geospatial storage technologies is a serious obstacle to the integration of GI systems. Many GI applications are developed to solve specialized problems of particular organizations, for example cadastre systems. In such a case the spatial data model is not essential (for the end user) as long as the expected functionality of the application is provided. Problems do emerge when

heterogeneous GI systems are integrated in order to build multi-thematic data repositories. Two main problems emerge: the variety of semantic data models involved and the variety of technologies of spatial data storage used.

While the problem of semantic heterogeneity is widely discussed in the literature, the problem of technological variety is not. In our opinion both the former and the latter are serious integration setbacks hindering full integration of many GI applications. Like Abel [8] we divide GI technologies into three main groups: 1) flat files, 2) relational databases, 3) object-relational databases.

Flat files enable persistent storage of spatial data as binary-encoded objects linked with pointers. The detailed syntax of data structures is defined by the software vendor. The GI application, which belongs to this group, gives complex functionality but integration with other GI applications is usually very difficult.

Relational database management systems (RDBMS) store information in table-like structures. While this approach dominates the market for large data stores, it is in many respects inefficient for GI systems. In the result GIS packages store geometric data using proprietary formats while descriptive data are stored in relational databases. Almost all GIS vendors use the above architecture.

Object-relational technology augments RDBMS functionality with the ability of storing complex objects. Descriptive and geometric data can be combined in the same repository which results in a clear separation of data layer from GUI[2].

The above classification reflects the development stages of GIS applications from monolithic packages with data and user interface closely dependent on each other, towards flexible object-relational systems which enables development of multi-layered and multi-user systems for efficient storage of spatial data.

5 Towards a Technologically Neutral Standard

The heterogeneity of geospatial technology and the diversity of semantic, schematic and syntactic geospatial data models require flexible and scalable infrastructure to store, transfer and process geospatial data in a heterogeneous environment. Focusing only on the implementation of GML is not enough. There is also the need for flexible information system architecture. The solution to this problem is introducing a multi-layer architecture, where the common data layer would be created in technologically neutral standard.

The greatest advantage of the proposal is the flexibility and vendor independence. The end user can choose the optimal technology for data storage regarding his/her needs and/or financial abilities still participating in data gathering and exchange. The association with XML standards enable to use existing and bullet-proof libraries to process geospatial data. Based on commonly accepted meta-standards they can also be easily extended without eliminating existing technologies which often causes an unacceptable expenses for some of the participants. In our opinion only the strategy which guarantees independence of the participating units can be regarded as a sound approach to building an NSDI.

[2] See for example open source projects like deegree or geoserver, aimed at developing object-oriented application servers for spatial datasets.

6 Summary

The technological environment presented above establishes space to be covered by activities undertaken by government agencies in order to create open, flexible and unconstrained NSDI.

First of all, according to financial abilities and scale of interest, government authorities are the biggest producer and user of geospatial data sets. This causes the need for building infrastructure to exchange geospatial data in technologically neutral formats [9].

Moreover, NSDI encourages research on reference systems, which disseminate the theory of identifying objects located on earth by using a spatial referencing system. It also creates a baseline for further investigation of other semantic reference systems [10]. A single user is not able to maintain such broad and complex geospatial systems, but the possibility to reference for example a health service network, a distribution chain or even a single service point to the geospatial reference system maintained by government opens horizons for new solutions improving the quality of life.

What is more, in the process of designing and maintaining NSDI special attention should be paid to preventing data brokers of assuming a dominant position and thus enforcing antitrust laws [11]. This is especially important on the boundary between the public and private sectors.

References

1. Masser, I.: All shapes and sizes: first generation of national spatial data infrastructures. International Journal of Geographical Information Science **13** (1999)
2. Bisher, Y.: Overcoming the semantic and other barriers to GIS interoperability. International Journal of Geographical Information Science **12** (1998)
3. Arctur, D., Hair, D., Timson, G., Martin, E.P., Fegeas, R.: Issues and prospects for the next generation of the spatial data transfer standard (sdts). International Journal of Geographical Information Science **12** (1998)
4. Devogele, T., Parent, C., Spaccapietra, S.: On spatial database integration. International Journal of Geographical Information Science **12** (1998)
5. OpenGIS Consortium: Opengis abstract specification (1999) http://www.opengis.org/techno/specs.html#abstract.
6. Cox, S., Cuthbert, A., Lake, R., Martell, R.: Geography markup language (GML) 3.0 (2003) http://www.opengis.net/gml/.
7. Fallside, D.C.: XML schema part 0: Primer (2001) http://www.w3.org/TR/xmlschema-0/.
8. Abel, D.J., Ooi, B.C., Tan, K.L., Tan, S.H.: Towards integrated geographical information processing. International Journal of Geographical Information Science **12** (1998)
9. Tosta, N.: Building national spatial data infrastructures: Roles and responsibility (1997) http://www.gisqatar.org.qa/conf97/links/g1.html.
10. Kuhn, W.: Semantic reference systems. International Journal of Geographical Information Science **15** (2003)
11. Porter, M.E.: Clusters and the new economics of competition. Harvard Business Review **76** (1998)

Spatial Application Integrating Infrastructure

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Abstract. A spatial application-integrating infrastructure (PAI) is presented. Many utilities can use PAI to integrate a variety of spatial database, systems and business processes. PAI consists of integrating bus, adapter services, metadata database, PAI mediator and PAI Toolkit. PAI Toolkit is composed of a series of API and web services. Integrating Bus is a group of domain-oriented encoding standards and communication protocols; Adapter Service encapsulations are recommended as a good solution to integrate existing applications or systems; metadata database is the key unit of "PAI", which manages all data and services and shields heterogeneity and distribution of spatial data and services; PAI mediator is positioned to manage metadata and update spatial data online; the terms used in metadata are defined in OWL; all data and protocols are encoded in XML; Web service can operate with each other using SOAP protocol.

1 Introduction

"Digital City" is a type of great application construction that needs to use spatial syntheses analyzing, decision-making and event handling. People urgently need an infrastructure to support the integration of distributed spatial information and service, make them cooperative and supplemental with each other.

The goal of the integrating infrastructure is to implement interoperating dynamic assemblage and relax coupling of the distributed and magnanimity spatial information and applications in a city. The importance of integrating spatial information service has been known more and more widely, and researchers within and out of country have given out kinds of infrastructures. Hang Yuxia [1] and some others gave out the three-layer client/server spatial information-sharing infrastructure. DISGIS [2] gave out an infrastructure that provides the spatial applications developers and spatial information providers a series of models, methods, principles and toolkits to define, design and develop spatial applications systems. ISIS [3] advanced an infrastructure based on agent that has a semantic coordinator to sustain GIS semantic interoperation, and could solve semantic conflicts dynamically. Further more, there are BUSTER infrastructure of Bremen University, sharing infrastructure of OpenGIS and so on.

Above infrastructures gave a view to data interoperation level, but great city spatial application systems are faced with new challenges: (1) Need to integrate operation of many vocations and departments; (2) Need to integrate existed spatial application systems; (3) Need to integrate lots of commercial web services; and (4) Need to implement great dynamic integration. For these reasons, new infrastructure is needed to implement data interoperation, software interoperation, and application interoperation. This paper gives out new spatial information and service integration infrastructure, the PAI infrastructure (Peking spatial Applications Integrating infrastructure, PAI), based on XML/GML, Web Services, ontology and metadata technologies.

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2 Integrating Infrastructure

2.1 Overview of Integrating Infrastructure

As shown in figure 1, PAI infrastructure includes four layers: Web applications layer, integrating coordinator layer, distributed service layer and distributed information layer. Different Web applications get spatial information and application services through integrating coordinator layer. Integrating coordinator provide a series of Toolkit function packages and Web Services to support web application development, transparent accessing to or operating spatial information and services. Integrating coordinator is the core of the infrastructure, and is provided with metadata service, integrating coordination, and can manage resources, assemble services dynamically, implement semantic interoperation with ontology technologies.

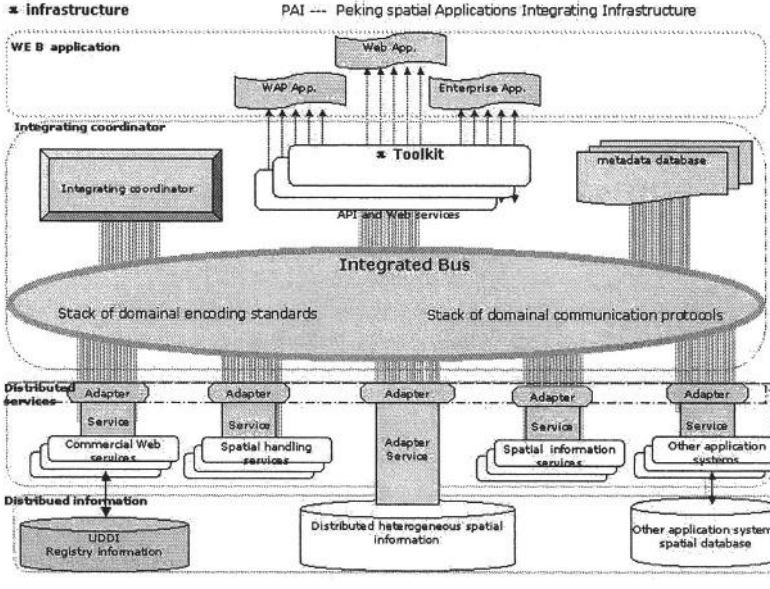

Fig. 1. Spatial Information and Service Integration Infrastructure.

(1) Web Applications Layer. Web applications need to invoke other heterogeneous distributed Web server systems of information or applications, provide application services to different operations. After getting users' require, if the require relate to spatial information, spatial service or other spatial application system function, they call related functions or web services of integrating coordinator to handle it, return information of GML format or others.

(2) Integrating Coordinator Layer. Integrating coordinator includes Integrated Bus, Integrating coordinator, Metadata Database and PAI Toolkit and so on. Integrated Bus is a bridge between spatial Web application, spatial information services, spatial handling services, commercial Web services and other spatial application systems; appli-

cation server programs in the Web application layer use API and Web Services provided by PAI Toolkit, and tool functions and Web Services dynamically assemble and relaxative couple the spatial data in distributed service layer and distributed information layer.

(3) Distributed Service Layer. There are five types of services in this layer: (a) Adapter Service. To make the non-criteria application services and databases integrated or to integrate other information and services, it is needed to program Adapter Services according to criterion, on the one hand to receive information that comes from the Integrated Bus, on the other hand to send its information to the Integrated Bus, such as transform services between different GIS platforms. Transform services means to get spatial data of united format (GML) from different data source. There are two kinds of data source: Spatial data files and databases of different GIS platforms; and General DBMS that sustain spatial information and services, such as Oracle Spatial. (b) Spatial Information Service. WMS (Web Mapping Service) Provided by GIS manufacturers, such as ESRI's ArcIMS service, MapInfo's MapXtreme service. (c) Spatial Handling Service. The service is used to handle information getting from distributed places synthetically according to users' requirements and their characters. The disposal includes syntheses, cutting down, routes analyzing, cash analyzing, three-dimension analyzing, statistical analyses, spatial calculation and so on. The goal of this is to provide users spatial information and services tally with their requirements recurring to metadata provided by catalog services. (d) Other Spatial System Web Service. To integrate other spatial application systems that have been running, it provides interfaces for Web Services, to be invoked by Integrating Coordinator to implement specified functions. (e) Commercial Web Services. It means that spatial commercial Web Services used by the system, such as commonable traffic changing services.

(4) Distributed Information Layer. Distributed heterogeneous spatial information databases are spatial information databases of different GIS format and distributed in different places. Distributed spatial information also includes UDDI registry center information database and other spatial application system databases.

2.2 Integrated Bus and Adapter Service

Integrated Bus is a set of encoding standards and communication protocols in fact.

(1) Function of Integrated Bus. The development of spatial information service systems is absolute in the early days. As shown in figure 2(a), it is developed by different developers for different goals.

It is more and more urgent to get data from several systems in distributed heterogeneous environments to making decisions. Developing methods as shown in figure 2(b) is in common use now, any user that gets information form N heterogeneous systems in different places needs different transform modules of the N systems to access and operate it, which means a high cost of time and money.

PAI infrastructure allows users to operate heterogeneous system information distributed in different places transparently in "one site" mode. Users need not to know the places, formats and memory modes of the information. Integration based on Integrated Bus has virtues compared to general integration (as shown in figure 2(c)): (a) It

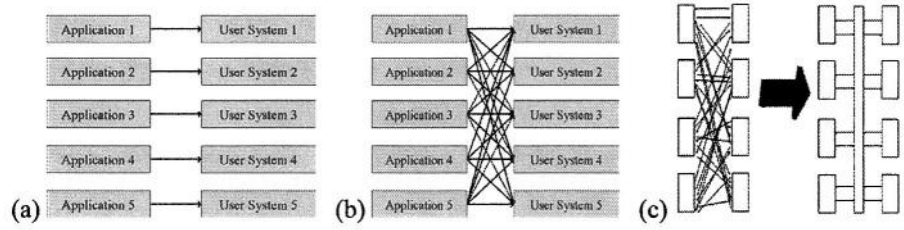

Fig. 2. (a)Systems developed absolutely; (b)System integration of general mode; (c)System integration based on Integrated Bus.

decreases the intensity of development. New programs only need an adapter Service to the Integrated Bus. Transform work reduced from N^2 to N, so it decreases the workload. (b) It fits great integration better. When increasing or decreasing an application, it needs not to modify other related applications. (c) It can implement dynamically assembling services based on Web Service structure, which increases its agility.

(2) Protocol Stack of Integrated Bus. Stacks of Integrated Bus' encoding standards and communication protocols are illustrated in figure 3.

PAI infrastructure includes TCP/IP communication servers, HTTP data accessing servers, SOAP services, and servers of these three layers all providing domain-oriented data access services, so it needs to define data access protocols for these three layer servers. These protocols are oriented to special domains. Clients of each layer can access domanial information and services according to these protocols.

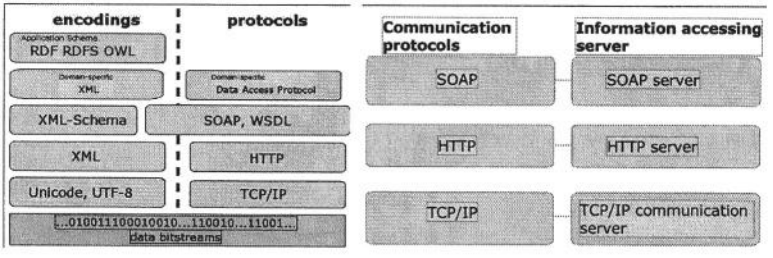

Fig. 3. Integrated Bus' encoding standards and communication protocols.

(3) Encoding of Integrated Bus. See Table 1. PAI also needs to define domain-oriented encoding of sharing information: Using RDF to define encoding of metadata; using RDF and XML to describe encoding of sharing information; using XML to describe encoding of communication protocols; and using RDFS/OWL to describe encoding of domain terminologies.

2.3 Metadata Database

Metadata database is the core of PAI, which is the basis of information sharing and interoperation. It manages and describes all the shared information and services in the integration system, supplies necessary descriptive information for data interoperation, software interoperation, and semantic interoperation.

Table 1. Encoding of integrated bus.

name	description	Functions in PAI infrastructure
XML	Structured surface layer syntax	all shared information described by XML , such as mutual information, metadata, communication protocols
XML Schema	structure restricted language to define XML document	to define syntax structure and data types of shared information
GML	spatial information defintion according to XML	to describe shared spatial infromation
RDF	objects(or resources) and data models of the relations between them, provide simple semanteme for data models	to describe semanteme of metadata and shared information
RDF Schema	vocabulary that describe RDF attributes and types of resources, provide semanteme for attributes and types	to define metadata and shared information's terminologyies and relation between them
OWL	Add more words to describe attribute and types, for instance, non-intersection, base, equivalence add more abundant attribute types; for instance, enumeration type	to definde terminologyies of metadata and shared information and relation between them(more abundant words)

(1) Content of Metadata Database. Information sharing and interoperation consist of three steps: information localization, information acquirement, and information comprehension. Every step needs supports from metadata. Information localization needs to know about the location, format and precision of information in order to realize data interoperation; Information acquirement needs to know about the platform of the information, accessing manner and necessary parameters for interoperating these information, such as user name, password, and number of port for the serve, in order to realize software interoperation. Information comprehension needs to definitely know the meaning of the phrases in the descriptive information in order to realize semantic interoperation. But the existing metadata standards only provide the metadata for data. PAI provides the metadata for software interoperation and semantic interoperation.

(2) Metadata Retrieval. PAI has set up TCP/IP Server, HTTP Server and SOAP service for metadata, through which clients can retrieval metadata.

(3) Framework of Metadata Database. Metadata database is distributed and layered, and every domain in PAI has its own metadata database.

2.4 Integrating Coordinator

Integrating Coordinator takes charge of many thing such as metadata in PAI, information sharing and applied services, resources state-information gathering, resource management, tasks management, tasks scheduling, task execution, data cache, data updating, semantic conflict harmonization, QoS management. It is a program of Web Applied server. Under the mediator, there are 4 parallel monitoring threads: Communication thread communicates with other services and acquaint their states; Planning thread divides a task into sub-services; task scheduling thread schedules sub-services; executing and monitoring thread monitors the executing of sub services.

2.5 Toolkits

Toolkits provides a set of APIs and Web Services that supply spatial information and services. Their API and Web Service separate client's requests into different sub-services, coordinate and integrate different spatial information service, metadata services, spatial dispose service (include transform service), business web service and Adapter Services of other systems, using metadata offered by metadata services, in order to achieve required function, shield the heterogeneity, distribution and semantic conflicts of data and services. This makes a developer needn't to pay attention to heterogeneity, distribution, semantic conflicts, and achieves interoperation of spatial data, software and semantics. The Web Service provided by PAI mediator makes it possible to be integrated into other spatial application.

3 Conclusion

PAI has achieved to integrate spatial information from different machines, different GIS platforms and different storage method successfully. Initiatively, it succeeds in data interoperation, software interoperation, application interoperation under distributed and heterogeneous environment, and integrating spatial information and services.

PAI provides a uniform sharing mechanism to access and retrieve spatial information for different user, different application in the cities. It is now be used in Digital Beijing, Digital Harbin and some other city emergency dealing systems.

Acknowledgement

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References

1. Huang Yuxia, *et al:* GIS Interoperation and Architecture (in Chinese), Geographical Research, 19(1): 86-92 (2000).
2. Roy Gronmo, *et al:* DISGIS: An Interoperability Framework for GIS – Using the ISO/TC 211 Model-based Approach, the 4th Global Spatial Data Infrastructure Conference, Cape Town, South Africa, http://www.gsdi.org/docs2000/capetown/gronmo.rtf (2000).
3. Eric Leclercq, *et al:* ISIS: A Semantic Mediation Model and an Agent Based Architecture for GIS Interoperability, Proceedings of International Database Engineering and Applications Symposium, P87-91, Montreal, Canada (1999).

Building e-Government Services over Spatial Data Infrastructures*

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1 Introduction

According to [1], eGovernment is defined as the use of information and communication technology in public administrations combined with an organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies. eGovernment has been defined as a priority in the eEurope 2005 Action Plan. However, many barriers and obstacles need to be overcome and sizeable investments are needed. Change processes in organization and culture are slow: it can take several years until the combined investment in information and communication technology, organization and skills deliver the full benefits. Strong political leadership and commitment is needed, guided by a long-term vision on the contribution of the public sector to Europe in the knowledge society. Forward thinking and innovation should be accompanied with concrete deliverables and results in the shorter term. The eGovernment initiative puts pressure on authorities to provide services online and accessible to the citizen. In turn, this necessitates improved information sharing between departments and joint working with other agencies and administration levels. As it is mentioned in [2], the most common eGovernment application is clearly oriented to provide citizens with access to information.

On the other hand, the main creators and users of geographic information are public administrations. In fact, around 80% of the databases used by them contain some kind of geographic reference (postal codes, cartographic coordinates...). This information is used for the implementation of the public services related with their role in the different levels of government. Spatial Data Infrastructures provide the framework for the optimization of the creation, maintenance and distribution of geographic information inside each public administration and across different ones. As a consequence of this, Governments start considering spatial data infrastructures as basic infrastructures for the development of a country. Spatial Data Infrastructures are becoming so relevant as

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the classical ones like utilities (water, electricity, gas), transport or telecommunication infrastructures. In this sense, it is necessary to remark some high-level political decisions that have as their main objective the promotion of spatial data infrastructures development. Maybe, the most relevant ones have been made in the United States of America (in April 11,1994, Bill Clinton signed the Executive Order nr. 12906 [3] for the establishment of the "National Spatial Data Infrastructure") and in the European Union (in November 2001, the E.C. launched INSPIRE – INfrastructure for SPatial InfoRmation in Europe – [4]).

Nevertheless, as [5] indicates in its Issue 1, the role(s) of geographic information and the associated technologies within eGovernment programmes are not currently registered and as such there is a need for the geographic information community to clearly demonstrate and present how geographic information and the associated technologies can contribute to the success of eGovernment programmes. If organizations integrated geographic information into the eGovernment process, things should work better. For instance, online services such as interactive mapping help agencies to serve citizens and businesses better. Furthermore, internal government operations (e.g., data management and warehousing, information exchange, and field force automation) are more efficient and flexible by providing data layers with a spatial perspective, over which the enterprise can be viewed. Additionally, the Issue 3 of [5] says that many of the infrastructure needs for a spatial data infrastructure (both hard and soft) are already included within many of the eGovernment programmes. This means that a spatial data infrastructure can provide interesting services for eGoverment. So, if there are many initiatives to build spatial data infrastructures, and they offer services that can be used by developing eGoverment services, why can not spatial data infrastructures be considered as the first step for developing eGoverment?

2 Developing e-Governnment Services

2.1 Spatial Data Infrastructures and Public Administration Levels

According to the model proposed by [6], the development of spatial data infrastructures should be organized into a hierarchy that includes infrastructures developed at different political/administrative levels. This model includes interconnected spatial data infrastructures at corporate, local, state (or province), national, regional and global levels. This structure is directly related with the structure of the public administrations. In this sense, each spatial data infrastructure provides a first set of core services (Web Mapping, Web Featuring, Web Coverage, Catalog, Gazetteer, ...) associated with the public administration level that has the responsibility of creating and maintaining the corresponding infrastructure level. Regarding this subject, each public administration is offering implicitly a minimum set of eGovernment services.

Additionally, these services provide a good base for developing new value-added services oriented to the satisfaction of specific functionality. Maybe the most immediate and prototypical example could be the direct access to the majority of the information of the public administrations. As it has been mentioned

before, most of the contents of the public administration databases can be related to a specific geographic location. This geographic reference could be used as a primary index for discovering the information by the citizens. In the same way, a citizen could have access to services that allow him to make a big number of administrative formalities related with elements having an associated geographic position such as business premises, home, or a plot of land.

2.2 The Ebro River Basin Use Case

This subsection presents a example of the job developed for the Ebro River Basin Authority (CHE: http://www.chebro.es) in order to facilitate citizens with the electronic access to the services provided by the Spanish public institution that is in charge of managing physically and administratively the hydrographical basin of the Ebro River (through planning, managing and investing).

One of its main activities is the analysis and approval of water point exploitations that are applied by particulars or companies. These exploitations must be granted in conformance with the river basin management plan objectives, and thus this department has to collect and maintain large sets of geodata, which are needed for this process (mainly thematic hydrological datasets and a water point inventory that stores over 50,000 water resource points). The origins of the GIS infrastructure at the CHE consisted of a set of applications oriented to provide tuned functionality for a perfectly established and experienced workflow process. But nowadays, this GIS infrastructure has evolved into an open spatial data infrastructure, which aims at fulfilling the new requirements originated from both the CHE work processes and the need of interoperation with other organizations. In particular, thanks to this new open strategy, different eGovernment services can be constructed and be offered to the citizens.

As it is stood by the Water Framework Directive in its 14^{th} article and by the Guidance on Public Participation in Relation to the Water Framework Directive [7], information supply is the base to allow consultation and active involvement in the management of the river basin to the general public, stakeholders and other authorities. This is achieved by giving public access to: the datasets created or owned by the CHE; and the up-to-date information stored in the inventory of water point exploitations. General public access to the data is achieved through a website, where a catalog search tool enables the users to specify queries and obtain information about the datasets that fulfill the query restrictions imposed. Users can browse the dataset metadata, access the web map server client to visualize its contents, and, eventually, download the datasets. Access to up-to-date inventory information is provided with specific html clients that query the web feature server and basic information results are shown. If the user is interested in further information, (s)he can browse a map with these results or request the same kind of informative reports or charts that are available inside the organization. Furthermore, much more specific services can be facilitated to individuals or companies that apply for water resources exploitation. Before submitting the application form, they can explore through a web map service client: the parameters of the catchment hydrological plan in the area; the areas

that are suspicious of over-exploitation; and the maximum caudal that is allowed at each location depending on other surface or groundwater resources in use in the surrounding area. This enables users to predict the likelihood of success of the request and to choose the best location to catch water from an environmental point of view.

Once an exploitation request has been made, specific and restricted services can be generated to keep the user informed about the process that it is being followed at the CHE: the present status, when that status was reached, or the additional documentation that may be required. Anytime a problem is found or once the petition is resolved, the user can get a copy of all the administrative and informative reports even before they are sent to him o her via postal mail, speeding up the whole administrative process.

3 Conclusions

The growing importance of eGovernment is putting pressure on authorities to provide services online and accessible to the citizen. In order to satisfy this necessity, Governments have to develop high-cost infrastructures in a short period of time and with diffuse specifications of the objectives and services. On the other hand, there are a large set of initiatives that have been launched to develop spatial data infrastructures. Given the large volume and complexity of geographic information, this kind of infrastructures are the basic tool for optimizing its management. Moreover, most of these initiatives are being promoted and sponsored by public administrations because geographic information is a basic resource in their operative work. Thus, this paper has proposed the development of eGovernment infrastructures over the spatial data infrastructures launched, viewing them as the providers of the first version of the eGovernment services. The consideration of spatial data infrastructures as the first stage for the development of eGovernment services is based on the high importance of geographic information in the implementation of public administration procedures.

References

1. European-Commission, eGovernment Unit (Unit C6): About eGovernment. http://europa.eu.int/information_society/programmes/egov_rd/about_us/text_en.htm (2003)
2. Marchionini, G., Samet, H., Brandt, L.: Introduction to the SPECIAL ISSUE: Digital government. Communications of the ACM **46** (2003) 24–67
3. U.S. Federal Register: Executive Order 12906. Coordinating Geographic Data Acquisition and Access: the National Spatial Data Infrastructure (U.S.). The April 13,1994, Edition of the Federal Register. Vol. 59, No. 71, pp. 17671-17674 (1994)
4. INSPIRE: Homepage of the INfrastructure for SPatial InfoRmation in Europe (INSPIRE): http://www.ec-gis.org/inspire/ (2004)
5. Corbin, C.: New Issues for the European GI strategy: eGovernment. D 2.9.2, GINIE: Geographic Information Network in Europe, IST-2000-29493 (2003) Available at http://wwwlmu.jrc.it/ginie/doc/d292newvf.pdf.

6. Rajabifard, A., Williamson, I.P., Holland, P., Johnstone, G.: From Local to Global SDI initiatives: a pyramid of building blocks. In: Proceedings of the 4th GSDI Conference, Cape Town, South Africa (2000)
7. Official Journal of the European Union: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The EU Water Framework Directive - integrated river basin management for Europe. L 327, 22/12/2000 pp. 0001-0073 (2000)

Political Aspects of Spatial Data Infrastructures*

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1 Introduction

The geographic information is the information that describes phenomena associated directly or indirectly with a location with respect to the Earth surface. Nowadays, there are available large amounts of geographic data that have been gathered with different purposes by different institutions and companies. Furthermore, the volume of this information grows day by day thanks to important technology advances in high-resolution satellite remote sensors, GPS, databases and geoprocessing software notwithstanding an increasing interest by individuals and institutions. Even more, it is possible to georeference complex collections of a broad range of resource types, including textual documents, real-time acquired observations, legacy databases of tabular historical records, multimedia components such as audio and video, and scientific algorithms.

Additionally, in most cases, data that are collected for a particular project are useful for other projects. This fact is even more pertinent with the recent "commoditisation" of data and information. The costs involved with data collection are taken into account in project planning, along with attempting to maximize the use of the data from a project. Furthermore, it should be also realized that some data required for particular decisions are transient and may no longer be able to be collected when required. An example of this occurs when decisions concerning agricultural practices must be made. These decisions will often require environmental data spanning over several years. This data must be collected when they are available, even if the need for them is not present at the time of collection, otherwise it is not possible to collect the data for past years when they are later needed. Thus there is a need to store this type of data in databases and make them accessible to others. These databases become a shared resource, which must be maintained continuously. Furthermore, one might be interested in the interoperation of those resources, which are maintained at the state or national level, and sometimes by private corporations. In such cases, coordinating authorities are needed to assign custodianship and usage privileges for subsets of the data to different users (which may be agencies). Users in the

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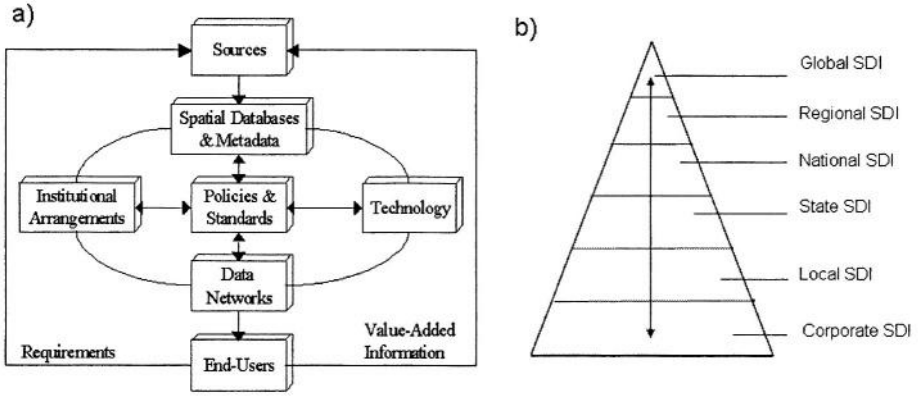

Fig. 1. a - A system view of the spatial data infrastructure components (taken from [1]); b - Spatial data infrastructure hierarchy (taken from [2])

general community are then able to expect the data to be available, and with network technology, to be accessible transparently. At this point, these collections of resources and services have acquired the status of an infrastructure: a Spatial Data Infrastructure.

According to [1] the main components of a spatial data infrastructure should include data providers (sources of spatial data), databases and metadata, data networks, technologies (dealing with data collection, management, search and representation), institutional arrangements, policies and standards, and end-users (see figure 1(a)).

Maybe, apart from technology component, the rest of the components shown in figure 1(a) have political implications. The following section details these aspects.

2 Political Aspects of a Spatial Data Infrastructure

2.1 Policies and Standards

Standards constitute the link among the different components of a spatial data infrastructures providing common languages and concepts that make possible their communication and coordination. However, the standardization processes in spatial data infrastructures involve not only the organization of data, but also issues related to the capture and integration of these data.

Additionally, as the volume of information grows, issues of quality and reliability are becoming more complex. The increase in the diversity of sources of information is an additional complicating factor. Problems of context, provenance and timeliness become much more complex with the added dimension of distribution. Users of on-line digital geographic information will tend to trust data that come from reputable institutions, with documented assurances of quality, and to mistrust data of uncertain origins, just as they do today by acquiring them off-line. In this sense, the active participation of public administration at all levels will be needed to guarantee a minimum level of quality.

Therefore, it is necessary the establishment of general guidelines (policies) to be followed by all the actors of a spatial data infrastructure. This guidelines should include several aspects such as architectures, processes, methods or standards. And the responsibility for the establishment of these guidelines should be assumed by public administrations. They are the necessary arbitrators because they have no private interests (especially, economic ones) in choosing one solution or another, i.e. their main interest is the social benefit.

2.2 Human Resources

The development of spatial data infrastructures must be done over the necessity of the users, both end-users and data providers (sources). On the other hand, the work to implement and maintain a spatial data infrastructure should be done by qualified teams of researchers and developers. All these people integrate the human resources that are necessary for the development of spatial data infrastructures. Governments are the only institutions which have enough capacity for providing the necessary human resources (directly or by sponsoring teams) for the development of spatial data infrastructures.

2.3 Institutional Arrangements

It is necessary the establishment of political decisions such as the creation of institutional framework. Agreements must be ratified to establish a national spatial data infrastructure, for coordinating the formation of regional spatial data infrastructures and for linking them to form the global spatial data infrastructure. As a result of developing spatial data infrastructures at different levels, a model of spatial data infrastructure hierarchy that includes spatial data infrastructures developed at different political-administrative levels was developed and introduced by [2] (see figure 1(b)). This model presents a spatial data infrastructure hierarchy that consists of inter-connected spatial data infrastructures at corporate, local, state (or provincial), national, regional and global levels. In the model, a corporate geographic information system is deemed to be a spatial data infrastructure at the corporate level (i.e., the base level of the hierarchy). Each spatial data infrastructure at the local level or above is primarily formed by the integration of spatial datasets originally developed for use in corporations operating at that level and below. This means that the realization of large-scale globally spatial data infrastructures depends as much on collaborative effort as it does on the development of new technologies in order to develop systems which truly integrate their components. The level of collaboration required, across disciplines as well as across geographical boundaries and Governments, will be much higher than one could have previously envisioned.

2.4 Spatial Databases and Metadata

Spatial data infrastructures should be created over the geographic data, stored in the spatial databases, and their description (metadata). In this sense it is necessary to take into account that the main creators and users of geographic

information are the public administrations. In recent years nations have made unprecedented investments in both information and the means to assemble, store, process, analyze, and disseminate it. Thousands of organizations and agencies (all levels of government, the private and non-profit sectors, and academia) throughout the world spend billions of euros each year producing and using geographic data [3]. This has been particularly enhanced by the rapid advancement in spatial data capture technologies, which has made the capture of digital spatial data a relatively quick and easy process. In addition, around 80% of the databases used by them contain some kind of geographic reference (postal codes, cartographic coordinates...). All this information is used for the implementation of the public services related with their role in the different levels of government. The participation of public administrations in the development of spatial data infrastructures is basic because they are the owners of the core data and metadata that should be provided.

2.5 Data Networks

Spatial data infrastructures should be open systems deployed over data networks that provide the channel for accessing the services from remote systems and users. As it happens with other basic infrastructures for the development of a country such as classical infrastructures (water, electricity, gas), transport or telecommunication, Governments should take responsibility for the coordination of the construction of a data network that facilitates the support of a spatial data infrastructure.

3 Conclusions

Nowadays, Spatial Data Infrastructures are considered so relevant as the transport or utilities (e.g. water, gas or electricity) infrastructure of a nation. And the creation of these infrastructures should follow a set of common strategies that makes possible the coordination among different initiatives. Despite the existence of a favorable environment for the creation of this kind of infrastructures, the initiatives launched are having a lot of problems in their consolidation. Far from being a problem concerned with the development of technology able to support the necessary services, the most complex problems to solve are those related with the political aspects. This paper has remarked the importance of these elements in the development of spatial data infrastructures.

References

1. Coleman, D.J., Nebert, D.D.: Building a North American Spatial Data Infrastructure. Cartography and Geographic Information Systems **25** (1998) 151–160
2. Rajabifard, A., Williamson, I.P., Holland, P., Johnstone, G.: From Local to Global SDI initiatives: a pyramid of building blocks. In: Proceedings of the 4th GSDI Conference, Cape Town, South Africa (2000)
3. Groot, R., McLaughlin, J.: Geospatial Data Infrastructure: concepts, cases and good practice. Oxford University Press, New York, USA (2000)

Fire Service in Korea: Advanced Emergency 119 System Based on GIS Technology

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Abstract. Fire service is one of the most important fields in e-government of Korea. In this paper, we introduce a pilot project for fire service currently operated at Daegu Fire Headquarter. For the project, we develop several components related to fire service and an emergency 119 system integrated with GIS technology. It supports information sharing between related organizations and mobile fire facility management. The system provides real-time information of fire service via Web. The developed system is efficiently used for fire extinction and rescue action, and will be also applied to other local fire service systems and extended to nationwide fire service system.

1 Introduction: Current Status of Fire Service in Korea

Disaster management is one of the most important topics in e-government, and many countries have concentrated on disaster management system and infrastructure for it. Because disasters can bring much loss of life and property, Korean government makes efforts to prevent and handle the various kinds of disasters. According to the annual report of disaster by Ministry of Government Administration and Home Affairs (MOGAHA) of Korea in 2002 [1], the traffic accident and fire are the two most frequent disasters in Korea, and fire occupies about 12.2% of all national disasters. In 2002, 32,966 fires were happened, 2,235 people were injured, and 130 million dollars were damaged.

In Korea, national-level fire service is handled as a part of disaster management, and its competent central government organization is MOGAHA. Fire Administration Bureau of MOGAHA establishes national strategy and long-term planning of fire service, and supervises local fire headquarters and their service systems. The 16 local fire headquarters have operated fire service system called emergency 119 system. Main roles of the system are to locate position of phone caller, to display the position on a digital map, and to dispatch fire engine or rescue unit. Actual rescue action and fire extinction operations are executed by local fire headquarters and their branch fire stations. Each local fire headquarter is responsible for detailed and actual operation system and infrastructure, so they are trying to construct better system for their own works.

However, similar projects for fire service are being executed separately by local government organizations, which may cause inefficiencies and duplicative

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investment. The systems cannot interface with each other since the systems are not interoperable and the data is incompatible. Other common issue in constructing fire service systems is integration with GIS capability. Fire service systems are usually tightly combined with GIS and have digital map in their own databases, because location and geographic information is essential for rescue and fire extinction operation. Further, with the rapidly developing information technology and rising interests of users, new requirements are emerging, such as sharing information among the related organizations and providing real-time information of fire service to the public.

2 Pilot Project at Daegu Fire Headquarter

We planned to improve national fire service and started with a pilot project at local government. We develop and enhance emergency 119 system as a pilot project at Daegu Fire Headquarter, because it has the most advanced fire service system and infrastructure among the 16 fire headquarters in Korea. To accept the requirements of actual users including e-119 system operator, we closely contacted with the officers of Daegu Fire Headquarter. The goals of the pilot project are: (1) to apply technologies for fire service to actual site; (2) to develop advanced emergency 119 system based on GIS; and thereby (3) to enhance the efficiency of fire service. The system has been developed since 2002 and launched at the end of 2003. When developing the system, we mainly consider the following issues to satisfy recent requirements.

Data and Information Sharing. By adopting open architecture and standardized interfaces when building the system, we can access different data sources located in several organizations. By sharing and utilizing geographic data among related organizations, the quality of fire service is greatly improved. For example, the information about gas station or underground pipeline that other organizations have will be very helpful when executing fire extinction or rescue action. The method to share data can also enable us to have consistent data and to eliminate data duplication between headquarter and branch stations.

Opening Information to Public. Fire headquarters need a method to provide real-time information of situation or statistics of fire service to senior officers and public. We provide real-time information of e-119 control center to officers of a fire headquarter, by a Web-based program that can show the information to whoever wants it. However, opening such information is now limited to inside a headquarter, because there is some security problem that is not resolved yet.

Extensibility and Portability. Because the necessary functions are developed as reusable components, we can easily apply them to newly planned fire service systems of other fire headquarters by changing some parts such as business logic and GUI. Such extensibility and portability can be obtained by conforming to domestic or international standards.

Supporting Mobile Works. The fire officers manually check fire facilities on site and save the data to the server after they returned to office. To reduce

the time for such works, we need a fire facility management system operated on mobile terminal or PDA. They check (and edit if necessary) fire facilities on site using PDA, and automatically transmit the data to database server at the control center in fire headquarter or fire station where they are working. Such support can make the works of fire station more efficient.

Our developed fire service system consists of 4 components and fire application. The necessary functions are implemented using components developed based on our previous 4S project [2]. The components conform to international standards of OGC (Open GIS Consortium) to support interoperability. Fig. 1 shows the overall system configuration. Brief descriptions of components are as below.

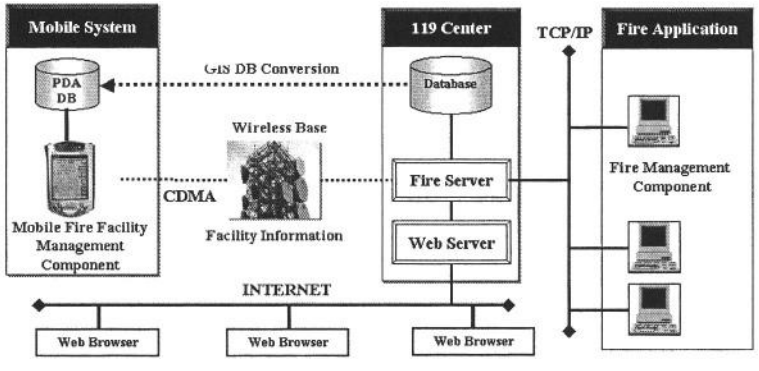

Fig. 1. Overall system configuration.

Fire Management Component. This component manages digital map, provides editing/searching for spatial and attribute data, and contains common business logic for fire service. It can access different data sources that are located in different organizations, such as telecommunication company, electric power corporation, and gas corporation. Such heterogeneous connection ability increases the capability of rescue action and fire prevention/extinction.

Fire Server Component. Because several operators in e-119 control center may access this fire server component at the same time, it should provide constant response time. This component maintains all client information and defines a protocol to provide some information to Web service component.

Web Server Component. We developed two Web server components: *FireWebServer* that supports multi-user access and management; and a control on Web browser called *FireWeb* that provides map control, address searching, fire facility searching, location searching of a disaster, and dispatching status of fire engine.

Mobile Fire Facility Management Component. This component is for fire facility management and is operated on PDA. To implement this component, we

design a data format for mobile device whose storage capacity is not large, and implement data converter between the data format and original data format. The component has basic functionalities that can be operated on PDA, such as editing, drawing, searching, and managing layers.

3 Expected Effects

The advanced fire service system discussed above will bring many effects. The extensibility and portability of the system will be improved because the components comprising the system conform to standardized interfaces. Utilizing reusable components based on open architecture, the cost for system construction and maintenance will be reduced. Also, sharing geographic data among related organizations improves the capability of fire service. By providing real-time information for fire situation and underlying geographic data via Web, efficient cooperative rescue action between related organizations can be possible. In addition, it is possible to provide real-time information of e-119 control center to officers of a fire headquarter, which will help more efficient decision-making. In the future, the related organizations and citizens also can get the necessary information about fire service via Web, which will bring a remarkable effect.

The pilot project is successfully being operated at Daegu Fire Headquarter, and recently, other local fire headquarters are also planning to use the system. In national viewpoint, such advance of technology related to fire service will promote the on-going plan of establishment of a new central government organization that is wholly responsible for fire service and disaster management.

4 Conclusion

In this paper, we present the development of advanced emergency 119 system for fire service as a pilot project executed on Daegu Fire Headquarter. The advanced emergency 119 system provides qualified service to the public, shares necessary information between related organizations and public via Web, and increases the ability and efficiency of fire service. The system is expected to minimize the loss of human life and property resulted from fire. The system is highly extensible because it is developed as reusable components in open environment. The system has been being operated at Daegu Fire Headquarter from last year. It will be tested and improved by feedbacks from actual operations on fire service. The developed system will be also applied to other local fire headquarters, and further extended as nationwide integrated system.

References

1. Ministry of Government Administration and Home Affairs: An Annual Report of Disasters in 2002. (2003)
2. In-Hak Joo, Ki-Won Lee, Min-Soo Kim, and Jong-Hun Lee: ISP (Information Strategy Planning) for 4S-based Integration of Spatial Information Systems as Korean Nationwide Project, Lecture Notes in Computer Science 2739, pp. 351-354. (2003)

M-GIS – Mobile and Interoperable Access to Geographic Information

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Abstract. This paper describes an architecture which can be used to access geographic information from mobile devices with limited display and processing characteristics, such as Personal Digital Assistants (PDA) or Mobile Phones. The information may come from different sources leading to an interoperable solution.
M-GIS obtains geographic information from sources described using Geogxraphy Markup Language (GML) from one or more *Web Feature Servers* allowing an access independent from its format or physical location, as long as the information is according to the specification.
Using XSLT, GML is transformed to a graphical format in Scalable Vector Graphics (SVG) which can then be manipulated in the mobile device.
M-GIS follows a client/server architecture and the client application was developed using *Java Mobile Information Device Profile* technology.
The results enable us to conclude that the mobile system, designed and developed with the use of open standards and representation formats to access geographic information, is a viable solution with some limitations. The main limitations of this approach have to do with the amount of information which the client can, at the moment, accommodate.

1 Introduction

The event of web-enhanced portable devices widens the way for a whole new series of personal and professional applications. It's becoming a common procedure to download utilities or leisure applications to use in one's mobile phone or *Personal Digital Assistants* (PDA). JAVA enabled platforms gave a broad contribute to this *status quo,* due to the "one-deployment-fits-all" approach.

In the Geographic Information Systems (GIS) application field, the potential has been identified: it's a world map in the palm of your hand, wherever you are, whatever you're doing and with no "strings" attached. This is carefully being explored by GIS and GPS companies at the pace that technology allows and strategy advises, having as main goal to achieve the best performance in a specific application for a platform of their choice.

Although this is probably the only way for a commercial approach, it is not the goal of the work presented in this paper. Of course that performance is

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desirable and was present on most of the choices during this development, but the main concern of this work was to achieve full interoperability for a cross-platform GIS application in mobile environments.

The requirements are high, but standards proved they are up to the task and a fully operational prototype was built. Performance is, predictably, its weakest point, but a few ways of improving it are also presented in this paper. On the other hand, the increasing processing capability of mobile devices, allied to broader communication bands sought for 3rd generation mobile networks, may help proving the added-value of solutions based on this prototype, specially for professional applications.

There are some implementations available for PDAs that are able to show the map of some area and may allow the search for locations of particular places or buildings. ArcPad [4] from ESRI, GeoGIS [5] from Geo InSight and PocketGIS [7] from Pocket Systems do not offer interoperable solutions, as they are limited to show information described in a particular format, usually from a particular vendor.

Mobile Geographic Information System(M-GIS) [1] follows a client/server architecture; it obtains geographic information from sources described in Geography Markup Language (GML) [6], using XSLT transforms it to a graphical format described using *Scalable Vector Graphics* (SVG) [11], which can then be manipulated in the mobile device.

Geographic information in GML can be served by one or more *Web Feature Servers* allowing an access independent from its format or physical location, as long as the information is according to the specification. The client application was developed using J2ME *(Java 2 Micro Edition)* technology, the profile MID *(Mobile Information Device).*

This paper continues by presenting in Section 2 an hypothetical situation, often experienced by work teams in public administration, in which M-GIS could prove of great value; Section 3 presents the M-GIS architecture design and shows a sequence of interactions with the M-GIS client application; Section 4 describes the implementation of M-GIS server and client; Section 5 presents an assessment of the technology used and, finally, conclusions and future work are presented.

2 Problem Description

This section describes an hypothetical situation, but one that is very real and often experienced by work teams in public administration, in which M-GIS could prove of great value. An inspection team for economical activities, "Team E", leaves to perform its daily work. Upon arriving to municipality X, which they did not visit for over 6 months, it urges to request updated information on cadastre, buildings or even roads, for the area they are aiming to inspect.

How to solve this problem? Each municipality will have its own GIS system, even inside the same city hall and sometimes different GIS technologies coexist. Which software is used? What kind of connection is needed?

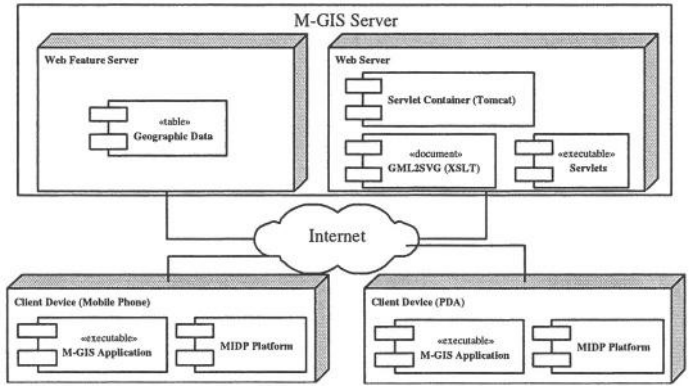


Fig. 1. M-GIS Architecture.

Now, another team, also from the public administration, but with a completely different set of responsibilities, decides to visit this same municipality. Will they have the same kind of devices than Team E, or a Java enabled mobile phone is sufficient?

This kind of scenario, where interoperability problems arise, lead to the requirements considered for M-GIS.

3 System's Architecture

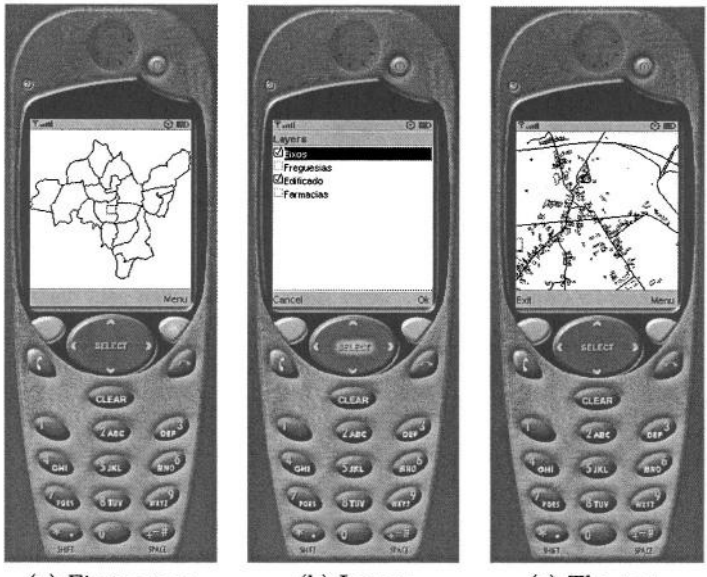
This section presents the architecture, designed and implemented to tackle the kind of problems sketched before, and describes the usage requirements that are devised for it.

The system's architecture is presented in Figure 1. The M-GIS system is composed by a *Web Server,* a *Web Feature Server* (WFS) and by devices with the M-GIS Client Application.

The geographic information is obtained from a *Web Feature Server* (WFS), which can itself be configured to get its data from other Web Feature Servers. The WFS provides geographic data in GML format which is dynamically transformed into Scalable Vector Graphics (SVG) upon a request by the client M-GIS Application. The transformation from GML to SVG is made using a XSL Transformation (XSLT) [10] and the resulting SVG document, that constitutes the map, is then sent to the client application for displaying.

The M-GIS Server

The server responds to two kinds of requests: list of available layers in the WFS and content of a specific area. The first is processed by asking the WFS for the list of available layers and passing it to the client. The second kind of requests triggers a more complex process. The area request is passed on to the *Web Feature Server* (with some syntax modifications) which will return a GML document



(a) First screen (b) Layers (c) The map

Fig. 2. Interaction sequence.

with the geographic data. This GML document will, in turn, be transformed to SVG by the server using a XSL transformation. Finally, the SVG document is sent to the client application.

All the communication between the client application and the M-GIS server is made through HTTP, with parameters sent in URL-encoded parameter-value pairs.

M-GIS Client Application

The client application is a Java MIDlet with the following main functionalities: select the area to visualise; pick the map layers to display; navigate the map: pan and zoom the view; search and identify features on the map.

Figure 2 shows displaying and interaction with the M-GIS Client Application. In this application, the user first selects the area to visualise over a pre-loaded map on the device (Figure 2(a)) containing administrative boundaries, in this case, at a local administration level. After the area has been selected, a list of available map layers will be displayed for the user to choose from (Figure 2(b)). Finally, the corresponding map will be displayed and the user will be able to pan, zoom, identify and search for features (Figure 2(c)). Once the map has been loaded into the device, all operations on it are made locally, i.e., there is no need to communicate with the server. The server only needs to be contacted if we want to load a different extent of the map.

4 Implementation

The M-GIS server was developed as a set of Java servlets and a XSLT stylesheet. As for the Web Feature Server, the Deegree [2] WFS was used since it is open source and free software. Both the M-GIS server and the Deegree WFS run on the Apache Tomcat servlet container. The XSL Transformation is done through the Java API for XML Processing (JAXP)[1].

5 Technological Assessment

As described in previous sections, M-GIS revealed to be a stable and agreeable prototype, with a very interesting degree of interaction with the user and fulfilling the initial requirements of interoperability towards geographic information data-sources and of platform independence.

The interpretation of the SVG document in the M-GIS client was built on top of kXML parser [3], since available implementations of SVG renderers required MIDP 2.0 [9] to run. This approach, allowed the prototype to execute on most graphical-enabled mobile platforms, because of the wide implementation of MIDP 1.0 [8], but introduced some degree of inefficiency in the client application.

Benchmarking demonstrated yet another bottleneck in M-GIS: the stylesheet-based transformation between GML and SVG. This transformation, implemented in this prototype through JAXP API, requires the creation of DOM trees, traditionally greedy in memory usage, that can turn out to be too lengthy if the requested area is too large or the number of features is too high.

6 Conclusions and Future Work

The main goal of the work described in this paper was to investigate the possibility of designing and implementing a mobile system, able to visualise and manipulate geographic information, with the interoperability of GIS systems in mind, i.e., by using formats and open standards. To assess these premises, an architecture was designed and a prototype called M-GIS was implemented.

The results of the M-GIS assessment conducted allow us to conclude that it is possible, but with some limitations. The main limitations are related with the amount of information that can be processed by the mobile client. The first limitation of the current devices have to do with the amount of memory needed to visualise a given map and the second with the amount of time needed to process it.

Another limitation of M-GIS is related with the graphical appearance, as the maps presented to the user are very simple due to the simplicity of the MIDP

[1] Due to publishing space constraints, sections on Transforming GML to SVG and on SVG Interpretation can only be seen in the online paper available at http://usic.inescporto.pt/papers/mgis_egov04.pdf.

graphics API used. This limitation could be overcome if vendor specific API were used but that would compromise the portability of the client application.

This limitation clearly indicate that M-GIS becomes more unusable as the amount of geographic information to be transformed and transmitted grows.

Besides the obvious improvements, like re-writing the GML to SVG transformation (server-side) and using native support for SVG rendering (client-side), the information layers can be annotated with maximum and minimum visible scale (for example, the edifications layer is only visible above the 1:5000 scale), reducing both transformation and transmission time.

In order to provide a better service, both for citizens and professional users, several new functionalities are thought and can be added to M-GIS:

Current location. Show the map of the place were the user is at the time. This service could be targeted at people visiting the city and requires support in the client device for identification of the place (in cell phones it is enough to use the information of the current cell).

Points of interest. Providing a list of interest points in the area being visualised could be added to help in finding, for example, the police or firemen stations in the area.

Global search. At the moment, search is confined to the area being visualised. A global search could be implemented allowing finding a place (a Street for example) and changing the visualisation area to that place, i.e., getting a new map centred in the place.

References

1. Jorge Cardoso. M-GIS: Mobile Geographic Information System. Report, INESC Porto, 2003.
2. Deegree. Deegree Project, 2003. http://www.deegree.org.
3. Enhydra.org. kXML Project, 2003. http://kxml.enhydra.org.
4. ESRI. ArcPad, 2003. http://www.esri.com/software/arcpad/index.html.
5. Geo InSight. GeoGIS, 2003. http://www.geoinsight.com.
6. OGC. *Geography Markup Language (GML) 2.0.* Spec., OGC, Feb 2001.
7. Pocket Systems Ltd. PocketGIS, 2003. http://www.pocket.co.uk.
8. Sun Microsystems. Mobile Information Device Profile 1.0a. Spec., Dec 2000.
9. Sun Microsystems. Mobile Information Device Profile 2.0. Spec., Nov 2002.
10. W3C. XSL Transformations, 1999. http://www.w3.org/TR/xslt.
11. W3C. Scalable Vector Graphics, 2003. http://www.w3.org/Graphics/SVG.

Implementing Spatial Analyzer Module into a Distributed GIS-Application

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Abstract. To improve the distributed spatial recovery by means of Geographical Information Systems (GIS), a Distributed GIS-Application (SIGHTAM) has been designed. This application is focused on recovering and making spatial analysis, throughout Spatial Analyzer Module (SAM). SAM contains several spatial and mathematical models that have been designed and implemented for detecting landslides and flooding areas. Users can make an analysis to recover the spatial data from different sites, using a specification based on Extensible Markup Language (XML), which is represented by Document Type Definition (DTD). Spatial data are stored into a spatial database. Moreover, all spatial processes are executed in the server application to improve the performance of the spatial analysis. SIGETAM is an application that has been developed to be used by the government of Tamaulipas state, Mexico. This application helps in the decision making process to detect risk areas.

1 Introduction

Nowadays, the spatial data present different formats and specifications such as scale, projection, spatial reference, representation type, thematic, DBMS type, and date. For these reasons, the *heterogeneity* of the spatial data complicates the geo-information retrieval to make spatial analysis [1].

In this paper, we propose a mechanism to make spatial analysis by means of Spatial Analyzer Module (SAM). SAM can recover geographical objects using a distributed environment. SAM is a tool designed to simulate and compute spatial and attributive properties with special methods focused on detecting landslides and flooding areas. XML is used to develop an encoding specification based on qualitative and quantitative properties of the geo-information.

The rest of the paper is organized as follows. In Section 2 we present the architecture and functionality of SIGETAM. Some obtained results are shown in Section 3. Section 4 exposes our conclusion related to the work.

2 SIGETAM: GIS-Application Architecture

The developed GIS-application presents client-server architecture. This tool contains the following modules: Enterprise GIS, Communication Module, Spatial Analyzer Module, Spatial Database and XML Administration Module. Fig. 1 shows the architecture of SIGETAM [2].

R. Traunmüller (Ed.): EGOV 2004, LNCS 3183, pp. 406–409, 2004.

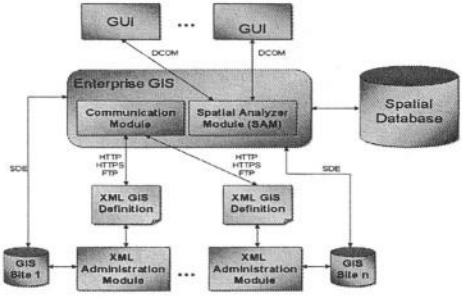

Fig. 1. SIGETAM: GIS-Application Architecture.

The functional mechanism of the GIS-application is the following: users need to make a request. This request is sent by DCOM technology to the communication module into the Enterprise GIS. This module processes the request and sends the parameters via HTTP or HTTPS protocols. In the remote GIS site, the XML administration module verifies the initial XML definition and queries the local XML definition to locate and compare the *qualitative* and *quantitative* characteristics of the spatial data such as scale, projection, spatial reference, representation type, thematic, DBMS type and attributive data. If the XML definition matches with the local XML definition, the spatial data will be recovered and sent by means of the Spatial Database Engine (SDE) mechanism and they are stored into the spatial database.

2.1 Communication Module into GIS-Application

The problem to interoperate a multi-vendor and distributed GIS can be divided into three parts: (1) Localization of the required data to perform a spatial analysis; (2) Remote access to the relevant data, and (3) Transformation of different data representations. In this work, we propose a partial but useful solution that treats the first two problems. We have been able to get rid of the first component of the problem, because in many cases GIS involved in analysis are distributed. However, all of them use the same technology provider. To locate the required data and to perform a spatial analysis, we include a module called *XML Administration Module.* It obtains the geo-information to know if a particular data source is relevant in a particular spatial analysis. The obtained geo-information is then codified in a XML description [3].

2.2 Spatial Analyzer Module into GIS-Application

SAM is a special module, which has been designed to make spatial analysis procedures. The main goal of SAM is to identify zones with high flooding and landslide probabilities. A specific analysis procedure has been designed for each one of the phenomena. The analysis is based on using different spatial data related to the case of study. SAM contains three components: *Analysis Block, List of Procedures* and *List of Resources* (see Fig. 2). 1) *Analysis Block* is composed by a set of processes to make data analysis. 2) *List of Procedures* stores the sequence of steps to find risk areas as well as the description of required data. 3) *List of Resources* contains the spatial and attributive data description that can be queried using the network.

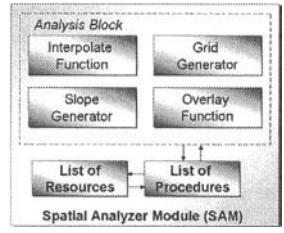

Fig. 2. Architecture of Spatial Analyzer Module.

3 Results

SIGETAM GIS-application is proposed to detect potential risk areas, which can be affected by flooding or landslides. The proposed approach has been applied to Tamaulipas State, Mexico. Some results are depicted in this section. Fig. 3 shows the spatial layers recovered from distributed GIS sites: drainage density, infrastructure, and population layers. Fig. 4 shows the areas with flooding and landslide risk. These areas have been retrieved from distributed GIS sites. The spatial data are stored in the local spatial database. The risk areas are concentrated at the center and south of the state. We present classified areas according to level of risk: low risk (blue), middle risk (yellow) and high risk (green), for this analysis a LandSat TM image has been used to enforce and improve the spatial analysis.

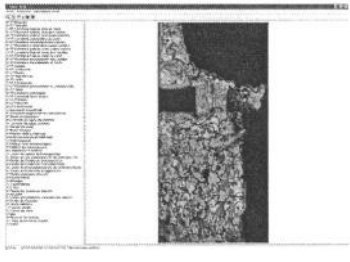

Fig. 3. Drainage density, infrastructure & popu-lations layers recovered from distributed GIS sites.

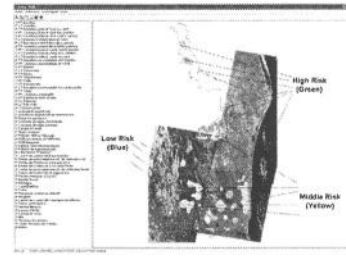

Fig. 4. Risk areas in Tamaulipas state, Mexico.

4 Conclusion

In this application SIGETAM works in a distributed environment. We propose a *XML specification* to partially solve the heterogeneity of the spatial data. With this application, spatial and attributive data can be recovered from different GIS sites, comparing their qualitative and quantitative properties by means of the XML description.

The system has been designed in *UML* and implemented into C++ *Builder.* This repository stores all recovered spatial objects from several GIS sites. This mechanism provides a topological model that is integrated by *class of elements.*

SAM is designed to make spatial analysis, related to natural phenomena such as landslides and flooding areas. Users can modify the selection criteria to have different scenarios. When the communication is established, SAM requires the spatial data by means of *List of Resources,* therefore the XML specification is compared with the local XML definition to verify the spatial data and recover the information from different GIS sites. This information is sent to the spatial database through the SDE. The mechanisms implemented in the *List of Procedures* can be modified and extended to apply the analysis of different phenomena. We propose a XML description, which can be used as a standard specification to partially solve the spatial data integration problem. This approach is an alternative to recover spatial data in a distributed environment, because the XML definition that has been designed can represent the ***spatial semantics*** of the geographical objects to find out solutions related to the spatial interoperability and heterogeneity.

Acknowledgments

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References

1. Goodchild, M.F.: Perspective: Browsing metadata, where do we go from here? Journal Geolnfo Systems, Vol. 10, No.5 (2000) 30–31.
2. Torres, M., Moreno, M., Quintero, R. and Levachkine, S.: "Implementing Web-Mapping Technology into GIS-Application to Recover Spatial Data", IASTED International Conference on Computer Science and Technology (CST'2003). Acta Press, Cancun, Mexico (2003) 170-175.
3. Arnold-Moore, T., Fuller, M., Kent, A., Sacks-Davis, R. and Sharman, N.: Architecture of a Content Management Server for XML Document Applications, Proceedings of the 1st International Conference on Web Information Systems Engineering (WISE 2000), Hong Kong (2000) 77-88.

Public Discussion of Oporto's Municipal Master Plan: An *e-Democracy* Service Supported by a Geographical Information System

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Abstract. The revision process of a Municipal Master Plan has a sequence of several steps that are to be executed. One of these steps, public discussion, is of great democratic importance as it allows citizens to actively participate in the management of the municipality through proposals and public debates taking place at a specific time and location in accordance to a previously published agenda.
With such a process running at Oporto's municipality, and with the aim of reaching as much citizens as possible through the removal of spatial and temporal constrains, an effort was made to develop an electronic service for citizens, to complement the usual methods of public participation. In this paper[1] we present the results of such service.

1 Supporting *e-Democracy*

Municipal Master Plan's (PDM) revision process goes through a sequence of several steps as it is presented in [1] and [2]. One of these steps, known as *Public Discussion,* consists of the public presentation and public debate of the new proposed plan through events taking place at a specific time and location in accordance to a previously published agenda. Since the local authority has the legal duty to ponder all public made proposals, as well as the duty to answer every information request, during this period, this act is of great democratic importance. It allows citizens to actively participate in the process taking place, and to contribute to the final PDM revision. The main problem is that spatial and temporal constrains are increasingly placing citizens apart of the participation in such acts, as can be seen by the usually low participated previous revision processes.

With the intention of reversing such tendency, an effort was made to develop a new electronic citizen service (Fig. 1), as part of the e-services component of the Oporto's Municipal Urban Information System [3]. It aimed to reduce time and space barriers to public participation, allowing citizens to participate, electronically, in the Oporto's PDM revision process, thus creating a major instrument of *e-democracy*[4]. In [5] other advantages to the use of *e-democracy* are presented.

[1] Full version available at http://usic.inescporto.pt/papers/sinup_egov04.pdf

R. Traunmüller (Ed.): EGOV 2004, LNCS 3183, pp. 410–413, 2004.

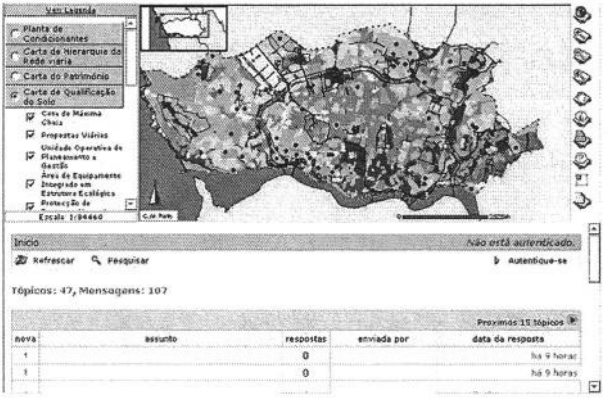

Fig. 1. Service main page.

2 Service Description

The citizen electronic service provides, among others of less importance, the following functionalities:

Anonymous participation: Anonymous users can access all the information available in the service, e.g, can access to PDM legislation, can follow discussion through posted messages, can view, search and query map contents and can search messages by alphanumerical and geographical input.

Registered participation: Besides every functionality available to anonymous users, registered users can post messages and create new discussion topics.

PDM legislation: The PDM proposal is supported on specific legislation, which citizens can consult online and oppose with the visualized proposal maps.

Public event agenda: The public agenda is available promoting the traditional formal procedures for public participation.

Message georeferenciation: The service provides ways to associate an area of interest to a posted message. This functionality is a value added frame, concerning other users understanding of posted messages.

Messages Geographical search: The ability to search posted messages and topics of discussion by geographical area is also available. It provides a way for citizens to easily locate messages related to a specific area and to avoid redundancy on discussion topics.

Map navigation and queries: It allows basic map navigation functionalities and specific queries on geographical information (GI) returning the corresponding textual description and pointers to the legislation.

Local authority involvement: This is not a service functionality, rather it is a local authority's commitment to the development of *e-democracy* at Oporto. In this way, the local authority participated in the electronic discussion forum at the highest level, answering directly to questions and proposals made by citizens.

Table 1. New proposals (%) during public discussion (adapted from [6]).

Through the online service	66%
Through visits to local government	21%
Through informal contacts and interviews	13%

Table 2. Online participation (adapted from [6]).

Registered Users	459
Active Users	93
Exchanged messages	813

Table 3. Public discussion daily averages (adapted from [6]).

Kbytes	352.616,99
Visits	351
Hits	37.248

3 Results

As indicated previously, the main goal of this service was to promote the public interest and participation in the discussion of Oporto's PDM (city population approximately 300.000 inhabitants). Publicity about the event and about the electronic citizen service was made at local and regional level.

Public participation. It was observed that the affluence to this *e-government* service was higher than initially expected, and promoted the formal means of public participation such as conferences and interviews. That was reflected by the growth of new proposals as compared with previous revisions. Even so, proposals made throughout the web environment were substantially higher in number than through other means (see Table 1), this way the *public participation* objective has been reached.

Public interest. Even with such participation growth, only a small percentage of initially registered users had an active participation in the public discussion (see Table 2), which means, and according to the web server daily statistics for this time period (see Table 3), that most of the users preferred to follow the online discussion, or used the service only to visualize the maps and legislation, rather to actively participate.

Side Results. Several side results where identified as consequence of the success of this *e-government* service such as: national level media coverage of the event; the approach to citizens that are concerned about municipality matters; some new proposals for Internet interfaces between local authority and citizens were made.

4 Conclusions

Citizens are interested in public local government matters, but most of the times, due to several constrains, the active participation is sparing. This consequence is not only due to spatial and temporal constraints but also of the lack of easy access to public relevant information.

The availability of electronic citizen services provides means to overcome most of the constraints identified. Yet, not all electronic citizen services are *e-democracy* instruments. The service provided by the local authority to support the PDM public discussion, inherits the aspects of a electronic citizen service and also allows citizens to discuss Oporto's urban development rules and constraints that will prevail for the next years.

Such a service proved to bring positive contributes to every actor in this process: the local authority got feedback from public relating critical aspects of the city; it provided the means to a broader discussion, besides the traditional ways; the citizens had a mean of expressing their opinions and clearing doubts; by removing several constrains, the process involved a broader group of citizens that, in other way, wouldn't have participated.

Once the debate was unmoderated, the need to register in order to participate proved to be an effective way of avoiding the jeopardize of the discussion by a single or a group of citizens.

Due to this service success, the local authority will provide similar means of participation, but with a broader scope, in order to bring citizens more close to municipality's problems, resolutions and decisions.

References

1. Alexandre Carvalho, Artur Rocha, and Marco Amaro Oliveira. SINUP: Using GIS to Support e-Democracy. In *Proceedings of the 2nd International Conference EGOV2003,* 1-5 September 2003. Prague,Czech Republic.
2. Imprensa Nacional-Casa da Moeda. Decreto-Lei 380/99 de 22 de Setembro. Diário da Républica I Série-A nr.222, 22 de Setembro 1999.
3. Alexandre Carvalho et al. SINUP – Sistema de Informação Urbana do Porto. In *Proceedings of the VI Encontro de Utilizadores de Informação Geogr'afica,* 28-30 November 2001. Oeiras, Portugal.
4. Steven Clift. e-Democracy Resource Links, 12 May 2003. `http://www.publicus.net/articles/edemresources.html`.
5. Hilmar Westholm. e-Democracy Goes Ahead. The Internet as a Tool for Improving Deliberative Policies. In *Proceedings of the 1st International Conference EGOV2002,* pages 240–247. Springer, 2-6 September 2002. Aix-en-Provence, France.
6. Câmara Municipal do Porto. Indicadores de Utilização do Fórum de Discussão Pública do Plano Director Municipal, 10 February 2004. `http://www.cm-porto.pt`

Geographic Information and Public Participation in Environmental Decision-Making

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Abstract. The protection and enhancement of the environment is the main aim of most environmental decision-making processes, and the use of geographic information as well as public participation can improve the quality of both the processes and the decisions. The current paper describes the use of geographic information in environmental decision-making and gives an overview over the various approaches to public participation. Finally, the methods and techniques is illustrated by experiences from practical wind turbine planning in Northern Jutland County, Denmark.

1 Introduction

The protection and enhancement of the environment is the main aim of most environmental decision-making processes, and it is often emphasised that the use of geographic information and active involvement of the citizens can improve the quality of both the processes and the end decisions. The Conference on Environment and Development (Earth Summit) in Rio de Janeiro in 1992, principle 10 [7] and Agenda 21 [8] both called for increased public participation in environmental decision-making. This led to the adoption in Europe of the Aarhus Convention [6], which grants the public rights to information and public participation. Agenda 21 emphasises the role of geographic information in monitoring and analysing the state of environment globally. The current advances in e-Government in many countries contain great possibilities for supporting good governance based on information and knowledge on the one hand and active involvement of the citizens on the other hand. One important precondition for success in this field is a well-informed population with access to the Internet.

The overall purpose of this paper is to give en overview of how to utilise geographic information and public participation as natural components in environmental decision-making. After the introduction I address various aspects of environmental information and public participation. Next, I describe how geographic information and public participation have been used in practical wind energy planning in the Northern Jutland County (Denmark). Finally, I have some concluding remarks and present for you some ideas for following up activities.

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2 The Spatial Dimension of Environmental Information

Almost all themes of environmental information (e.g. water, soil, biodiversity, etc.) have a spatial dimension. All interactions between the living environment of the citizens and the effects of the environmental policies occur at certain spots on Earth. This common spatial dimension is very important for the environment and other sectors that need to integrate in environmental considerations. GIS modelling tools provide capabilities for analysing and visualising the space / time distribution of environmental phenomena. Computer simulation models help us to understand better the ecological and physical processes involved in transport, accumulation and degradation of pollutants and materials and can predict the way in which environmental situations may change for good or worse. However, developing an efficient environmental model is not easy. Most environmental processes show complicated interrelations, both in space and time as mentioned above, leading to numerical models with a complex mathematical structure. Also, environmental models require huge amounts of data, often coming from many sources. During the last few years there has been an overall trend towards geographic information systems becoming more powerful, easier to use.

3 Public Participation

The main purpose of environmental decision-making and thus the main purpose of public participation in this matter is to achieve protection, conservation, and wise management of the environment. This can only be achieved if all the interested or affected stakeholders are fully involved in the decision-making process, and from the earliest possible opportunity. The level at which the public is involved varies - often it just means informing the public of a previously made decision and asking for comments, which may or may not be taken into consideration. For public participation to be effective at any level, it requires the public to be well informed and kept aware of the possibility of participation. Arnstein [1] claims that the involvement of the public in decision-making represents a redistribution of power from the authority to the citizens. He describes the public participation by a 'ladder' with 8 rungs each representing the level of citizen participation. The uppermost ladder representing 'citizen power', involves public-authority partnerships in which citizens are in control, or can veto agency decisions. Based on the Arnstein ladder, Weideman and Femers [9] developed a revised ladder of public participation, where the involvement increases with the level of access to information as well as the citizen's rights in the decision-making process. In most cases, the public participation is limited to the right to object, but the current and future information and communication technologies will provide opportunities to helping the degree of involvement to move further up in the public participation ladder. Tulloch and Shapiro [5] explored possible combinations that could exist between the presence and absence of access and participation. They identified 4 different situations: 1) No or low levels of access, 2) High levels of access, 3) No or low levels of participation, and 4) High levels of participation. This resulted in a simplified comparison of participation and access that allowed a quick categorisation of successful and unsuccessful projects into 4 types.

As mentioned earlier, the acceptance of GIS as an appropriate technology for handling environmental information is recognised in Agenda 21, and Internet GIS can

support and facilitate citizen involvement in environmental planning and decision-making. It is important to avoid hearing from only the activists or the powerful elite, and in order to get the widest sweep of opinions and information, authorities must reach out into the community. Internet GIS at least allows the more cautious and reserved citizens to express their opinions [2]. Public participation GIS (PPGIS) has proved to be an effective means to increase community participation in the evaluation process. Based on the level of contents and functionality a PPGIS could have various levels of service representing various levels of citizen involvement and interactivity. Peng [4] provides a framework of an Internet based public participation system and categorises the provided level of service based on the information content and interactivity. The lowest level of service only deals with information distribution, whereas the highest level of service offer the citizens a much more active role in building scenarios and suggesting alternatives. There is a clear similarity between Arnstein's ladder of public participation and Peng's framework.

4 Example from Wind Energy Planning in Northern Jutland

Decision-making concerning wind energy planning involves a wide range of spatial planning issues as well as environmental impact assessments. Therefore, wind energy planning has been chosen as an example on the use of GI and PPGIS in environmental decision-making. Wind turbines are conspicuous and therefore involve a lot of emotion among the citizens. Wind energy has generally a positive image, mainly because it is renewable and clean, but wind turbines also have some negative impacts such as disturbing the landscape, making noise, etc. Therefore the negative impacts should really be taken into consideration and the citizens involved in the decision-making process.

Locating a wind farm is a significant initial step in the process of developing wind energy. Criteria have been set up by legislation, local rules and recommendations from the wind power associations. Combining these restrictions will not be possible without access to professional GIS software with possibilities for cell-based modelling. 3D animations may be used for evaluating different project alternatives, in discussions with planning authorities, neighbors, etc. and to adjust a project to fit into the landscape in the best possible way. Jutland County has created an artificial landscape model with wind turbines giving thus a photo-realistic presentation of the landscape in relation to a proposed wind farm project. This kind of tool is nearly indispensable in the final political decision-making. Although wind turbine planning involves complicated technical calculations, the citizens have to be involved in the decision-making process. In Northern Jutland this has been done by a combination of public meetings, reports, maps on the Internet, and electronic meetings between the citizens and the politicians [3]. Thus the way they have done it Northern Jutland is beyond the basic information level. By having the discussion forum between citizens, experts and politicians they have reached a level of public participation belonging to category II of the Tulloch and Shapiro taxonomy [5]. According to Peng's framework [4] their way of involving the citizens can be considered as "web-based public discussion forums on various planning alternatives".

The current paper is partly based on my work in the INTERREG III project "Wind Energy in the Baltic Sea Region" financed by the EU.

5 Concluding Remarks

Improved decision-making is perhaps the most promising element in e-Government, and the central idea in all decision-making is how to make the optimum solution and how to get acceptance by the citizens. The current paper has demonstrated how the use of geographic information and advanced spatial modelling can improve the technical foundation for the decision, and how to involve the citizens in the decision-making process. The Planning Department of Northern Jutland has ongoing plans for more active involvement of the citizens by letting the citizens make alternative plans directly on the Internet using the county's Web-GIS application. We know that wind turbine planning involves complicated technical matters, and therefore requires new ways of presenting for example scenario tools. On the other hand, new developments within virtual reality give us new methods to visualize the results of modelling efforts in a more easy understandable way.

References

1. Arnstein, S.R. (1969). A ladder of citizen participation. *American Institute of Planners Journal,* vol. 35, pp. 216 – 224.
2. Kingston, R., Carver, S., Evans, A, and Turton, I. (2000). Web-based public participation geographic information systems: an aid to local environmental decision-making. *Computers, Environment and Urban Systems,* vol. 24, pp. 109 – 125.
3. Northern Jutland County (2002). Electronic Meetings between Citizens and the Politicians. Evaluation of a Pilot Project. Aalborg, March 2002.
4. Peng, Z-R, (2001). Internet GIS for public participation. Environment and Planning B: Planning and Design, vol. 28, pp. 889 – 905.
5. Tulloch, D.L. and Shapiro, T. (2003). The Intersection of Data Access and Public Participation: Implementing GIS User's Success? *URISA Journal,* vol. 15. pp. 55 – 60.
6. UN ECE (1998). *Convention on Access to Information, Public Participation in decision-making and access to justice in environmental matters.* ECE Committee on Environmental Policy, Aarhus, Denmark
7. United Nations (1992a). *The Rio Declaration on Environment and Development.* UN.
8. United Nations (1992b). *Agenda 21.* UN, Rio de Janeiro, Brazil.
9. Weidemann, I. and Femers, S. (1993) Public participation in waste management decision-making: analysis and management of conflicts. *Journal of Hazardous Materials,* Vol. 33 pp.355-368.

Using Open Source GIS in e-Government Applications

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Abstract. Geographical Information System (GIS) plays an important role in e-government applications once that all government information has a geographic dimension - a street address, a transportation road, a river, a city, a state and so on. GIS apart from contributing for data integration from different data sources, enables data visualization using maps, which enhances the system usability and can help the decision-making process. This paper describes a web GIS framework that provides fast and easy deployment of e-government applications. The framework is validated by the realization of a substantial application of a Brazilian state, which contains data about health, education, industry, human development index and other socio-economic data.

1 Introduction

The plethora of e-Government applications using heterogeneous technologies has pushed research to develop new ways of managing and integrating government data. Many research areas such as databases, distributed systems, and e-commerce have been contributing for this field evolution. Geographic Information System – GIS -- also plays an important role in this process once that all government information has a geographic dimension -- a street address, a transportation corridor, a river, a city line. GIS apart from contributing for data integration from different data sources, enables data visualization using maps, which enhance the system usability. Hence, by using the spatial dimension, users can discover new information through spatial joins and other operators. In particular, GIS can be combined to multidimensional databases, resulting in very powerful decision support systems [1].

Obviously, at Internet time, it is mandatory to use distributed systems, accessed via a Web browser, in which a decision maker can access the system from anywhere at anytime [2]. Moreover, the use of open source software has been strongly encouraged, so that the overall cost of the entire system can be reduced.

This paper describes the iGIS framework, which enables rapid GIS web development, using a distributed architecture and open source software. Particularly, we focus on our experience with a Brazilian state government, which demonstrates a succeeded experiment of using GIS in e-government.

The rest of this paper is organized in four sections. Section 2 discusses related work. Section 3 highlights the framework architecture. Section 4 details our prototype. Finally, section 5 concludes the paper.

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2 Related Work

Nowadays, decision support systems and other technologies can better facilitate government work. GIS is part of the technologies that can help to govern. A map is important to make decisions, and an interactive and dynamic map is very useful, making it possible to quickly identify socio-economic problems and inequalities.

A Web GIS provide maps, which can be accessed by the governor, and mainly by every citizen. Citizens can verify the progress of current administration using a visual interface. Also, GIS can provide decision support. The governor can decide where to build a new water barrage, where are the areas in which more investments are needed, and the use of what-if simulations.

Although there are many efforts on applying GIS in e-government, its use is still in infancy. In the following, related works are presented and discussed.

The SINUP is a GIS, which integrates urban information from the Oporto city in Portugal [3]. It aims to structure the knowledge about the urban reality, so that citizens can query and provide their opinions on the city management. The main restriction of this system is that firstly it is a system applied to a specific domain, instead of being a framework. Secondly, it is not based on open source software, which increases the overall costs of the system.

Savary and Zeitouni present an interesting spatial data warehouse prototype which integrates data from heterogeneous sources and uses GML for spatial data representation [4].

The New Jersey Business Portal uses a geospatial workflow system which captures user requirements and extract government regulations to assist citizens when they need government services [5]. Again, it is a customized application, which was designed for a specific domain, so it is not a framework.

3 The iGIS Framework

The iGIS Framework makes it possible and easy to build a GIS application in few minutes. By configuring an XML file using the deployment tool, a user can rapidly deplay a Web mapping application. Firstly, it is necessary to populate the database. Then, the user sets data location by providing the parameters: login, password, database url; the layers to be displayed; the colors that are going to be used; and other parameters.

The iGIS architecture is based on three tiers: presentation, application, and database. In the presentation layer Java Server Pages –JSP – are used for implementing dynamic pages. Also, SVG and JavaScript are used for map rendering and graphical tools. SVG was chosen due to many reasons including the fact of being a W3C recommendation; the ability of using vector maps with client manipulation operations such as zooming and panning; and data compression capabilities.

The application layer is responsible for the business logic and it is composed of the following modules:

- **Data Loader** is responsible for loading data from different data sources, which are configured using XML configuration files. To add a new data source it is necessary to extend some classes from this package.

- **Application Data Model** uses the OpenGIS standard for implementing the system logic classes.
- **Data Formatter** formats data according to the chosen rendering type. This module is extensible and is configured using XML. Currently, the iGIS uses SVG for rendering.
- **Static Maps** loads and stores SVG maps, improving system performance.

Finally, the data layer contains different data sources. Currently, there are drivers for Oracle and Postgresql database servers, and spatial data in ESRI shapefile format. Again, this module can be extended to support other data source types.

3.1 Spatial and Non-spatial Data Integration and Tools

iGIS copes with spatial and non-spatial data in an integrated way: both data types are stored in the database server and manipulated via data manipulation language and data definition language statements. For example, information about a hospital would include name, address, number of rooms, physicians, equipments and its latitude and longitude coordinates. Fortunately, there are several database servers with support to spatial dimension such as Oracle, IBM DB2 and Postgresql. Therefore, by using SQL users can submit spatial queries mixed with non-spatial ones. iGIS provides many functions including : information about a feature, zooming, and panning. iGIS works with different units of measurement which facilitates internationalization.

Moreover, iGIS implements multi-resolution by enabling users to navigate through several levels of detail in a map. For example, an application initially presents information at country level of detail. Then, after some operations of zooming in, it can present information at state level of detail, then at city level and so on. In order to achieve that, iGIS deals with static and dynamic map generation.

4 Our Prototype

In order to validate our system, a prototype was developed using data from the State of Paraíba in the Northeast of Brazil. This prototype focused on data collected about health, education, transportation, hydrology, industry, commerce, agriculture and some social indices. These data were geo-referenced by state administrative regions and cities.

A map about participative budget was designed, in which every city chooses what social index is more important in a specific period of time, and sets its priorities. For example, a city may choose infrastructure as its first priority, education as the second one, and so on for health, agriculture, security, industry, etc. Hence, by visualizing this map, the state governor can see the distribution of the budget in different areas, and plan a better application of public funds in these regions according to their aspirations.

Non-spatial information can also be obtained from a city or a particular region of interest. Hence, a governor can search on total population, human development index, number of children enrolled in private and public schools, number of industries operating in a specific region, and other socio-economical indices. By using multi-

resolution, a decision-maker can obtain details of a city including maps with streets and squares.

The system can be accessed at http://www.buchada.dsc.ufcg.edu.br/igisdemo/.

5 Conclusion

This article has focused on the problem of integrating GIS and e-government technologies. The framework iGIS was presented and it was highlighted its main contributions which include: the use of open source software; the extensibility of the framework, which enables to adapt the system to new functions and data sources; the rapid Web application development capability via XML configuration files; and the many spatial and non-spatial operations including query capabilities, buffer, spatial search, and multi-resolution.

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References

1. J.O. Looney, Beyond maps: GIS and decision making in local government, Redlands, California, ESRI Press, 2000.
2. S. Shekhar, R. Vatsavai, N. Sahay, T. Burk, and S.Lime: WMS and GML based Interoperable Web Mapping System. In: Proceedings of the Ninth ACM International Symposium on Advances in Geographic Information Systems, Atlanta, 106-111, 2001.
3. A. Carvalho, A. Rocha, and M. Oliveira, SINUP: using GIS to support e-Democracy. In: Proceedings of the 2nd International Conference on Electronic Government, DEXA, Prague, Czech Republic, Springer-Verlag LNCS 2739, 2003.
4. L.Savary and K.Zeitouni, Spatio-Temporal Data Warehouse - a Prototype. In: Proceedings of the 2nd International Conference on Electronic Government, DEXA, Prague, Czech Republic, Spriner-Verlag LNCS 2739, 2003.
5. N. Adam and V. Atluri, Building E-government Service System with the State of New Jersey. In: Proceedings of the Second National Conference on Digital Government (dg.o 2002), Los Angeles, California, 2002.

Self-regulation Model for e-Governance Legal Framework

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Abstract. Self-regulation emerges as very important form for regulating different aspects of the electronic domain, and is advocated by current regulatory initiatives. Equally, the special laws and regulations are created to address e-governance issues. The paper suggests and analyses the possibilities of transferring elements of self-regulation model to the broader domain. The limitations of such transfer, as well as disadvantages thereof, which interestingly have many similarities, are analyzed, along with the practicality of applying self-regulation successfulness tests to measure governmental regulation of e-governance. In order to support the theoretical arguments, the empirical analysis of the ISP self-regulation in the Baltic's on the issues of Internet content is made. Conclusions are drawn on the necessity for co-existence of governmental regulation and self-regulation, in order to facilitate the overall success of the e-governance legal framework.

1 Introduction

E-governance legal framework initiatives in Lithuania and other European Countries so far have followed several different paths [1], which are not always successful [2]. It is therefore necessary to look for and identify the possible features of the e-governance regulations, which either lead to their success or failure. Analysis of such features may serve the e-governance regulation in two ways – by identifying the issues, which require governmental intervention, and ways in which these issues shall be approached, as well as by identifying the factors, in case of lack whereof, the regulation is not likely to succeed or vice versa [3].

Self-regulation is lately been gaining momentum as the alternative or even superior form of regulating the digital domain, when compared to governmental regulation. Self-regulation is also widely promoted in many regional and national regulations pertaining to e-governance legal framework. Most notably the eEurope Action Plan[1] calls to reduce government legislative control and instead empower the industry to police itself. Emergence and rapid development of self-regulation, in many cases uninfluenced by traditional governmental regulations, make it a very important and interesting model, against which externally developed governmental regulatory framework may be tested [4]. Self-regulation models also provide success-failure measures, which in the opinion of the authors may serve in measuring the governmental e-governance regulation models.

[1] http://europa.eu.int/information_society/eeurope/2002/news_library/documents/eeurope2005/eeurope2005_en.pdf

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2 Defining Self-regulation

The term self-regulation has no uniform meaning. From a narrow perspective the term refers only to those instances where the government has formally delegated the power to regulate to the industry, certain bodies within the industry or other players in the field, while in the broader sense, the term is used when the community (industry) perceives the need to regulate itself and acts to implement regulatory measures, without any intervention from the government [5].

As the self-regulation, is inherently a form of regulation, it may be appropriate to it is widely acknowledged, any form of regulation has three components:

- legislation, establishing appropriate rules;
- enforcement; and
- adjudication, i.e. deciding whether a violation has taken place and imposing an appropriate sanction.

Self-regulation, as opposed to governmental regulation, thus, may be described as a regulatory form implemented by the players themselves without a government action. It is not necessarily the case, however, that government involvement is entirely lacking in self-regulation. Instead of taking over all three components of regulation, community may be involved in only one or two. For example, the players may be involved at the legislation stage by developing a code of conduct, while leaving enforcement to the government or the government may establish regulations, but delegate enforcement to the players. In most cases self-regulation is attempted in order to avoid governmental regulation, however self-regulation may also be undertaken in order to implement or supplement governmental legislation [5].

Self-regulation emerged within the field of the media and telecommunications by the mid-twentieth century, and was quite naturally adopted in the electronic domain [6]. Arguably, electronic communities of bulletin board services (BBS) and Usenet, have followed self-regulatory patterns even prior to the commercialization of the cyberspace, i.e. move to the internet of telecommunications and media businesses with their own self-regulatory experience. Codes of conduct in respect of privacy, user content placed by different internet communities and service providers, as well as domain dispute resolution practices developed by national top level domain administrators are the best examples of cyberspace self-regulation.

3 Self-regulation vs. Governmental Regulation

Importance of self-regulation is widely acknowledged in the governmental initiatives aimed at regulating of the digital frontier. Self-regulation is expressly endorsed in the EU directives (e.g. Directive 2000/31/EC on Electronic Commerce), and other EU regulations (e.g. Regulation 276/1999/EC on Safer Internet Action Plan). At the same time, the E-governance is attempted to be regulated through special laws and regulations, at both national level and the regional (EU) level. The common argument for governmental intervention is that the government addresses issues of public importance, which are not otherwise addressed by the self-regulation, or that the government regulates activity of public (governmental) bodies in their relationship among themselves, as well as with the economic entities and the general public [7]. Both

these options foresee little involvement of the non-governmental players in the regulatory process.

In this situation two major challenges arise to the governmental regulation. Firstly, it is not clear whether relevant regulation is at all necessary, and does it serve any particular purpose. Secondly, if the regulation is aimed at activity of public (governmental) bodies in their relationship with the economic entities and the general public, or even among themselves, such regulation would inevitably influence the conditions and quality of such relationship, thus, affecting the interests not only of the governmental actors, but of the economic entities, individuals and various communities. Thus, effects of intra-governmental regulation are transposed over the much broader range of players, what clearly indicates the need to consider the interests of all relevant players. One of the ways to assume such interests may be to look for self-regulatory models and elements.

4 Regulatory Failure or Success: A Common Case for Self-regulation and Governmental Regulation

Lithuania and other European countries have seen substantial number of the failures of governmental regulation of the electronic domain in the last few years. One of such failed attempts is the regulation of the electronic signatures, enshrined in the EU directive 1999/93/EC on a Community framework for electronic signatures and numerous national laws. Similar fate has destined national regulations on the internet content, and contributed to the EU bodies abstaining from legislative intervention into this field. National legislation in this field was cursed by the limited enforcement resources, absence of objective criteria of unlawful content and jurisdictional issues [8]. On the other hand, the latest cases suggest that the internet community may much more efficiently deal with the internet content, while the governmental intervention results in major controversies.

In the Lithuanian case related to the Chechen web site "Kavkaz-Center" (http://www.kavkazcenter.net), which was hosted by Lithuanian internet service provider "Elneta". On 20 June 2003 the provider was requested shut down the web site and the hosting server was seized by the Lithuanian authorities on to alleged accusations of hosting prohibited information – in particular – information related to terrorism and incitement of ethnical and racial discord. The presence of prohibited information was established by single individual expert, without any public and transparent procedures, and remains questionable to date, since acknowledged experts of the field have ruled out presence of unlawful information. The website was brought down by immediate administrative action, without any "notice and takedown" procedure, and hence was ruled unlawful by the court. Final decision of the courts is still pending. The governmental intervention in such situation is likely to be harmful as it has only served a political purpose, rather than broader public purpose of the right to information. Even better example is supervision of internet forums in Lithuania and Estonia, which are efficiently and generally responsibly administered by the internet service providers [9]. Practical cases of self-regulation also bring forward a handful of failures. One of such most notable failures is privacy protection in cyberspace. Interestingly, latest cases show that privacy has been neglected by both governmental and private players.

Given the substantial parallels and similarity of basic principles of governmental regulation and self-regulation of the electronic domain, it may be argued that governmental regulation may face very similar hurdles as the self-regulations, as well as may enjoy similar factors of success.

The most commonly emphasized advantages of self-regulation are efficiency, increased flexibility, increased incentives for compliance, and reduced cost [10]. Firstly, the players in the field are likely to have superior knowledge of the subject compared to the governmental bodies. Therefore, it is more efficient for government to rely on the player's collective expertise than to reproduce it at the agency level. This factor may be particularly important where technical knowledge is needed to develop appropriate rules and determine whether they have been violated, as it is usually the case in the field of information technology. Second, it is argued that self-regulation is more flexible than government regulation. It is easier for the players to modify rules in response to changing circumstances than for a government body to amend its rules. Third, self-regulation provides greater incentives for compliance. Rules developed by the players themselves are more likely to be perceived as reasonable. Even competitors may be more willing to comply with rules developed by their peers rather than those coming from the outside. Fourth, self-regulation is less costly to the government because it shifts the cost of developing and enforcing rules to the players themselves. Even if the government is involved in one of the regulatory functions (e.g. enforcement), such single function would require fewer resources than direct regulation. Finally, self-regulation may be able to overcome jurisdictional and similar issues, plaguing a lot of attempts by the national governments to regulate cyberspace.

Common arguments against self-regulation include selfishness of the most powerful players, disregard of minority interests, and failure to increase compliance, which may be achieved by otherwise extensively involving the players into the development of the governmental rules. Leaving regulation to the players creates the possibility that they may subvert regulatory goals to their own goals. Moreover, the private nature of self-regulation may fail to give adequate attention to the needs of the public or the views of affected parties outside of the relevant field. The players may also be unwilling to commit the resources needed for strict enforcement of self-regulatory rules. On the other hand, when enforcement actions are taken, concerns are raised about the exercise of unreviewable discretion. It is also unclear whether self-regulatory sanctions are adequate. Self-regulatory frameworks are also prone to cheating [10].

Good examples of self-regulatory failure are administering of copyrighted content on the internet by the internet service providers, as well as already mentioned privacy protection issues.

Interestingly and non-accidentally, the benefits of the self-regulation are these goals which are commonly sought by the e-government regulators and players. Equally the disadvantages of self-regulation often plague the legislative attempts in the field of e-governance. The best illustration of these issues is failures of both self-regulation and governmental regulations to address some of the e-governance issues, such as privacy of the individuals. Based on these premises, it is therefore may be argued that self-regulation may serve as the complimentary model for the governmental regulation of E-governance, as well as a measure for successfulness thereof.

5 Measuring Regulatory Failure or Success

The theory of self-regulation suggests five measures that would affect the success thereof [10], which based on the above analysis, may also be applied to measure governmental e-governance legal frameworks.

The first measure is an incentive to engage in self-regulation. For the e-governance legal framework this shall translate into allowing the stakeholders (citizens, businesses and other governmental agencies) to benefit from the regulation, in terms of direct benefits or more realistically – savings of time, money and effort. Non-traditional benefits of demonstrating oneself on the forehead of the knowledge society shall also be taken into account.

The second measure requires governmental regulation to back up the self-regulation, i.e. availability of governmental effort for enforcement of the regulations. The regulation shall not be left for self-accomplishment or unreviewed implementation.

The third condition is objective standards of measure for the regulated behavior, i.e. benchmarking system for implementation of e-governance.

The fourth very important factor is public participation, or bi-directional communication with the public not only as the result of e-governance but also in advance.

The final factor is the number and organization of affected players. This factor of number and organization of affected players is little applicable to the governmental actions affecting e-governance, however it may require close cooperation and involvement of all governmental agencies in regulating e-governance.

Conclusion

Practical cases suggest that neither government nor self-regulation works perfectly. Which will work better will depend on the purpose of the regulation and on the specific circumstances. It may also be argued that co-existence of governmental regulation and self-regulation is necessary, in order to facilitate the overall success of the e-governance. Emergent self-regulation models, however, provide relatively simple measures to test the success of any e-governance regulation, which may be adopted by the governments. In particular this refers to incentives for e-governance as the starting points of e-governance regulation, as well as public involvement into the e-governance regulation.

References

1. Legal framework for the information society. http://www.unizar.es/DERECHO/FYD/lefis/index-legal.htm.
2. Kiškis M., Petrauskas R.; E-Governance: two views on legal environment; In: R. Traunmüller, (Ed.). Electronic government: Second International conference EGOV 2003, Springer LNCS#2739, Heidelberg at al, 2003, p.407-412.
3. Kiškis M., Petrauskas R.; Tackling the digital divide through e-government legislation. Euro lawyer, 2003, Issue 20, P. 6-7
4. Galindo F.; Self-regulation in e-Government: A Step More. Electronic Government; In: R. Traunmüller, K.Lenk (Eds.), Electronic Government, First International Conference EGOV 2002, Springer LNCS#2456, Heidelberg at al, 2002, p.p. 411-418.

5. Campbell A.J. Self-Regulation and the Media. 51 Fed. Comm. L. J. 711.
6. Irving L.; Introduction to Privacy and Self-Regulation in the Information Age (NTIA 1997). http://www.ntia.doc.gov/reports/privacy/privacy_rpt.htm
7. PCMLP-IAPCODE Report. Self-Regulation of Digital Media Converging on the Internet: Industry Codes of Conduct in Sectoral Analysis, 2004. http://www.selfregulation.info/iapcoda/0405-iapcode-final.pdf.
8. Kiškis M.; First steps of Internet regulation in Lithuania; In: Spreading the Word on the Internet. Vienna: OSCE Representative for the Freedom of the Media, 2003. P. 43-53.
9. Kiškis M., Petrauskas R.; Internet Regulation – a Test to E-Government. Proceeds of the Conference Legal Environment of Electronic Government, Law University of Lithuania, 19-20 October 2003, Vilnius, 2004.
10. Campbell A.J.; Self-Regulation and the Media: Four Years Later. http://www.selfregulation.info/iapcoda/030310-campbell.doc

A Review of Current e-Government Initiatives in Spain

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Abstract. The Spanish government has been supporting several initiatives oriented to develop the Information Society in Spain during the last years. This paper reviews the main ongoing projects as well as the established legal framework in Spain. Special attention is given to *España.es,* a two years (2004-2005) strategic plan to promote the access to electronic services to all citizens. The current situation of these works is analysed.

1 Introduction

The state of art of electronic transactions and digital data processing, specially those related to process managing, has experimented a huge improvement during the last twenty years due to the great development of telematic science. Governments from all over the world are involved, at different levels, in this new e-service framework.

The implantation of these new ideas and methods is a long process through several steps. This paper reviews this process in the case of Spain. In this country, and mainly since 2001, e-government has been compelled towards platforms more and more sophisticated.

To get a real notion of the current degree of the penetration of e-government in a country, thus UN has a benchmarking[1], which is established according to several features and it is oriented to provide an idea of which the current status of a country is and therefore, it is possible to estimate how far it is from its final goal. If we take into account that index and their criteria, the current situation for Spain is Transactional (users can pay for services and other transactions online). To achieve the current situation, several projects have been developed and a lot of initiatives had been carried out before.

This paper is organized as follows: the next section briefly discusses the legal framework. After this, we present the current e-government plan for Spain: *España.es.* Later on, we present the relevant initiatives about e-voting. The paper is completed with some conclusions.

2 Legal Framework

The first step in this process to a fully transactional e-government system is related to legal issues. All projects and initiatives on e-government must take

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into account the legal framework where they are developed. This legal framework must provide a solid sandbox where e-government may become a real option for citizens. In order to provide this environment, the Spanish governments had developed the following normative framework:

- The LSSI[4] (*Ley de Servicios de la Sociedad de la Información y de Comercio Electrónico,* Law of Information Society Services and Electronic Commerce). The implementation into Spanish law of European Union Directives on electronic commerce and Privacy and Electronic Communications. This law deals with services in the Society of Information in a broad sense: from supplying online information to commerce on Internet, covering nearly any transaction that may be undertaken on Internet.
- The LOPD[5] (*Ley orgánica de protección de datos,* Organic Law of Data Protection). An organic law aimed to protect and guarantee people public freedoms and foundational rights, especially those related to personal privacy.

A part from these ones, there are many other laws responsible for supporting the interchange of information and regulating on-line transactions.

3 Plan *España.es*

As previously stated, the implantation of e-government needs cooperation between different institutions and between different departments within the same institution. With this idea on mind, the European Union has encouraged all its members to develop their own e-government framework under a common framework called eEurope 2005[6]. The main aim for this plan is to compel all countries to go on-line by the year 2005. Many efforts are devoted to provide services and framework all over Europe to better service citizens. And this global project is where the plan *España.es*[7] is promoted.

This plan is made of several steps and concrete actions towards partial goals. These ones are oriented to serve and improve some strategic guidelines. In order to study the implementation and coordinate all efforts invested in this project, the Spanish government has created a commission: the Soto Commission, responsible for the actions involved in the plan *España.es*.

The very first problem this commission had to face is related with the lack of interest and training in the citizens to access new services on e-government. The other main concern for the Soto Commission is the absence of infrastructure. This problem is not just related to data access on providers but also on poor data connection on most homes and also the little training or technical support for most citizens.

The plan *España.es* and the involved projects also may be divided into different blocks:

- Vertical projects. These projects will affect specific segments at all levels.
- Horizontal projects, oriented to provide general services on several fields

This project also includes several single steps towards a real Spanish transactional e-government. All these single steps make a long journey of 19 steps towards the final goal. These steps can be organized in several categories according to partial goals:

- To facilitate citizen to public access.
- To promote the development of services for citizen.
- To facilitate the information exchange in the public administrations.
- To support the internal reorganization of processes in the public administrations.

4 e-Voting

The main concern and final goal for e-government is the provision of functionalities by digital means to improve relationship with the government. According to this idea, the most important task for democratic systems is voting. This mechanism is the key for democracies, so e-government researching had devoted a lot of resources and efforts to design and implement an e-voting platform. These platforms are expected to be very useful in the near future due to the amount of advantages from traditional voting systems: faster tabulation of the results, more accurate system, additional facilities for people with physical limitations and a more confident system. Several systems had been designed and tested. In the Spanish case, several attempts had been carried out. Among the most relevant tries out, we would like to outline the support for e-voting provided by Indra[2] during last polls in March 2004.

Any e-voting platform must take into account some consideration:

- The implemented project must be developed under Open Source license and the used standard for data interchanging and encrypting/decrypting algorithms must be public.
- The system must be absolute stable.
- The integrity of the ballot must be extreme to extreme.
- The user interface has to be simple enough for untrained users.
- The ballot must be completely detached from the voter, once the ballot is accepted as a valid one.

It is important to note that the current legal framework in Spain does not allow voting by these means, just the traditional way is allowed. So, up to now, these tests are just experiments for developing technology and methods but no practical use for them is possible for the moment.

5 Conclusions

This paper introduced the current state of the most outstanding initiatives in the e-government area in Spain. Three different phases are easily identified, which, in turn, can also be extended to other western countries:

- The first step should be to provide a suitable legal framework.
- The needed technical infrastructure has to be provided for both official institutions and citizens.
- Proper services built upon the previous infrastructure and compliant with the defined legal framework have to be identified.

We would also like to provide a reminder about a common problem also presented in the Spanish case. Many projects on e-government are concerned with "front office" projects and takes no care of "back office" projects. These "front office" projects are required to have interaction with final user but to achieve a fully developed state on e-government, "back office" interoperability research is also a must.

Like in other areas, e.g. e-business[3], interoperability may be reduced due to the apparition of different proposals for data models and software interfaces. Eventually, a standardization process is needed to come up with common specifications. In the meantime, a brokerage platform would provide different applications with a common access point to services offered by heterogeneous institutions, providers of e-government services.

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References

1. Benchmarking E-government: A Global Perspective. Website available at URL: http://unpan1.un.org/intradoc/groups/public/documents/un/unpan003984.pdf Last access on May 20th,2004
2. Indra. Website available at URL: http://www.indra.es/ Last access on May 20th,2004
3. Luis Anido, Luis Álvarez. Towards Interoperable Frameworks for E-business. IEEE International Conference on Information & Communication Technologies: From Theory to Applications. IEEE Catalog Number: 04EX852C. ISBN: 0-7803-8483-0. 19-22 de abril de 2004. Damasco (Siria).
4. LSSI. Website available at URL: http http://www.lssi.es/ Last access on May 20th,2004
5. LOPD. Website available at URL: https://www.agpd.es/ Last access on May 20th,2004
6. eEurope. Website available at URL: http://europa.eu.int/information_society/eeurope/2005/ index_en.htm Last access on May 20th,2004
7. *España.es*. Website available at URL: http://www.setsi.mcyt.es/espana_es/espana_es.htm Last access on May 20th,2004

e-Government and Information Society: The First Regional Law in Italy

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Abstract. After a lengthy and wide-ranging debate, the Tuscany Region (Italy) has promulgated the framework law on "the promotion of electronic administration and of the information and knowledge society throughout the regional system. Regulating the Tuscany Region Telecommunications Network" (L. 26 January 2004, n. 1). This is the first example of Regional legislation in the area after the reform of the Constitution.

The aim of the paper is to describe the experience of Tuscany on *e-government.*

In this Region the experience on e-Government has always been well-established and has recently received the recognition of a specific Regional law: Law n.1 of the 26th January 2004, which sets out the rules for the *Promotion of Electronic Administration and of the Information and Knowledge Society in the Regional System* (and for) the *Regulation of the "Tuscan Region Telecommunications Network"*.

The ITTIG directly contributed to the elaboration of this law on behalf of the Tuscan Region.

It is important to immediately point out that this law not only has an significant political, strategic and symbolic value for the Tuscan Region (as is obvious) but also beyond, within the Italian development process for innovation policies.

For the Tuscan region the law marks the passing from an experience that could be defined as *good practice* to the construction of an actual "institutional cooperative system" that is reinforced by the symbolic value of the law and by the (few but essential) cogent elements that are inserted within it and that aim at organizational and technological innovation in public administration as well as wider social objectives to do with the development of the "knowledge and information society" in the Regional system (art. 1).

From another point of view, the law marks a passage from a technical experience to a political challenge. If up to now, the Region had carried out its tasks by using external innovations – coming from Europe, the market and scientific research – hence forward it sets itself, along with other local organizations, to be the fulcrum and motor of innovation. It creates a favorable administrative context to exploit the peculiarities of its territorial districts and that correspond to the particular needs of its own local system.

With this law, therefore, a new sector of Tuscan Regional policy opens up. Its planning takes place at the regional and ad hoc level and is widely shared by other

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public bodies in the area, particularly the local authorities, as well as other important organizations throughout Tuscany which are invited to cooperate within the context of the Tuscan Region Telecommunications Network (art.7).

The Network (I will call it thus henceforward) had already been set up in the 1980s as a technological infrastructure. On it, and formally in 1997, a "community network" was founded as the locus for the technical coordination, in particular of the local Public Administration. It has now become "the permanent form for the coordination of the system of local authorities organizations and of cooperation between the system itself and other public and private parties with regard to the objectives of the law itself" (art.2 par. 2); that is, it has become the primary tool and motor for framing technological choices in a broad political scenario that is shared by the various components that go to make up society.

In this context the Region has become a junction that wants to connect what is created within its territory with what is happening at the European and National level as well as inserting the various aspects of this theme within the main currents of its regional planning.

The role that the Region takes on in order to contribute to planning in this sector is primarily concerned with the coordination of infrastructure. This is because the regional level (but remaining nevertheless connected to the national) is the optimum in terms of size (it allows for sufficient planning and sharing to the point that all the Network parties will be able to use its information and content).

This is the most typical function of the Region, its particular contribution to planning in the sector. Other organizations, particularly the Municipalities, will develop content, create services and, as far as is possible, innovate practices and experiences.

The Provinces, for their particular institutional vocation, will be expected to program differentiated training for ICTs use. This training will be aimed, above all, at creating the cultural background for people to acquire the habit and the capacity to use content available on the Network.

This law, however, does not just concern Tuscany but is directly and forcefully involved in the national development of innovation policies.

Why? Because the Tuscany Region law is the first (and for the moment the only) example of organic regional legislation (notwithstanding its promotional character) in this sector after the constitutional reform of 2001 (reform of Heading V part II of the Constitution which has renewed the framework of legislative competencies of State and Region and at the same time has opened up a new chapter in governance, in cooperation between the various institutional levels and with citizens themselves); after the appointment of the Minister for Innovation and Technology; after the promotion of E-Europe; and after the follow-up national e-government initiatives (developed by the new Minister with planning and financing taking place together with regional and local administrations)[1]. And all this without organic national regulation in the sector.

From the formal and structural point of view the constitutional reform of 2001 has, for the first time, entailed a detailed rethinking of the configuration of regional legislative competence in this area (a competence that was guaranteed to be of a "general" and "exclusive" character) and of the mechanisms required to ensure cooperation between institutions and the coherence of the complex regulatory system in the sector.

[1] The Emilia-Romagna Region is the only one that is discussing a projected law that in some ways is very similar.

From the contents point of view the law is also innovative and original because, as is obvious, it regards a phenomenon that is rapidly and turbulently expanding. It is a thematic rather than a subject, its frontiers are hazy and European and national policies and regulations in its regards have very peculiar models, techniques and practices.

This is a pioneering law in all its aspects and as such is likely to have an influence over the national process of innovation currently underway.

The first aspect regards the fact that this law confirms forcefully that innovation is not a question of technology.

For the Tuscan legislator the process of innovation, in the administration and in the territory in general, is facilitated by technology but is not a technological question. Rather it is about a much broader organizational, social and economic change. This belief is clearly expressed throughout the law's text.

So, this is what happens with the elements that characterized from the start this regional initiative: the context of "cooperative governance" within which this process should take place that is a cooperation that not only includes institutional parties but also social actors and citizens themselves in accordance to the principle of horizontal subsidiarity (see the new art. 118, u.co. Const.); and with the principle objectives that the law sets itself (the broadening of citizenship and participation rights, the prevention and suppression of all causes of marginalization or social exclusion connected to the use of information technology, what is referred to as the "digital divide") (art 1).

A good example here is that the word "Network" as used in this law (art. 2), is not about technological infrastructure; or rather, it includes it, in the sense that technology is the pre-condition that permits the socio-economic and organizational change desired, but it refers above all to an organizational model and to ways in which institutional and social subjects cooperate and have a specific, innovative and complex mission to fulfill.

The network of relationships between the various actors comes before the technology. This is not only because resources are limited (although the idea of a limit is always a good thing to keep in mind) but rather because the Network reinforces the capacity to compete.

The fact that technology is not assumed to be important in and of itself, but rather because it facilitates organizational change, is also valid for the preferential adoption and promotion of open source programs (that the law states to be one of its principles and guideline criteria) that from being a piece of technology, here in the Regional law, becomes a metaphor for a more general open and free way of thinking that from the administrative context will filter into the wider social world. (art. 4, par. 1, let. i).

The second aspect that highlights the process of national innovation is that this law is a contribution to the enactment of federalism, a process in which we are involved and which in particular is conditioning the development of this country.

In this respect the Tuscan regional law shows operationally and therefore effectively that the construction of federalism takes the organizational model of the Network in order to allow autonomy and cooperation between the different parties called upon to carry out the tasks that their competencies entail.

The experience accumulated by the Tuscany Region along with the present law, that has taken on board and enhanced this experience, push towards broader forms of cooperative governance both in terms of inter-regional relations (that are themselves an element of national government) and those between Regions and the State. These relationships must necessarily use the cooperative model in order to tackle and to

overcome the complexities of contemporary society. It is sufficient to think about Public Connectivity System (ex Public Administration Unified Network) which is getting off the ground now. This system was initially defined as "the organizational structures, the technological infrastructure and technical rules for the development, the sharing, the integration and the circulation of the information held by Public Administration in order to ensure the interoperability and the applicative cooperation of information systems and of information flows whilst at the same time guaranteeing security and confidentiality."

The third element that the Tuscany Region law clearly highlights is that of the importance of the coupling of development with information and telecommunications technology as the specific subjects of a law.

As yet on this subject there is no national law.

At both the national and the local level the paucity (but also the low quality) of investment in these sectors is a problem. Quality of investment in this context of governance means the capacity to integrate different innovation paths (infrastructure, training, industrial policies etc.) that, coming down from the national level to the local, may suffer from a lack of coherence.

Finally, a last important element of the Tuscany Region law is the passage from egovernment to the development of the government of the information and knowledge society.

This is by no means a foregone transition. An experience of e-government, such as the RTRT, is employed at a much higher level. The acquired capacity to cooperate that each of the administrations that participated in the Network achieved in order to innovate can be used today by that administration as the capacity to renew one's own territory with development policies based on the ICT.

Moreover, the theme of the Network and the structure of the regional Network is fundamental not only as an internal tool for connecting different actors, but also as a tool for the placing of a renewed territory in the huge network of global competition.

The LEFIS Network

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Abstract. This paper presents the basic characteristics and main activities of the LEFIS Network (Legal Framework for the Information Society), which is comprised of various teaching and research centres, companies and associations. The primary and complementary objective of LEFIS is to make legislative proposals and prepare education modules designed to put into action the professional training required to perform the activities of public and private institutions and firms that are engaged in the creation and implementation of legal decisions and social and industrial standards directed at governance of the knowledge based society.

Introduction

The implementation of the so-called electronic government or, more specifically, making electronic administration a reality, requires the transformation of Public Administrations themselves and the instruments of action that they use, and it requires that the professional training of those who work in it or at the firms where the same is supported be adapted and updated. This requirement is easy to express, although it is difficult to specify. This is especially true if we take into account that education centres also need to adapt their practices in order to satisfy the changes that the generically so-called knowledge society is demanding as regards both the aforementioned governmental or governance aspects as well as aspects relating to the organisation of all kinds of production activities and even recreational activities. In spite of the obvious difficulties of the task, the European Union is promoting this change by having put into practice since 1999 the content of the Declarations made in this regard by the Rectors of European Universities and by the Education Ministers of the various member countries. Significant Declarations were those made in Bologna, Prague and Berlin[1].

These Declarations include consensus's and agreements reached regarding education matters and which centre their proposals, especially, on specifying a kind of training that is directed, to a greater extent, at learning rather than at knowledge, contrary to what happens in "traditional" teaching in countries of the "continental" culture. For these purposes, it has been resolved to establish teaching in two cycles, whereby the nature of the first cycle is general education and the second cycle, conversely, is directed at professional specialisation. The content of the teaching is measurable, given that the credits necessary for exercising the various professions have

[1] Documents on the process are, for example, in: http://www.unizar.es/eees/. Also in: http://www.bologna-berlin2003.de/ or, more generically (horizon 2010), in: http://europa.eu.int/comm/education/policies/2010/et_2010_en.html

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likewise been established. Another part of the content of the Declarations refers to the need to establish permanent training that allows professionals to periodically update their knowledge and qualifications in accordance with the demands of social and technological change.

In accordance with the aforementioned, other initiatives establish procedures directed at adapting teaching content to the requirements of the job positions themselves that professionals will hold, thereby respecting, as much as possible, the educational traditions and practices of each territory of the European Union. The Tuning project is significant in this regard, which has developed methods whereby the teaching content of the various professional careers is "tuned" to the common and specific requirements of the job positions for which they are being prepared through teacher training and professional training[2].

The aforementioned policies are being put into practice by the state governments and by universities as regards the various fields of knowledge and work in which, in compliance with their commission, they are bound to provide basic training for citizens, which thus allows them, by obtaining the corresponding degree, to have sufficient preparation in order to obtain a job position in any of the member countries of the European Union.

The LEFIS network forms a part of the initiatives herein set forth. Through specific actions linked to the design of masters degrees and permanent training modules directed at training professionals who are experts in governance of the knowledge society, it thereby contributes to carrying out joint activities directed at co-assisting in the implementation of teaching reforms at Law Faculties, Engineering Schools and Economics and Business Faculties in all of Europe. It should be taken into account that the LEFIS network has partners in all the states of the European Union, thereby including the countries that will soon become members of the same. All proposals for teaching reforms are sustained by the joint work performed by the members of the network: fundamentally universities, research and development centres, and firms, which establish the appropriate joint actions through the meetings and conferences that they hold and together with other kinds of professional and interested organisations. They also come about in the joint R&D projects that they the undertake in the various areas where these entities are specialists.

This work herein gives an account of the characteristics and tasks of the LEFIS network, as well as the initiatives that the same puts into practice so that it may constitute a mechanism that is capable of promoting reforms for electronic governance and government, as regards the preparation of regulatory proposals – thereby including R&D projects – as well as the training of professionals that is being demanded in order to make knowledge based society a reality.

For these purposes, we hereby present this work as follows: first, we provide a brief history of the network. Second, we present an overview of the current network. Third, we go over its fundamental duties, and finally, we conclude.

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[2] See on Tuning: http://www.relint.deusto.es/TuningProject/index_english.htm . GONZALEZ, J.,WAGENAAR, R., (eds.), Tuning Educational Structures in Europe, Bilbao, Universidad de Deusto, Bilbao, 2003

Brief History

The LEFIS Network originated from the discussions on "Computers and Law" and related subjects that have been taking place for years, especially since 1999, among a group of European professors, and together with other professors, they have set up and jointly directed teaching modules, held meetings and organised exchanges of professors and students.

The original core of this group is made up of members from 19 Universities. Currently, and together with other Universities and institutions, they all form the thematic Socrates Network called LEFIS: Legal Framework for the Information Society. Professors, professionals and institutions and firms from Europe, Russia and America[3] take part in discussions and in organising activities.

All of the participants are involved in drafting legislative proposals, developing research and development projects, and introducing – at Law Faculties and other centres where they teach (Management, Public Administration, Information and Communication Technologies and Engineering Faculties) – graduate and post-graduate studies directed mainly at jurists (although not exclusively) and which refer to the problems posed by regulating and initiating Information and Communication Technologies (ICT) Law. The material is explained not exclusively from a positivist perspective (the merely explanatory study of positive Law) or a technical one (the study of ICTs), but also from a preferably interdisciplinary perspective, thereby drafting proposals of reflection and application: in other words, clearly practical proposals coming from the various areas of knowledge involved in solving the difficulties posed by the progressive implementation of the knowledge society. It therefore, a common goal of the presentations and works by participants is to consider the values, principles and rules of Democracy that are involved in the said implementation, without thereby disregarding the prerequisite: a study of the specific facts using the tools of the social sciences (fundamentally, sociology, systems theory, logic and communicative theory). When necessary, they also make use of proposals by the history of science or the theory of science. Needless to say, in their proposals, they observe both general Philosophy and Legal Philosophy. They likewise observe the proposals of legal dogmatics.

Special emphasis should be placed on the following: As it has already been stated, the participants in the discussions are generally professors who are involved in teaching and research groups that usually participate in starting up research and development projects on the matter, and they work together with the Public Administrations (the European Union and national or regional governments) or firms. This aspect is what provides this discussion, this group and the works herein presented with the following, important methodological difference with respect to other legal works. In general, the latter are constrained to carrying out an exhaustive study of legal texts, laws and principles. Our point of departure is totally different: group activities are specifically focused on the study of legal activities such as they are carried out by people, professionals and institutions.

Initially, the discussions were for teaching purposes, yet they are progressively being used as a platform for analysing and developing legislative and regulatory prac-

[3] 90 institutions or industries currently participate in the initiatives (information available at http://www.lefis.net).

tices, thereby contributing proposals for preparing studies and for draft legislation directed at legislators and other professionals. In turn, these proposals provide the content of the teaching offer. In this regard, for instance, Summer Schools were launched (and continued), in which the professors explained their research activities and positions on relevant subjects before an auditorium of students. Currently, an increasing number of Seminars and Conferences are being held, thereby comparing and refining the common object of the discussion, especially due to the contribution of specialists and experts from fields related to material discussed[4].

What It Is

The brief history forces us to take another step forward at this time: to give LEFIS stability, thereby providing it with an organisational means and sufficient resources with which it can manufacture products and develop joint projects in tune with the social demands that exist for the same. This is necessary because, although there is no doubt that the academic past as a whole has provided for the consolidation of a solid line of reasoning and cooperative practices, the next step lies in constituting a solid organisation that, established in conjunction with interested social agents (firms, public institutions and academic and professional associations), is capable of generating teaching modules and materials and pursuing other developments that may be necessary for governance of the knowledge society.

Therefore, steps are being taken at the start of 2004 to constitute LEFIS as an organisation with its own legal personality. For these purposes, it has the legal personality accorded by the Protocol of Intentions that is being arranged between the University of Zaragoza, the coordinating entity of the network, and the association called APTICE, a member of LEFIS.

APTICE is an international, non-profit association that was founded in April of 2000[5]. It is comprised of eighty firms, institutions and individual members, and its objective is to carry out activities that create a favourable atmosphere for the development of information technologies and electronic commerce. Its members include computer and telecommunications firms, banking institutions, the media, firms engaged in teaching, professional associations and public institutions.

APTICE has a General Assembly and the Board of Directors, which act as the governing bodies. It satisfies its founding purposes through committee actions.

The most significant of the current APTICE committees are the following:

- The AGACE Committee. It handles the creation and publication of rules and procedures that are necessary for implementing and maintaining the seal of quality for electronic government and commerce called AGACE (Auditoría y Garantía de Calidad para el Comercio Electrónico [*Quality Auditing and Guaranty for Electronic Commerce*]), together with the standardisation rules directed at recognising consultants and auditors officially approved by APTICE.
- The Security Committee, which deals with organising discussions and channelling resources that refer to solving problems regarding Internet security. Based on this committee's work, the APDATA platform has arisen. It is comprised of

[4] See, for example: http://elj.warwick.ac.uk/jilt/03-1/galindo.htm

[5] http://www.aptice.org/

a group of firms engaged data protection and security measures for information and communications systems, and it has adopted a common working procedure for its own tasks, which is in accordance with the rules established in the APTICE Code for electronic commerce and government.

- The Education Committee, which has the duty of ensuring that the teaching provided by its associates is given in accordance with real user needs, thereby facilitating intermediation between the ICT and non-ICT firms that come together in APTICE for the purpose of preparing educational offers that meet specific social demands.

Experience with the outlined duties makes APTICE an especially suited association so that, within the framework of its usual activities, the LEFIS network may develop specific actions within a determined social context. It thereby bases its actions not only on the timely financial support received through subsidies from institutions such as the European Union, but also on the social results obtained, thereby collected in the form of the income that it brings in through the products generated by its business activities.

For these purposes, the LEFIS Committee is constituted in APTICE (by resolution adopted by the General Assembly on 12 February 2004), and its commission is the following:

1) To define LEFIS products.
2) To establish the procedures to be followed for developing LEFIS products.
3) To establish the procedures for the official approval of LEFIS products.
4) To establish the formulas for marketing and operating LEFIS products.

The LEFIS Committee is comprised of LEFIS members that make specific contributions to the network and by APTICE partners. The decisions of the Committee will allow designing realistic products that may be of interest to the market. Therefore, APTICE partners and LEFIS members have full action capacity on the Committee. In exchange for the services received, LEFIS will allow a reduction of the inscription fee for all APTICE partners at the events organised by the network.

All resolutions of the LEFIS-APTICE Committee will be executed through the LEFIS office of the University of Zaragoza. Its administrative and legal section is located at the Faculty of Law, and the research and development section is located at the Legal-Business Laboratory of the Parque Tecnológico Walqa [*Walqa Technological Park*].

Based on the experience gained, a resolution will be reached regarding the integration of LEFIS in APTICE or the constitution of a new association or other legal figure deemed appropriate by LEFIS members at the General LEFIS Conference to be held on 1 September 2004 in Zaragoza.

The APTICE Association is open to incorporation by all members of LEFIS who may wish to join, thereby observing the rules that APTICE has established in its by-laws for admitting new members to the Association. They thereby recognise the following kinds of partners:

1) Corporate
2) Businesses or private institutions
3) Public institutions
4) Individuals
5) Honorary

It is also possible to establish cooperation agreements with other associations or institutions of recognised prestige, thereby allowing the mutual exchange of information, or even the participation of their representatives on committees or governing bodies, but without the right to vote in the General Assembly.

What It Does

The main objective of LEFIS is to construct educational modules of a professional nature, whether they may be Masters programs, postgraduate courses or permanent training courses.

The courses have the following objectives:

1) To provide education on ICT Law for jurists and non-jurists.
2) To provide legal education and other kinds of education with the assistance of ICTs.
3) To provide all kinds of education on the stated materials, thereby using resources that offer distance teaching techniques.

In compliance with these objectives, LEFIS prepared questionnaires directed at its members and which asked about the teaching that they provide, in the event that the surveyed parties were academic institutions, and which asked about the training that is needed by the professionals that they hire, in the event that the surveyed parties were non-academic institutions.

After processing the information collected in the surveys, the following can be highlighted:

1) Various participating universities have experience in masters programs on ICT Law in so far as they are a part of the EULISP program coordinated by the University of Hanover. The model is adapted to the guidelines approved by the European Declarations on the reform of university teaching.
2) Some of them offer doctorate programs of an inter-disciplinary nature on subjects such as electronic commerce and government.
3) The implementation of masters programs is in a period of transition at this time, due to the fact that the academic reforms that are being adopted in all of Europe by the Ministers of Education and by University Rectors, in compliance with the stated teaching Declarations, have not yet entered into force.
4) Attended postgraduate courses are being prepared and given.
5) Attended graduate courses are being prepared and given at Law Faculties and Engineering Schools.
6) Distance education modules are being developed, which even include majors that are given entirely by distance.

Other products being developed are the following:

1) The web site, www.lefis.org
2) Intranet
3) The communications program between LEFIS and APTICE members (workflow).
4) Products developed for guaranteeing communication security.
5) Products designed to facilitate the inter-operability of secure communications between LEFIS members and between LEFIS members and other firms or institutions and individuals.

There are groups in LEFIS that are developing various R&D activities by virtue of their institutional commissions and purposes and by virtue of the opportunity that they are offered by the relationships established through the existence of the LEFIS network.

Steps are being initiated in order to officially register the LEFIS trademark, which, for third parties, will allow establishing the content and nature of the products to be developed by LEFIS and will allow the liabilities and authoring systems of the same to be distributed. This will also allow the pertinent bilateral agreements to be established between the LEFIS partners who define the liability of the products that may receive the trademark. Registration will likewise allow the LEFIS-APTICE Committee to establish the qualities that a product must have in order to be marketed under the LEFIS name.

The initial ownership of the rights to the trademark will be held by the project and by the universities and firms that may invest in the creation of the first LEFIS products, thereby assuming the expenses that are incurred through the organisation of or participation in workshops and conferences, or that may contribute basic elements for developing the products or for product marketing.

Conclusion

The LEFIS network is an example of the production and distribution of educational products made in accordance with the rules established by the European higher education reform. This is included in Declarations such as those of Bologna, Prague and Berlin, and it is being put into practice by the academic authorities of the member States of the European Union. Its work centres on the preparation of teaching modules that are grouped together as Masters or that are independent, which modules may be offered as permanent training and directed at professionals of law, company executives or engineers in order to train them in the generation and application of the rules of governance of the knowledge based society. Lately, steps are being taken to establish these products permanently. Time will tell if they might possibly adjust to the stated social needs.

Information and Law in the Constitutional State

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Abstract. In the modern constitutional state, law and justice should coincide closely. This is one of the fundamental requirements of democracy. The principal way in which we pursue, articulate and realize justice is to draft and enact legislation. Laws are codes that impose obligations in various ways. Juridification is however decreasing our possibilities to know and understand the law. Without a good systematics legislation is like a jungle where we do have difficulties to orientate. The authors main message in this paper is to point out the importance of information law as a new tool when planning information systems for *e*government. If we keep a close eye on the position of information networks as a part of society's infrastructure, the legal assessment of information systems and electronic services is unavoidable. And this assessmenti is ineffective without modern legal dynamic systematics.

1 Systematics, Society and Law

One of the principal purposes of science is to create order, and a crucial tool in this pursuit is *systematics.* Knowledge lives in structures. Science creates structures. We speak of systematics and systematizing. Science would be an odd phenomenon indeed without systematics.

Systematizing is an essential process. It indicates the relative importance of the things considered their social, technological and scientific importance. It also provides us with a means to distinguish different degrees and types of expertise. In our nowadays increasingly complex society and ever more divers knowledge environment, systematization is part of *quality assurance.* After all, where information management is concerned, our capabilities as human beings are demonstrably limited. In this kind of society *tacit knowledge* is not enough.

In Law, systematics is also a significant factor in interpretation. We use the frameworks available to us in the component disciplines of Law to construct subsystems. These have an influence on the kinds of interpretations science puts forward. We refer to this as systematic interpretation, and it helps us avoid haphazard actions and allows us to test the positions that have been presented. In this respect, systematics serves to *constrain the power* typically exercised by experts and authority. *Administration law* seems to be a good example.

It is thus natural for us to work within the bounds of a systematics. Given the function of science, this assertion is beyond dispute. Science serves society. But a systematic can also be risky, even severely detrimental. If is not renewed, science begins to become detached from society; it ascribes itself an absolute value. It no longer fulfills the criteria for science. What we end up with is *pseudoscience.*

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There are many reasons why systematics fail to change. Some have to do with the individuals involved. *Resistance to change* is a familiar phenomenon even in scientific circles. Given the strong focus on the individual in the world of scholarship, a single professor of law adhering to to the old systematics is enough to hold back progress for decades. Academic freedom has its price.

A second significant reason why science is so static lies in *bureaucracy.* Teaching and research at the university level has a distinctive bureaucratic tinge to it. This applies equally to public and private universities. In an address delivered upon his appointment as professor, Danish scholar *Peter Blume* spoke of a *subject imperialism* that was impedes progress. This is well put. Despite its role in society, a university is a conservative community. And there is place for bad bureaucracy too.

The academic world – Law included – was painfully slow to notice the Information Society. This should not be forgotten when we talk about *Information Law* as a new field in the discipline of Law.

2 Information Law as One of the Legal Science

2.1 The Family of Legal Sciences

There are many legal sciences. We even speak of the family of legal sciences. Systematization has made quite a bit of progress if we recall that just a few decades ago we only had a handful of important legal sciences. On factor contributing to this development is *juridification.*[1] More and more of the phenomena in our lives are regulated by different ways. And the new systematics is often following new legislation.

Information Law as a concept a long history. *Herbert Fiedler* in Germany was one of the first to introduce it back in the early 1970s. At that time, we were going through the initial stages in the development of two new institutions: administrative automation and personal data protection were making their appearance on administration and the legal scene, and brought with them a number of legal problems – problems in understanding, interpreting and drafting.

Later, the well-known Norwegian pioneer in Legal Informatics *Jon Bing* created the conceptual foundation for Information Law in his famous 1981 article "Information Law?" He linked the topic to the new issues that had been raised by the development of information technology [1].

To *Bing,* Information Law at the time was a interdisciplinary and heterogeneous area of research but one that was essential. At the same time, the term itself "Information Law" served as a *slogan* that was to have awakened lawyers to the problematic nature of the relationship between IT and Law.

It is essential that we mention the early works of *Bing* and *Fiedler* when we talk about Information Law today. They are valuable accounts of the time before the present Network Society. Yet any systematics is – and should be – always bound to soci-

[1] Juridification is a relatively new concept in the legal debate. It has its origin in German scholarship. For example, Günther Teubner and Jürgen Habermas used it effectively in their works in the 1980s.

ety as well. This means we would do well to ask: What is Information Law like in the Network Society?[2]

Information law is – partly – still a slogan today. A significant percentage of today's practicing lawyers and administration staff were educated when the Information Society in its infancy. Moreover, there are always many different strata within the professions in terms of background knowledge. Among its other functions, legal *systematics is a form of communication* for lawyers and legal stakeholders such as administrative professional. This is one reason why we need effective slogans.

But mere slogans are not going to be enough. What we have to do is to examine the core issues of Information Law more deeply in their social context – a society that is heavily dependent on data, information, information management and information networks. What we are witnessing is not just a new technical phenomenon – such as for example the telephone in its day – prompting new questions of interpretation and regulation; in essence these can be solved without significant changes in our systematics. New technology does not necessarily entail anything terribly new in legal terms or it is easily adapted to existing frameworks.

It is also often thought that the increase in the amount of legislation is directly linked to systematization. If we think about specialization, this would seem to be the case to a certain extent. But it would be very misleading to generalize here. Increased legislation is only one factor when assessing the need to rethink our systematization.

And it is also a dangerous factor: It causes us to concentrate on the legislation itself, making it easy for us to forget the change that prompted that legislation in the first place. Systematization cannot be merely the cutting up of legislative material into convenient, manageable chunks. To be sure, it may seem like a good method at first, but it will gradually reveal its shortcomings. The analogy of exchanging an SLR (single-lens reflex) camera for an instamatic suggests itself here. Quality declines.

With these reservations in mind, I would like to go on to take a closer look to what seem to be persistent problems in perceiving the relationship between law and information.

2.2 The Focus of Law, Administration and a Field of Law

We can speak of Information Law as a field that, in *general terms,* is concerned with information. It is a good slogan. But it is no solution. We have done no more than find a catchy name.

Information Law is a much better term than *law and information.* The latter brings to mind a special interdisciplinary enterprise along the lines of *law and literature* or *law and economics* or *law and administration.* Many combination with "law and" have a decidedly bad reputation especially in the eyes of practicing lawyers[3].

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[2] It is important to note that *network society* and *networked society* are different concepts. What I mean by "network society" is a society in which work largely takes the form of informational work in a digital environment, in which the information infrastructure has come to rely crucially on information networks, and in which information networks have become the communication highways of the masses. [2]

[3] Generally *law and information* is however often used in the discussion of the role of *Legal Informatics* as a legal discipline. It is, as *Günther Kreuzbauer* – among – other points out, in this connection for example important to understand the concept of Information. [3]

Looking at things in opposite perspective, one should point out that every field of Law has its essential interfaces with together disciplines. Good Law is generally also dialogue with other sciences. Law from which other sciences have been expunged is an odd phenomenon indeed, although this is what part of the conventional, theory-shirking doctrine of interpretation jurisprudence – for example in government – has aspired to. It is dangerous for the discipline, and for society.

If and when we say that Information Law is a field whose focus is information and which interacts with data processing and the information sciences we have found a *practical description* for Information Law, But it will not suffice. It is too general, too vulnerable. Following Swede *Peter Seipel,* we could criticize the description by pointing out that it is hard to find anything in Law that does not have to do with information in one way or another [4].

Seipel is no doubt correct here. Information and Law are linked to one another in a wide variety of way. A closer look at information-related regulation suggests at least a rough six-fold classification of relevant provisions: those that are *information-dependent;* those applying to *information-based products;* those pertaining to *communication;* those relating to the *individual;* those concerned with *public information;* and, finally, those that are connected with the *information infrastructure.* For example, typical legal provisions related to form are typical information-dependent provisions[4].

This my elementary breakdown alone shows that it would be extraordinarily difficult to create a fixed, traditional legal systematics such as that found in family Law or Property Law or Administration law. It would be far too elaborate and thus inapplicable in a static systematics that distinguishes bodies of provisions. And this has been the nature of our traditional legal systematics.

What is often touted as the opposite of Law based on static systematics is so called *problem-based Law.* This is a Law that goes beyond established system boundaries. Is this then the key to the development of Information Law?

My answer is "no", a very categorical "no". Information is not a problem as defined by problem-centered Law, i.e., something whose study requires the crossing of system boundaries. Not at all.

What we are dealing with is a *structural factor* that in a new way has become a significant factor in the development of society. The social debate we engage in as lawyers requires us to examine the dependency of individuals, communities and society itself, as well as the related rights and obligations and benefits and risks. One consequence of this is the continued brisk development of legal regulation of the *Network Society.* We no longer speak of the proliferation of data processing or the growth in the amount of information.

In the Network Society we find ourselves working within a *new information infrastructure* and processing data and information in a new way. Our *operational environment* has changed. And, at the end of the day, we must note that our basic, constitutional rights have, at least in part, already been transferred to information networks and that this process continues. Our privacy and our identity are exposed to new types of *risks* every time we make use of information networks. This is essential in the *citizen/government relation* too.

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[4] The often misunderstood role of form and formalities is in the Finnish literature by an interesting way described by *Sauli Mäkelä* [5]

These changes should prompt us to re-examine the position of information in society from the point of view of the discipline of Law as well. The importance of Information Law today derives from the significant change taking place in society[5]. And it is here, I dare say, that we find the difference compared to earlier descriptions of Information Law. At the time, the Information Society was a distant utopia.

2.3 The Principles of Information Law

Not even social change alone is good enough reason for setting up a new field of research, however. We should, of course, be able to justify the new field in scientific terms. A need to be familiar with law and IT is not in itself adequate justification. The need to educate *computer lawyers* or *administrative data management experts* is a different matter than changing a traditional legal systematics.

In order to get beyond specialization as an argument for revising our systematics, things must be assessed in light of what we term *general doctrines.* If social change and the need to develop new doctrines coincide, we have a sound justification for a new field of Law.

When we speak of the general doctrines in Law we typically refer to *legal principles.* Today, in my view, we are fully justified in speaking about the central principles of Information Law. The foremost among these are the right to information, the right to communication, the freedom of information and of the transmission of information, individual's right of self-determination with respect to information, and the right to data security.

Each of these principles is a *metaright* of sorts, that is moral, goal-oriented rights on the level of a *social contract.* Occasionally it is asserted that social contracts are manifested in the form of written basic rights. This idea has been put forward in an interesting way by *Luigi Ferrajoli,* for example. Basic rights are a link to social contracts [6].

Yet, this is not necessarily the case. For the most part, none of the principles of Information Law mentioned above is – for example in Finland – enshrined as such in express, direct provisions on the level of basic, constitutional rights. Yet, they are clear background accounts of the regulation of human and basic rights, accounts which *the conservative legislator* has largely overlooked due to the rapid pace of change in society[6]. A few words on each of these principles is in order here.

The right to know is a central freedom based on the prevailing concept of the human being. The individual has a genuine need and right to know and to use information. In order to use his or her right of self-determination in the constitutional state, individuals must have the right to information – the information that has been gathered on them, as well as information related to their culture and society. What we

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[5] I have in the Finnish literature used following concept of *Information Law.* "Information Law refers to the field of Law that studies the legal regulation of the production, processing, transmission, marketing, protecting and storage of information, as well as the need for and possibilities of such regulation."

[6] One of the traditional, but to day more and more important risks in modern society is the law making (drafting) risk. Conservative legislator is not able to see the possibilities of law making. The rapid change of society and the slow change of legislation, especially basic rights, are in tension towards each other .

have here is the informational dimension of the right to self-determination. For these reasons, the legal order must be prepared to provide rights that safeguard the individual's need for information – basic rights as well as others. This is why, for example, privacy and publicity in Finland are enshrined in the Constitution and, similarly, the Library Act is based on the idea of the right to know.

The right to communication, for its part, is a new basic metaright, or at least one that has come to the fore in a new way in the Network Society. It is not enough to speak of freedom of expression as a technology-neutral freedom and, for example, of the protection of confidential messages. Equally essential is the opportunity to use the new information infrastructure, now that the exercise and protection of our basic rights takes place in part on information networks. Modern communication on information networks naturally realizes our right to information but it is only one aspect of the issue. The right of the individual to communication on networks must also be safeguarded. It must be possible to use the new and essential infrastructure in an appropriate manner. This is why we are justified in including this question in the debate on legal principles that is taking place on the level of basic metarights. The so called digital divide is also depending on our *access* to open and other networks.

The principles of *freedom of information* and the *free flow of information* are central social principles where the functioning of democracy, culture and private economic life are concerned. Unlike other raw materials, information should – so the thinking goes – basically be freely available not only privately but also socially, communicationally, and commercially. It should also be possible to disseminate information; its free flow cannot be prevented through secrets or monopolies. Accordingly, the legal order has to be prepared to ensure the free flow of information through special rights, above all basic rights. In relation to public authority we also speak of *openness* and *transparency* in this context.

The right to data and information security is a basic condition for the functionality of the information infrastructure in the new Network Society. A democratic society and the constitutional state can only be built on information networks and digital information if the requisite data security exists to ensure the operation and use of this infrastructure. We should have a right to data and information security every bit as much as to other forms of security. We have been slow to realize this. In open information networks, data security has been primarily left to market forces and end users.

The *informational right of self-determination* is a basic element of the right of self-determination. As individuals we also have *the right to be alone* in society. Physical privacy is supplemented to an increasing extent in the Network Society by *informational privacy.* Our *digital identities* are also part of our right to self-determination. We basically have a right to retain control over information on us, to keep it confidential should we so wish, or to disseminate it in society. We can no doubt speak justifiably of an *informational domestic peace* of sorts. The interface between information and society is not merely a technical matter dictated by public authority's criteria for what is appropriate. This is a crucial issue as we move towards electronic administration and egovernment.

In addition to the general principles of Information Law mentioned above, we can cite special legal principles that augment and realize these general principles. These include – at the very least – *privacy, publicity, freedom of communication* and the principle of *public service.* Where intellectual property rights are concerned, the *ban on monopolies* can also be seen as one of the principles in this group. All of these

principles have – or should have – realizations on the level of legislation – norms that expressly support legal principles. And they all have links to other fields of Law.

I will leave my presentation of the central and supplementary principles of Information Law here. They would, they really would warrant a separate presentation. I believe the list I have presented is enough to convince the reader of the need for Information Law as a field of Law. In the Network Society, data, information, the information markets and information systems must be taken seriously in a new way. The complex path traveled by digital information begins with its attachment in some way to a particular platform and ends with its erasure or archiving. This is a *risky road* in technical terms. It is a rough course legally as well. We must both adapt old legal principles to the new environments and assess the need for new principles.

3 From a Static to a Dynamic Systematics

In terms of a *static, traditional systematics,* what I have said above no doubt prompts the question what fields of Law might lose some of their objects of research to Information Law in the redistribution of legal sciences. The answer is simple – none, really. The question is ill formulated. The idea of Information Law as a field of Law in its own right is part of the shift a static to a *dynamic systematics.* The same issue can and should be examined from several different points and levels of view.

This phenomenon is by no means a totally new one in *Law.* For example, it has long been the practice to assess questions of *data protection* as part of the *law of personality* and *Information Law* as part of *Legal Informatics.* The legal status of the patient has also been assessed in terms of the *law of personality, medical law* and *social law.* There is no shortage of comparable examples.

The essential thing in a dynamic systematics is not that the same pieces of legislation become objects of interest for different fields within Law. This is common enough where static systematics is concerned. What is essential in dynamic systematics is the role of *legal principles and social contracts.*

The crux of this issue is what I have called *the depth of sources in law.* Conventional jurisprudence and frequently theoretical jurisprudence as well often adopt a narrow scope when they set out to find recommended interpretations and to systematize. They easily end up concentrating on other than the central legal principles. The bridge to *basic, constitutional* rights either collapses or is wobbly at best. What we need to counteract this is a science of Law that recognizes the depth of sources of law and covers the range from a social contract to an individual situation calling for the interpretation of a law[7].

We are also accustomed to drawing a distinction between the *general legal sciences* – for example legal theory – and *jurisprudence.* This distinction is often presented in rather dichotomous terms. As *Kaarle Makkonen* has already many years ago noted, no clear boundary can be drawn between the general legal sciences and jurisprudence [8]. But where the depth of sources is concerned, the distinction is a well-founded one. We need the general legal sciences to ensure the scientific nature of Law and to safeguard its mission of serving society.

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[7] With somewhat the same purpose in mind, *Kaarlo Tuori* has written in the Finnish legal literature about distinguishing between different levels of Law and about the deep structure of Law.[7]

In this perspective, Information Law can primarily be considered one of the general legal sciences. This is why it has been developed as part of *Legal Informatics.* Legal Informatics is like an elevator between a social contract and the different ways in which information is processed. Information Law is part of Legal Informatics and there is a social need for it as one of the increasingly independent general legal sciences.

The scope of Information Law includes an examination of the processing of information and the transmission of information in the operational environment created by the new information infrastructure. But we are also producing dogmatics too. Data protection, electronic services in administration, digital signature and e-government are typical areas, where the elevator of information law is used at the level of interpretations too. We are not only discussing about principles. And we are not only discussing about the increasing legislative area of administration law.

4 Information and e-Government

Drahos and *Braitwaite* present us with an interesting perspective on the Information Society in their book *The Feudalism of Information* [9]. The challenging nature of the title well describes the tensions that we have to deal with as the social significance of information and the information markets changes.

Technological, economic, administrative and legal *convergence* bring about not only significant changes in different activities but also – and perhaps most importantly – a growing shortage of know-how. New issues are addressed either through old tools or unbridled enthusiasm for the new [10]. Equally problematic is our failure to notice changes in values. This is particularly familiar in the brief history of *data protection.* Our age is still marked by a significant *deficit in know-how,* despite the fact that data protection legislation has been in use here in Finland since the beginning of 1988. *e*Government may be the next example, if we are not taking seriously the role of information law.

During the last years we have taken a lot of steps from the old bureaucratic administrative state towards the new constitutional state. The transition to the constitutional state has had an impact of its own on the practice and science of Law. The development of the Network Society has coincided with the development of the constitutional state too. But, surprisingly, the direction of that development seems to be – a bit and even a lot – different. It seems to a considerable extent that the obligation to legislate that is part of the constitutional state is not being used to improve the position of the individual but to enact additional control and economic efficiency. Under such circumstances, the principles of *Information Law* are disregarded or at least compromised. This is easy enough to do if and when information and information systems continue to be considered as little more than aids.

When *Wilhelm Steinmüller* designed the first Legal Informatics curriculum at the beginning of the 1970s in Germany in terms of *applied IT,* he was farsighted enough to give due consideration to the importance of *data processing systems.* This perspective is important today as well. We live lives that are very much dependent on information systems. The planning of information systems requires *legal planning.* A lack of such planning jeopardizes *democracy* [11].

This shortcoming takes on a critical role when government information systems are designed and brought on line. Here, too, I would like to emphasize that in the changing constitutional state we meet law ever earlier; law is more and more a planning science and the legal profession is required to work with other professions. This, too, is one aspect of safeguarding democracy[8].

But we must keep an eye on information itself to an equal extent. Its status has changed significantly during the last years. Here, *Thomas Hoeren's* recent idea of a special *information justice* as an extension *of John Rawls'* justice debate becomes an important step forwards towards a more highly developed Information Law on the level of the general legal sciences [13]. Information should not be made into a mere commodity.

You will no doubt permit me to conclude with an example of the real impact of Information Law. If we think of the development of *good government* – a basis of government already mentioned in the law in Finland by name good administration – the primary way to develop the information systems needed in government is to make user friendly information systems available to citizens as part of the transition to electronic government. This is in fact already required by law in Finland.

From the perspective of Information Law, however, the issue changes quite a bit. In addition to software that is user friendly we need *openness in the systems.* The citizen's interest in information systems cannot end with the user interface. We have a right to know how public information is processed. This requires either open-source software or an adequate account of how the software used in public administration works. Neither of these goals has been grasped deeply as yet. And yet we are proceeding headlong toward electronic government. From a legal perspective, that of Information Law, the development that lies ahead is nothing of short frightening.

5 Conclusion

We should under no circumstances forget the human being's counterpart in democracy – government. It is, or should be, for people. But in the administrative state, so called *bad bureaucracy* turned this relation quite on its head. The individual was there for government. He or she was, as we say in Finland, *a government subject.* Things should be the other way around in a constitutional state. In assessing changes in society and the state, we should be alert to changes in government. We must ask ourselves if it is changing and if so in what direction?

When we put together the network society and the constitutional state – and this is something we must do – the outcome is in many ways a vision of a new society. We can speak of a *legal network society.* It is a society in which the changes in how information technology is used, in the information infrastructure and in the information market result in a significant juridification of society where information law is concerned.

Law in a democracy should be *a simple proposition.* Otherwise we would not be living in a democracy. However, juridification poses a threat to democracy. The in-

[8] When speaking about *legal certainty* as one of the leading principles in EC Law, we can not pass the role of egovernment. It should also provide legal certainty. Often legal certainty is, as for example *Juha Raitio* by an interesting way has done, connected only to judicial decision making [12].

crease in legislation is making it harder to keep the big picture in view. Justice becomes scarce. It is harder for us to tell what is right; yet, European tradition say that we should know the law. *Ignorantia juris nocet.* Appealing to ignorance of the law is no defence[1].

If and when we continue *juridification* without new legal systematics and if and when we continue planning and building egovernment without effective legal assessment, it is easy to take even remarkable steps back to the old administrative state. From this point of view *e*government may be a threat to democracy. And only attempts to simplify the law making process do not help us enough[9]. We should see law also as a communication; communication between state and citizens. In this communication legislation should be simple and administrative systems qualified after legal assessment [14].

References

1. Bing, J.: Information Law. In Torvund, Bygrave (ed.) Et tilbakblikk på fremtiden, Institutt for rettsinformatikk, Oslo (2004) 26-41
2. Saarenpää, A.: Oikeusinformatiikka. In: Haavisto (ed.) Oikeusjärjestys 2000 I.Lapin yliopistopaino, Rovaniemi (2004) 1-84
3. Kreuzbaur , G.: Philosophische Betrachtungen zum Informationsbegriff in Schweighofer – Menzel – Kreuzbauer (eds.) Auf dem weg zur ePerson. Verlag Österreich, Wien (2001) 199-209.
4. Seipel, P.: Juristen och Datorn, 5th edition, Kristianstads Boktryckeri AB, Kristianstad (1994) 158-199
5. Mäkelä, S.: Formaalisuus oikeudellisessa prosessissa, Lapin Yliopistopaino, Rovaniemi (2002) 151-260
6. Ferrajoli, L.: Fundamental Rights in International Journal for the semiotics of law, Volume 14, Kluwer Academic Publishers (2001) 1-33
7. Tuori, K.; Kriittinen oikeuspositivismi, Tummavuoren kirjapaino, Vantaa (2000), 163-233
8. Makkonen, K.: Luentoja yleisestä oikeustieteesä, Helsingin yliopistopaino, Helsinki 1998
9. Drahos P. and Braitwite J.: Information Dualism -Who owns the Knowledge Economy, W. W. Norton & Company (2003)
10. Saarenpää, A.: Law, technology and data technology. In Haavisto (ed.) Judicial Academy of Northern Finland. Publications 4/1999. Lapin yliopistopaino, Rovaniemi 1999.
11. Fiedler H.: Rechtsinformatik und Informationsrecht Zur ursprüngelichen Formel von W. Steinmüller und der Weiterentwicklung in Taeger, Wiebe (ed.) Festschrift fur Wolfgang Kilian, (2004) 71-74
12. Raitio, J.: The principle of legal certainty in EC Law. Kluwer Academic Publishers. Dordrecht – Boston – London (2003), passim.
13. Hoeren, T.: Informationsgerectighket als Leitperspektive des Informationsrechts 91- 102 and Dumortier J.: Hat das Fachgebiet "Recht und Informatik"noch Zukunft?59-70 in Taeger, Wiebe (ed.) Festschrift fur Wolfgang Kilian, (2004)
14. European governance; better lawmaking. Com (2002) 275 final.

[9] The new three communications for better lawmaking do not take into account the end user problems.[13]

Master Studies on e-Governance Administration: The First Experience in Lithuania

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Abstract. The article provides discussions about teaching programs of e-governance, review of Master's study programme "E-governance administration" providing curriculum of this program, the summary of the experience of the first teaching year of the program.

1 Introduction

The main objective of the article is to discuss e-governance studies on the basis of the first experiences at the Law University of Lithuania.

The issues of e-governance became scientific and practical topicality for the following reasons:

- The concept of e-governance is developing in different ways and on different basic models;
- E-governance is based on another paradigm as compared to traditional governmental system;
- E-governance becomes increasingly of a complex character and is related with integrated policy instruments and integrated public services;
- E-governance requires new professional standards dominated by interdisciplinary principles.

The multiplicity of e-governance issues formulates the need to modify and transform the classic content of studies on public administration into separate special educational and training programs. Master studies on e-governance allow to integrate and interpret a broad spectrum of specialized knowledge such as public administration, legal background, information technologies, communication, management, political sciences, etc.

In recent years, universities in various countries organize training and courses in e-governance on different levels: for students, state officers, specific topics or separate subjects in the system of competence building are distinguished, while at universities different level courses and modules (according to frequency of choice) are organized [1, 2]. In 2001, Law University of Lithuania also launched an alternatively chosen introductory e-governance subject for students of legal informatics and public administration studies programmes.

Due to the necessity arising from the e-governance topicality, in 2002 preparation of a Master degree programme of e-Governance Administration Studies was started at

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the Law University of Lithuania (LUL), it being one of the leading schools in Lithuania at all education levels (Bachelor's, Master's, Doctor's) in the area of state governance for officials. Eventually, in 2003 a new e-Governance Administration study programme branched off from Master of Public Administration studies.

2 The Main Principles of the Study Programme

Interdisciplinary generation of knowledge in the field of e-governance does not set preferences for one or another specialized background. The list of specialties that indicate appropriate graduate directions of higher education is defined in the admission requirements. Graduates with Bachelor in Public Administration, Law, Management and Business Administration, Sociology, Political science, Informatics, Communication and Information, Informatics Engineering and Electronic Engineering are admitted. Those study directions reflect, to a certain extent, disciplinary topics of e-governance and provide the basis for seeking a Master's degree.

E-governance administration program at the Law University of Lithuania has particularly strong links with the university traditions, especially with problem-based research in law and public management. Therefore, the e-Governance Administration program is treated as a program within the framework of Administration studies and legitimised as a specialisation in Public Administration.

It is a program in the field of social science, leading to the Master of Public Administration degree upon completion. The programme covers three terms; at the successful completion of the program students present their Master Thesis

As a special professional target group, e-governance students will be trained for all levels of public administration in the national and European dimensions, as well as for public and non-governmental institutions and, to a certain extent, communities.

The content of e-Governance Administration program yields a complex understanding of public administration based on information technologies, which includes thorough interaction between the government and the citizens. From the conceptual standpoint, the program is based on K.Lenk and R.Traunmüller methodological provisions [3] and concept of basic capacities and skills needed for e-Governance [4]. The key conceptual differences comparing these two programs are stressing on "soft" side of administration, i.e. political, social and managerial applications of e-governance against systemic applications of information technologies.

3 Programme Capacities and Curriculum

The main knowledge and skills for e-governance professionals should be related to contemporary governance changes in the context of knowledge society: when the management models change, new forms of interaction between government and citizens.

The study programme (90 ETSC credits, duration 3 semesters) has 43 hours of classes per semester.

The program itself consists of 5 parts: traditional block of public administration, block of knowledge management and knowledge society, block of information technology, block of e-governance and E-governance researches.

The traditional block of public administration subjects includes (approx. 17%):

- Comparative analysis of public administration;
- State economic development strategy;
- Public administration of the EU (altern.choosen);
- Human resource management.

The block of knowledge management and knowledge society subjects include (approx. 13%):

- Models and strategy of knowledge management;
- Theories of knowledge society (altern.choosen);
- Intergrated communication and public relations (altern.choosen).

The block of information technology includes (approx. 10%):

- Information technologies in public administration;
- Statistical management technologies.

The block of e-governance subjects includes (approx. 20%):

- E-governance and e-democracy;
- E-services;
- Legal environment of e-government;
- Management of information resources of e-government (altern.choosen)
- Data protection and data security.

E-governance researches include (approx. 40%):

- Scientific research work;
- Master Theses.

A big attention in the programme is paid to scientific research in e-governance that are carried out in the first and second semesters. Each student chooses own direction of research of e-governance often related to different projects of e-governance. Students prepare a written report of research subject to consultations with the tutor; this report after receiving successful evaluation is further on developed into Master's thesis. The master thesis is a scientific research work based written during second and third semesters paper and a requirement for Master's title.

4 First Experience and Projection

In 2003, 26 students chose this study program, including 6 – day studies and 20 – extramural studies. Most of them have significant experience in public administration and hold top positions. This indicates reasonable decision and high motivation, bearing in mind the need, applicability at work and prospects of e-governance knowledge. One of surprising result was the high quality and creativity of conceptual projects in knowledge management and strategy course. The students presented really interdisciplinary approaches to modifying of organizations their chosen as a study subject.

The first year revealed some shortcomings of the program as well. First of all, it indicated lack of methodological approaches, which might be directly applied for creating e-government as integrated complex of public administration and for the implementation of theoretical statements in the practical fields. Absence of strong relations between theories and practices, between compatibility of traditional public

administration realities and e-governance models show weakness and insufficient development of master program curriculum.

In the future it is necessary to look for new methods of overcoming the problems arising. Distance between academic knowledge and practical attitudes could be probably overcome through more effective using trought teaching project forms and methods. Teaching projects and groupware forms development could play very important role for integration of systemic model of traditional bureaucratic "hard" reality of administration and principles of interactivity, complexity and dynamism of e-governance model.

It also revealed the necessity to strengthen the block of ICT disciplines and the subjects of management and communication and public-private partnership in creating of e-governance. The main question, how to integrate technological skills with social, political and economical knowledge in comprehensive and to modern public management oriented conceptual unit.

All of the above demonstrates that e-governance study topics form a special problem area, the development of which requires special research and effort and has to deal with a number of complicated questions that may be relavent for the majority of the universities of Europe for implementation of Masters studies on e-governance

What are the prospects of preparing e-governance specialists on the national and European level?

How should the best practices and strengths of different research schools be shared?

Is it possible to create a network of competences aimed at the training of e-government specialists?

References

1. Bermejo J. L. Training Public Employees and Process for Implementing e-Government in Spain. In F.Galindo, R. Traunmüller (Eds.), E-Government: Legal, Technical and Pedagogical Aspects, Albaracin, May 2003, p.153-170.
2. Parycek P, Pircher R.; Teaching „e-Government" and „Knowledge Management"; In F.Galindo, R. Traunmüller (Eds.), E-Government: Legal, Technical and Pedagogical Aspects, Albaracin, May 2003, p. 213-228.
3. Öffentliche Verwaltung und Informationstechnik - Perspektiven einer radikalen Neugestaltung der öffentlichen Verwaltung mit Informationstechnik/ von K.Lenk und R.Traunmüller. – Heidelberg: v. Decker, 1999.
4. Augustinaitis A., Petrauskas R.; The First Steps of e-Governance in Lithuania: From Theory to Practice; In R. Traunmüller, K.Lenk (Eds.), E-Government, First International Conference EGOV 2002, Springer LNCS#2456, Heidelberg at al, 2002, p. 438-445.

Educational Programs in e-Government – An Active, Practice- and Design-Oriented Network?

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Abstract. In the autumn of 2004 two higher educational programs in e-government will be starting up at Blekinge Institute of Technology in Sweden. Each will be the first of its kind in Scandinavia, and both will be offered as net-based education. The interdisciplinary group of researchers developing the educational programs sees the co-construction as the beginning of an active network of competence around higher education, R&D in the e-government area. Participatory Design, as well as ideas about e-government as ongoing co-construction, have inspired us in our work with developing the educational programs.

1 Background – How Did It All Get Started?

This is a work-in-progress paper about our experiences of co-operation in developing two higher educational programs in e-government at Blekinge Institute of Technology (BIT), in Sweden. *"Where is the education about 24/7 for municipal employees – education that isn't just about technology, but also about the more mental adaptation to new ways of working with technology?"*

The quote above is from the mailing list *E-DEMOKRATI*[1] made by a municipal employee. With the author's permission, we used the quote in a letter sent to out to all municipalities in Sweden, asking for help in defining what an e-government education for municipal employees might ideally consist of. In the letter, we referred to a questionnaire available via the Internet. All of the answers were positive to the idea of a higher education in e-government. Meanwhile, we had done an extensive search through Scandinavian higher educational programs and found nothing in this area. In continued contact with a number of municipalities, we have now developed the basic outline, and the courses, for two educational programs in e-government[2]. One of these is a Master's level program, while the other is a two-year vocational education. Each will be the first of its kind in Scandinavia, and will be offered as net-based education, starting in the autumn of 2004.

2 e-Government?

The planning group has adopted a broad and border transgressing understanding of e-government. We use the following declaration as a shared statement for planning of

[1] A mailing list for discussions concerning e-government and e-democracy, hosted by the Swedish Agency for Public Management (http://www.statskontoret.se/english/index.htm)

[2] For more detailed information see www.bth.se/egov [In Swedish!]

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the direction and content of the educational programs: E-government consists of e-administration, e-services and e-democracy, and is a collective term for the processes of change which are currently taking place within the public sector. The purpose of these changes is the integration of administrative, operational and technical developments, with a deliberate focus on the citizens' perspective. The participation of citizens, employees within the public sector and politicians is an important prerequisite and starting point for these integrative processes of change. [See also e.g. 2, 4].

3 Participatory Design as a Source of Inspiration

The Scandinavian tradition of Participatory Design (PD), as well as ideas about e-government as constantly ongoing co-construction, have inspired us in our work with developing the programs. The central issue in PD has been user involvement in computer-based system design. The approach has had two trajectories: to participate and influence the democratisation of working life and also to democratise the design process [1]. Traditionally, PD has been implemented as methods for enhancing user involvement in systems design, but PD, as we see it, is multifarious, warranting constant negotiations, and who delimits 'the system' only to include systems design? We are experimenting with expanding the notion of PD to cover the long-term design of e-government – and, also the design of university based educational programs - by stressing the collaboration and co-construction of planning and designing.

3.1 Co-constructors?

Interdisciplinarity
Although coming from a number of different disciplines (computer science, informatics, law, organizational studies, pedagogics and technoscience studies), we who are now cooperating in developing the programs share the belief that it is crucial for development of technology to be grounded in an understanding of *actual, everyday use and design of technology*. In cooperating within the TANGO arena for e-government[3] around new public services, we have aimed towards establishing long-term mutual feedback channels between practice and theory, between use and design, and between different academic disciplines, where we see a growing need to synchronize the models and methods we work with [2]. Thus, we have seen the possibility of developing educational programs providing a more extensive access to the practitioner's view of developments in e-government as a challenging opportunity for mutual learning and competence development in this area.

Society as Co-constructor
Our work is supported by a reference group consisting of representatives from a number of municipalities, government agencies, trade unions and IT companies, as well as researchers from other universities in Scandinavia. Through the reference group we get access to the experience based knowledge and practices. It will also hopefully give our students access to the public sector and to IT company practices during the

[3] TANGO *(Thematic Arenas Nourish Growth Opportunities),* a regional project partially financed by Innovative Actions of the European Regional Development Fund (ERDF), consists of five arenas, one of which is focused on research and development within e-government. See more at http://www.k.lst.se/tango2/engindex.htm

students' field studies. Besides this, it facilitates the future engaging of guest lecturers coming from practices. At the first reference group meeting, we discussed the design and content of the education, as well as how to reach the groups of employees from which we hope to recruit our future students. Employers in the public sector in Sweden seem to be willing to actively promote the e-government education. A number of pilot municipalities indicate that they are willing to let employees study on a part time basis during working hours without reducing their wages. Most municipalities offer various types of technical support as well as showing a willingness to take an active part in marketing the educational programs both within the municipality and vis-à-vis other municipalities.

4 Scandinavian Network of Competence?

E-government as an area of research is so expansive and interdisciplinary that we need to network in order to get a better overview of what we are actually attempting to develop.

Net-based education is a challenge, and the groups of potential students we are addressing will call for alternative forms of education. We have the ambition to encourage the students to do their projects in close contact with R&D projects, and to take an part in the local and regional discourses on e-government, the digital society and infrastructural implementation. The multitude of competences and experiences that we as teachers and researchers hope to gain access to through the programs will strengthen and enhance the R&D projects in the future. This approach is closely connected with our focus on work practice, skill and technology, and on life-long learning. It is also grounded in our ambition to contribute to active and deliberate involvement from employees in the public sector as well as citizens in general in the change of society in which we are all a part.

We hope the programs in e-government can form part of the development of an active Scandinavian network of practice- and design-oriented competence, including researchers, teachers and employees. First steps to this direction have been taken: the first Scandinavian e-Government workshop in Örebro, Sweden[4] and a meeting for Danish e-government education organized in Roskilde[5].

References

1. Bjerknes, G & Bratteteig, T (1995) User Participation and Democracy, A Discussion of Scandinavian Research on System Development. Scandinavian J of Information Systems 1:73-98
2. Eriksén, S et al (2003) It Takes More Than Two... Developing a TANGO Arena for Regional Cooperation around E-government. In Traunmüller, R (ed.) Electronic Government. Second International Conference, EGOV 2003, Proceedings. LNCS 2739, pp.472-75
3. Grönlund, Å, Ranerup, A (2001) Elektronisk förvaltning, elektronisk demokrati. Studentlitteratur, Lund
4. Lenk, K, Traunmüller, R (2002) Electronic Government: Where are we heading? Keynote paper for the 1st DEXA E-Government Conference Aix-en-Provence, Sept. 2-6 2002

[4] http://www.oru.se/templates/oruExtNormal.aspx?id=13993

[5] http://www.dat.ruc.dk/~nielsj/digital-forvaltning/workshop.html

Teaching e-Government in Italy

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Abstract. ICTs have become extraordinary tools employed by State governments for improving the quality, the rapidity and reliability of services provided to private citizens and firms, with the aim, in the long-term, of achieving the goals of the Information Society. The human factor is essential for the structural and organizational development of the labour-intensive world of the public administration. Digital literacy initiatives are, therefore, the major tool for promoting innovation in the various fields of the country's economic and social life and for moving towards the development of the Information Society, as recognized in various political and legislative documents.

1 e-Government Political Background and Issues

The notion of e-Government, which literally means "electronic government", is very recent and represents a new philosophical approach covering the possibility of public administrations to offer services and information through new media or interactive tools, taking advantage from the innovative features produced by ICTs and, at the same time, bringing citizens closer to public bodies.

The present e-Government political policies carried on by European countries are based on specific strategies promoted by the European Union. The focus was on the rapid trasformation (within 2010) of Member States into most competitive and dynamic information societies based on knowledge and on greater social cohesion. In order to reach these results two Action Plans were promoted: eEurope 2002 and eEurope 2005 (http://europa.eu.int/). Their major objectives were to provide fully interactive online government services (e-Government), to foster a dynamic and widespread e-Business environment and e-Health and e-Learning services.

So, the term e-Government, which in previous years did not have an autonomous identity and relevance, has become a specific keyword embracing all the aspects of the Information Society connected with the exploitation of ICTs in the modernisation and digitalisation of public administrations (e-Administration) and in the enhancement of citizens participation (e-Democracy).

The Italian government as well as the other Member States, followed this innovation approach through specific Action Plans. The main steps were the adoption of an Action Plan for the Information Society and a more specific e-Government Action Plan (2000), and the approval of the Government's Guidelines for the Development of the Information Society (2002) (http://www.innovazione.gov.it/ita/index.shtml).

As to Action Plan for the Information Society, Italian policy focuses on four major intervention areas, namely those referring to human capital (training, education, research and development), to e-Government (public administration services), to e-Commerce (coordination, rules and procedures) and to infrastructures.

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The Government's Guidelines specify the aims contained in the Action Plan focusing especially on two strategic policies:

1. The transformation of government by means of ICTs, based on a model in which the public administration is responsive to the users needs and provides modern services. This goal can be reached by coordinating all elements involved: legislation, financing, organization, procedural issues, and above all human resources.
2. The implementation of actions for innovation and the development of the Information Society, which rely on a State model in which the Information Society not only plays a role in its great opportunities for economic development but also ensures social balance and equity.

So, some educational initiatives specifically directed to human capital were undertaken, in order to promote a rapid progress in cultural background and change motivations by the major actors that is public servants and citizens. Public servants are to be trained for being able to manage the services introduced by e-Government policies; citizens are to be educated for being able to use new provided services.

2 e-Government Education

These goals can be achieved by consolidating specific training and updating policies for public servants and introducing digital literacy for the general public within the educational and post educational system. Attention is to be stressed on virtual education, based both on the creation of specific courses and masters on e-Government issues and on the use of e-learning tools, the importance of which derives from the present need for providing a sort of ongoing retraining of skills and from the possibility of reaching users wherever they may be without forcing them to be in the same place at the same time.

It is well known that large sections of the population are still presently excluded from the digital revolution since they do not have the knowledge necessary for using information technologies, and that the existing "digital divide" can only be faced with policies favouring widespread computer literacy, that is promoting the European Computer Driving Licence (ECDL), equipping public sector employees with IT skills, providing post-educational courses in computer literacy, providing access points to the Internet. Of course present curricula are to be adjusted so to give global responses and proper courses are to be held for refreshing public servants engaged in the use of new technologies.

As to the conceptual backbone on which this type of courses is to be based, attention should be paid to an interdisciplinary basic education consisting of technical issues able to guarantee a basic technological background and of political and legal issues, essential for the promotion of the Information Society.

3 e-Government Education for Public Servants

As already underlined, it is difficult to attain huge transformations within the social or public administration system without focusing attention on people involved.

A survey on recent refresher courses held to public officials is therefore essential for analysing the educational offer and evaluating its congruity with the real needs arising from the new scenarios. This will allow to identify core elements which should be included in adequate e-Government practical teaching experiences.

Present courses are usually organized by public or private technical institutions, Public Authorities or Ministers and Universities.

As to technical institutions, some refresher courses - off-line and on-line - were developed by the Istituto di Teoria e Tecniche dell'Informazione Giuridica (Ittig) of the Italian National Research Council, utilising hypertext instructional modules. The Institute, engaged in a large national research project entitled Norme in Rete (Legislation on the Net), financed by the Italian Ministry of Justice for creating a unified portal on Italian legislation, was asked to realize a teaching module for training the public servants involved in the project. The module dealt with the peculiarities of the XML language and has been already applied to numerous administrations at local and regional level. The system, dealing with general concepts of the XML language, consists of 12 units, subdivided into more short lessons, and includes various components: *texts of the lessons,* into which the disciplinary domain was subdivided, presented and organised in hypertext form; *multimedia material* such as some interactive graphics of relevant legal procedures and electronic notebooks for stimulating the user's cognitive development; *exercises* for personal evaluation of the level of learning the user has reached; *a search engine,* with weighted terms, using the information retrieval vector model; *online animated help* to make the tutorial use more user-friendly (http://www.normeinrete.it/sito_area2-progetto_formazione.htm).

As to the second type of organizers (Public Authorities), a Master's Degree on e-Government issues is to be mentioned. The Master's concentrates on the most relevant legal and practical issues of the electronic public administration system, focusing especially on new technologies and integrated public services. It deals with: *e-Decisions* or cooperation models among local authorities (digital signature, digital identity card), *e-Services* or relations between citizens and private firms, *e-Procurement* or relations with suppliers and *e-Works* or relations with employees (http://www.asmez.it/formazione/me.pdf).

As to the third type of organizers (Ministers), some Italian Ministries have promoted the realization of refresher training courses to be given to all personnel. A relevant example is offered by the Ministry for Education, which has created its own center for training its leading staff. Another important experience is represented by training courses on e-Government issues organized by specific Regional Centers (http://www.crcitalia.it/), for leading staff involved in regional and local governments.

As to University promotion, a Master's on the PA and Innovation Technology was organized by Public Administration schools together with the University of Bologna. The course concentrates on technological issues (information systems, communication networks, tools and methodologies for public communication) and on legal instances of technological innovation in the PA (security, information technology law, internet law and uses e-learning methodology and tools (http://www.sspa.it/pdf/Programma_Russi.pdf).

As to courses for citizens and the general public initiatives are increasing day by day and a more specific consideration for adequate notions relating the development of *e-Democracy* and *e-Citizenship* is gradually coming out.

A few Master's for lifelong learning were organized by different Universities Camerino, *Law, Economics and New Technologies,* Bologna, *Information Technology*

Law and Legal Informatics, Pavia, *New Technologies for the Public Administration and E-Government,* Rome, *Ma.Go.L. -Local Government Management* and *Institutional Communication and Organisation through Advanced Technologies,* and *European Citizenship and Public Administrations* and others).

Another initiative is the TV promotion campaign for the general public (Non è M@i troppo tardi) recently (2004) organized by the Ministry for Innovation and RAI.

4 Conclusions

From the present brief survey it is to be pointed out that courses specifically oriented to public servants are still very few, although public servants are key human resources of PA transformation. So, they should be greatly increased and specialized within single administrations, such as some Italian Ministers are realizing.

From the conecptual point of view e-Government teaching must rely on a composite whole made up of various disciplines, comprising information technology and administrative sciences as well as social and legal sciences. This interdisciplinary approach implies that topics to be taught in this newly oriented education must derive from all the disciplines involved, also taking into account the priorities and objectives identified within the European general cultural background. Therefore, the elaboration of ad hoc university curricula specifically oriented to all e-Government issues seems to be a practical good initiative.

The creation of a permanent observatory on these new teaching experiences in the European context would be also advisable, as it should allow to compare topics and disciplines taught in the Member States, to build shared educational platforms and to face the problem of digital divide among them.

References

1. Cliff, S. e-Democracy, e-Governance and Public Net-Work, in http://www.publicus.net/articles/edempublicnetwork.html
2. Nannucci, R., La società dell'Informazione nel terzo millennio: trasformazione sociale e innovazione giuridica, p. 517-554, in Nannucci R. (ed), Lineamenti di Informatica Giuridica. Teoria, Metodi, Applicazioni, Naples, ESI, 2002.
3. D'Elia, I., Informatica e Pubblica Amministrazione: quadro normativo e istituzionale, p. 329-364, in Nannucci R. (ed), Lineamenti di Informatica Giuridica. Teoria, Metodi, Applicazioni, Naples, ESI, 2002.

Qualification Requirements in e-Government: The Need for Information Systems in Public Administration Education

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Abstract. In the wake of e-government new qualification requirements arise for users, managers, decision makers in public administration. The need is met through seminars, e-learning and training on the job. But observing an increasing dependency of public administrations on external consultancy and analyzing the tasks in e-government one gets the impression that there are qualification requirements for which educational programmes are more appropriate, especially coping with the complex issues of an integrated organization and technology design.

Introduction: Qualification Requirements

Qualifying the staff of (German) public administration is considered a success factor for e-government. While for GI &ITG (2000, 31) the design of organizational technical systems is a core ability, for Grabow et al. (2002, 34f) usage and (project and change) management skills are central. Now, what are the required qualifications? And how can they be obtained?

E-government can be defined as performing business processes in the context of government supported with information and communication technology via electronic media (von Lucke & Reinermann, 2000, 1). While the focus of this definition is on primary, value adding activities, it implies the existence of secondary, supporting activities:

1. *Supply chain and co-operation management* to realize likewise complex and expensive technical infrastructures in co-operation and to cope with the resulting increase in mutual dependencies (cf. Schuppan & Reichard, 2002; Lenk, 2002),
2. *Multi channel management* to ensure integrated access channels, to manage processes in service production, to learn about customer expectations and to influence customer behaviour (cf. Hagen & Wind, 2002),
3. *Integrated design and implementation of organization and technology* to improve task accomplishment as well as to make the best of technology (Engel et al., 2001, 400ff),
4. *Strategic management* as a basis for IT infrastructure planning (Krcmar, 2000, 25).

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These tasks presuppose specific qualifications. For accomplishing *primary tasks,* knowledge on how to use the technical systems and in which situation to apply which function is needed. These skills are needed throughout the whole organization as they are essential for everyone in direct and technically mediated contact with customers. *Secondary tasks* require:

1. Qualifications in *controlling and steering* are needed to manage processes (e. g. to meet service levels), to manage projects (e. g. to cope with the novelty and complexity of e-government tasks) and to legitimate high cost for technology and reorganization.
2. A precondition for a higher degree of *customer orientation* is knowing their preferences and habits. Unfortunately, customer contact gets more technically mediated and therefore less direct in e-government. Thus sociological and statistical skills (e. g. web log mining, survey construction) are required, even if the task is in part outsourced. Likewise despite of external marketing support, internal marketing skills are needed to influence the behaviour and the attitudes of the customers.
3. An *integrated design and implementation of organization and technology* is a permanent and characteristic task in e-government. It is triggered e. g. by technological developments, new knowledge on customers or by efforts to improve processes. It is a challenging job as it requires knowledge on and experience in technology, (re)design opportunities and constraints, end user participation and qualification, requirements and software engineering, the ability to relate technical solutions to organizational problems, legal expertise, and so on.

Ways to Meet Qualification Requirements

The majority of German public administration staff is educated in law and economics. Due to the schedule of this education information systems and computer science subjects are reduced to teaching basic IT skills to perform primary e-government tasks (e. g. Mehlich, 2000, 261). Technical experts are scarce which is even more true for experts in integrated organization and technology design and implementation. The traditional solution – teaming up internal personnel with external experts – gets to its limits because of the permanent nature of the tasks and the high expenses for external consultancy. To reduce the complexity of the task, at least at the federal level, competence centres are established e. g. for developing basic e-government infrastructure components and reference models which can more easily adapted to the needs of the user organization (BMI, 2002). But in addition, the internal qualification base has to be fostered. Apart from training on the job, there are three ways to do so:

1. The most popular are *trainings for internal personnel.* They are a means to teach skills necessary to perform primary tasks in e-government as well as for training experts (e. g. www.bakoev.de)
2. Getting more and more popular is *employing personnel with an education in computer science or information systems.* Though computer scientist help building up internal technical know how they tend to lack qualifications in the integrated design of organizational and technical systems, customer orientation as well as controlling and steering. On the other hand, information systems people usually have difficulties to understand processes, structures and the culture of

public administration since they differ significantly from those in private organizations.

3. The least well known approach is *educating (internal) personnel in information systems in public administration.* This provides for the most comprehensive qualification in both information systems and the specifics of public administration. In contrast to trainings, education programmes are well suited for learning fundamentally new subjects, though the focus on information systems design and implementation results in a neglect of more e-government specific qualifications like those related to customer orientation or to requirements engineering.. Organized as postgraduate programmes, they are well integrated into the career system (Mehlich, 2000, 265) and can be better focussed on technical and organizational (re-)design and implementation issues (e. g. www.fhbund.de/verwaltungsinformatik). In contrast, graduate programmes avoid some practical problems like the long absence of qualified personnel from the job (e. g. Rösener & Stember, 2000, 273f).

There is a discussion on the relevance of education programmes. E. g. Drüke (2003) concludes from his experience with the Media@Komm project (www.mediakomm.net) and an additional survey that training is sufficient for obtaining e-government qualifications, though an integrated organization and technology design is not his main interest. In this domain the increasing dependency on external consultancy, the trend to hire computer scientists and information systems engineers and the establishment of educational programmes hints to qualification need beyond what can be learned in trainings.

Conclusions

E-government requires qualifications which are up to now rare in german public administration. Thus a strong need for external consultancy arises. But to control their work, to cope with the arising permanent egovernment tasks and due to financial constraints, public administrations have to broaden their internal qualification base. This is mainly done in trainings, but education is essential, too. In addition, competence centres similar to those on federal level. Nonetheless, their reference models and technical solutions have to be adapted to the needs of small(er) local authorities since their organizational and technical requirements as well as financial abilities differ significantly from the typically large, specialized authorities at the federal level. Qualification build up and the establishment of competence centres are likewise important for the dissemination of e-government in Germany as the local authorities have most customer contact so that they are a cornerstone in e-government.

References

1. BMI (2002) BundOnline 2005 Basiskomponenten und Kompetenzzentren, Berlin: Bundesministerium des Innern.
2. Drüke, Helmut (2003) E-Government in Deutschland – Profile des virtuellen Rathauses. Ergebnisse des Teilprojekts „Monitoring nationaler Anwendungsfälle des kommunalen E-Government". Arbeitspapiere aus der Begleitforschung zum Städtewettbewerb Media@Komm, Berlin: Deutsches Institut für Urbanistik.

3. Engel, Andreas, Kaiser, Siegfried, Kern, Andrea, Mayer, Andreas (2001), Einführung und Betrieb, in: Schwabe, Gerhard, Streitz, Norbert, Unland, Rainer (Hrsg.), CSCW-Kompendium. Lehr- und Handbuch zum computerunterstützten kooperativen Arbeiten, Berlin u. a.: Springer, S. 396-412.
4. GI & ITG (2000), Memorandum ,,Electronic Government", Electronic Government als Schlüssel zur Modernisierung von Staat und Verwaltung. Ein Memorandum des Fachausschusses Verwaltungsinformatik der Gesellschaft für Informatik e.V. und des Fachbereichs 1 der Informationstechnischen Gesellschaft im VDE. September 2000, Bonn: GI, Frankfurt: ITG.
5. Grabow, Busso, Drüke, Helmut, Siegfried, Christine, Stapel-Schulz, Claudia, Püschel, Jan Ole (2002) Erfolgsfaktoren – Was bei der Gestaltung virtueller Rathäuser zu beachten ist, Berlin: Bundesministerium für Wirtschaft und Technologie.
6. Hagen, Martin, Wind, Martin (2002), Multi-Channel-Management, in Verwaltung und Management, 8. Jg. (2002), Heft 6, S. 349-353.
7. Krcmar, Helmut (2000), Informationsmanagement. 2. Auflage, Berlin u. a.: Springer.
8. Lenk, Klaus, Elektronische Bürgerdienste im Flächenland als staatlich-kommunale Gemeinschaftsaufgabe, in: Verwaltung & Management, 8. Jg. (2002) , Heft 1, S. 4-10.
9. Lüttich, Hans-Jürgen, Rautenstrauch, Claus (Hrsg.), Verwaltungsinformatik 2000. Verwaltungsinformatik in Theorie, Anwendung und Hochschulausbildung. 3. Internationale Fachtagung ,,Verwaltungsinformatik" der Gesellschaft für Informatik. Halberstadt 2000. Halle: Mitteldeutscher Verlag.
10. von Lucke, Jörn, Reinermann, Heinrich (2000), Speyerer Definition von E-Government. Online-Publikation. Speyer: Forschungsinstitut für öffentliche Verwaltung bei der Deutschen Hochschule für Verwaltungswissenschaften, http://foev.dhv-speyer.de/ruvii, download 7.3.2001.
11. Mehlich, Harald (2000), Verwaltungsinformatik an der HVF Ludwigsburg: Stand und Perspektiven der Ausbildung, in Lüttich & Rautenstrauch (Hrsg.), S. 258-266.
12. Rösener, Matthias, Stember, Jürgen (2000) Informatik, Medien und Verwaltung, in Lüttich & Rautenstrauch (Hrsg.), S. 266-276.

An e-Learning Tool for the Austrian Citizen Card

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Abstract. Austria is one of the leading countries in the field of electronic identity. The Austrian Citizen Card System is presently going live; the next step is to inform the citizen about the functionalities and advantages, as well as on how to use the card. On authority of the Federal Chancellor's Office, the Danube University has developed an e-learning tool that will be made available to all Austrian households. The target group is the citizen rather than the early technological adopter, and the aim is to explain the use of a citizen card rather than the technical background. The main pedagogical method therefore is to reduce technical complexity to an absolute minimum. This e-learning tool is positioned to be one piece of a sophisticated e-government communication strategy.

1 Introduction

In the last years, the Austrian Administration developed a broad E-Government Strategy, with the electronic identity for the citizens, customers, economy and the public servants as one of the most important projects. The project "Austrian Citizen Card" was started in 2000 and from a technical point of view finished in 2004. On April 1, 2004, the Austrian Parliament passed one of the worldwide first E-Government laws building a legal framework for the Austrian Citizen Card, for example by changing legal internal administrative procedures.

The next steps that need to be undertaken are the organizational integration at all federal levels and a marketing and communication campaign. Our project focuses on creating an online and offline e-learning tool, which is used both as a tool for learning as well as marketing. The main purpose is to familiarize citizens with the Citizen Card so that they begin to appreciate the advantages of having an electronic identity.

2 Technical, Organizational and Legal Framework

The central department for ICT strategy did not choose a stand-alone identity card such as the one used, for example, in Finland. Instead, Prof. Posch and his team designed a technical concept that can be implemented on different chip cards, such as a driving license or a credit card. This strategy is also compatible to other devices such as mobile phones or USB tokens.

Technically, the concept combines two main functions, electronic identification and electronic signature. Both functions accord to the Austrian Signature Law, which is based on the European signature guideline. To access the electronic identity function, the Public Key Infrastructure (PKI) has to be linked to the CRR data. Since this

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is a complex technical procedure, we will not describe it in further detail here. For the purpose of the e-Learning Tool described in this paper, it is important to note, however, that a citizen has two functionalities on the card, identification and signature.

In addition, there are also two types of concepts based on different usage scenarios, namely the so-called "strong" Citizen Card and the "light" Citizen Card. The "light" Citizen Card is easier to handle with reduced functionality, requires less equipment and is cheaper, but is limited to the year 2007. Nevertheless, both versions of the card remain very complex products with applications difficult to communicate to the average citizen.

Another problem in communicating the Citizen Card concerns its main distribution channel. The initial plan was that the proposed e-Health Card should include the functionality of the Citizen Card. But the e-Health Card project has been interrupted several times and remains unfinished. One new distribution channel therefore will be through ATM and bank cards. They will be equipped with "Austrian Citizen Card" functionality; however, the functionality will not be automatically activated. All Austrian banks support the project and offer it as a special service to their customers. A second big distribution channel is provided by the mobile carrier A1, who developed an application that implements the light version of the Citizen Card functionality. By using this application, citizens can use their mobile devices for identification and signature.

3 Target Groups

The power users in the public administration sector come from commerce and industry, who will be able to use electronic applications to complete their public administration processes , for example their tax declaration. Especially business users will benefit since the Card guarantees lower costs, more efficiency and faster access to administrative procedures. In addition, the economy could also be forced to use the card either by law or by higher handling costs. Since there is hardly a digital divide problem within the national economy (91% of Austrian businesses have internet connectivity), introducing the Citizen Card to businesses is a straightforward process.

On the other hand, average citizens are in a completely different situation. There is still a digital divide problem (52% of the Austrian citizens have internet access), and the number of contacts a citizen has with public administration is low (currently about 1.5 contacts per year). This creates high barriers of entry for complex technological changes in the administrative process. Thus the government had to take appropriate steps to familiarize everybody with the Citizen Card concept. On this basis, we developed an e-learning tool described below.

4 Pedagogical Concept

As mentioned above, one of the main goals of the tool was to provide an introduction to the Citizen Card concept on a plain and simple basis that does appeal to the average citizen and not necessarily to the early adopter. The tool was furthermore supposed to present the perspective of the user and not the service provider. Therefore, an approach focusing on common use cases had to be chosen. For example, as much as

security is an important issue and therefore needed to be communicated in simple terms, its technical complexity had to be hidden from the end used in order to avoid confusion. Naturally, this was at odds with the main interests of the technology providers who wanted to showcase their technology.

Didactically, we decided to apply an approach based on a virtual coach, called 'Konrad Koach', who establishes the feeling of a guide that leads the end user through the process of learning about the Citizen Card (see Figure 1). Konrad Koach knows all the problems a user can encounter and helps out in calm and confident manner.

Fig. 1. Konrad Koach helps out.

It was furthermore decided to limit the total click-through time to 10 minutes in order to minimize the drop-out rate. At the end of the learning sequence, a short quiz in style an pacing similar to the popular quiz show 'Who wants to be a Millionaire' was designed so that users would actively learn the information provided by Konrad Koach.

5 Content Concept

From a content perspective, three chapters were designed to familiarize the user with the common functionality of the card (see Figure 2). These chapters are:

1. What are the advantages of the Citizen Card?
2. How do I get the Citizen Card?
3. How do I use the Citizen Card?

In the first chapter, Konrad Koach, provides a general overview about the product. "Instead of going to the government office, the office comes to you," he says. The tool shows a situation on a rainy day; on the streets people are getting wet (see Figure 3). Konrad Koach, on the other hand, sits at home and uses the Card to conveniently access government services. The advantage of the Card is immediately visible. Convenience, efficiency and easy access are the unique selling points.

Fig. 2. The Citizen Card in Three Chapters.

In chapter 2, Konrad Koach describes how he got the card and how it was activated through an activation center. In chapter 3, Konrad Koach finally shows one particular application of the Citizen Card by registering at the Social Security Office.

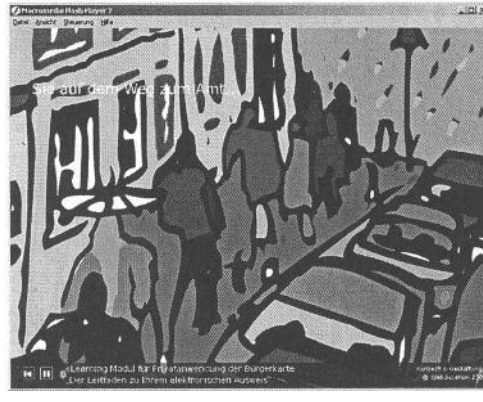

Fig. 3. People without a Citizen Card.

To make sure that access is as easy as possible, we decided to implement the tool in Macromedia Flash, which has become a standard in Web-based Multimedia. In addition, we added video sequences that show short background interviews with some of the people involved in the Citizen Card project. These video sequences are integrated into the storyline.

6 Conclusion

The present E-Learning tool provides a straightforward introduction to the Citizen Card. It is not supposed to give any specific details about the underlying technology or the legal framework. Instead it is aimed to achieve acceptance for the card by focusing on the main advantages it can provide to the average citizen.

Applications and Interfaces for e-Government

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Abstract. For over 15 years Fabasoft has been a European leader in standard software for Document Management Systems and Workflow Management, in particular electronic filing and archiving. This paper shows the efforts in e-Government from the software producer's view. Making e-Government standard software includes the task to find the best solution to international and national requirements on functionality, standards and guidelines. e-Government forms an essential part towards modern administrations as it embraces the optimization of intra-authority processes, of the interfaces between the authority entities, citizens and companies, and of inter-authority processes thus leading to the realization of the information society. The tasks complexity results from the authorities' different ways of accomplishing their tasks, from their communication partners like citizens, companies and other authorities and from complex social and legal frameworks.

1 e-Government from an Holistic Angel

e-Government processes may be understood as administrative internal or administrative external processes. Administrative internal e-Government processes comprise all intra-authority processes (flow of files) in the respective field of work, and cross-authority co-operation in settling of issues. Administrative external e-Government means processes that are not part of intra-administrative action in a narrow sense but still fall within the scope of administrative issues.

Different requirements and angles resulting from the external, internal, and cross-authority processing of business objects lead to separate presentation of problems as to required interfaces, standards and safety requirements. The e-Government process needs to be seen from a holistic angel. The desired increase of efficiency cannot be achieved unless by means of electronic projection and linking of all process items, i. e. continuous and co-ordinated electronic processing embracing the complete scale of the filing of an application, the intra-authority processing and the delivery.

Within the frame of the New Public Management strategy, the One-Stop Shop principle - a central contact oriented towards solving of problems - has also been in the focus. During this, the portal architecture serves to realise the One-Stop Shops for citizens. These are thus able to access most various "virtual authorities" from one point to present their concerns.

2 From Electronic Filing of an Application to Delivery

The great diversity of external communication partners and the general legal set-up provided by public administrative bodies require a very complex technological im-

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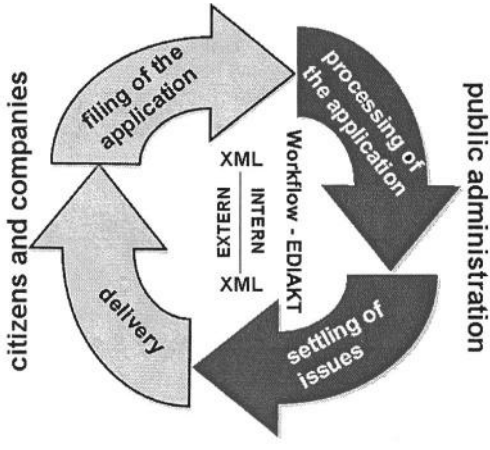
plementation of e-Government systems and call for innovative technologies which they need to cope with the resulting demands. The Internet provides the basic communication platform for the transfer of information between citizens, companies and the authorities as it forms the base for web-based e-Government applications and tools such as online services, online delivery and mobile devices. So, internet allows the construction of comprehensive e-Government scenarios.



A citizen submits his or her application on the home PC using online forms Field staff officials access the required intra-authority data via mobile terminal devices on the Web. In a similar fashion, external authorities can review the ongoing issue to the required extend plus the necessary authority to process the respective business issue – if needed – according to specific access mechanisms. Finally the applicant is sent the settled issue in an electronic form through a delivery server.

Scenarios of this kind require highly-developed networks in the intra and inter-administrative communication. In order to accomplish this, tools which are based on well-established technological standards are an indispensable means to use. Technological standards, directives and recommendations for the communication via Internet are primarily specified through global organizations such as XML, WAI conformity standards or the SOAP recommendation issued by W3C (World Wide Web-Consortium). The utilization of technological standards and open interfaces guarantee a high degree of interoperability and favorable future prospects. Examples for international and national standards and guidelines are: W3C WAI-A-conformity, Interworking of MOA modules, Security Layer, Styleguide.

2.1 Filing of an Application: Online Services

In processing an application filed, incorrect collection of business-related basic data and the resulting information gap tend to cause process delays. Form sequences have the task to ensure a clear structuring of the data to be collected on the one hand and to guide the applicant through application processes including the enclosure of documents, the payment of fees and the confirmation of the particulars provided via a digital signature on the other.

E.g. for the design of online forms in Austria, the operative unit of the Chief Information Office published directives within the frame of the e-Government Styleguide (current v 1.2). Theses directives are designed to ensure a high quality and uniform presentation of online services of Austrian administrative units. In handling online forms, modular forms have proved effective in the past. This is due to an increased serviceability, structured and more flexible design options and the application of form layout tools by persons without programming skills.

The involvement of external authorities in the settlement of applications is another vital issue in the inter-authority cooperation. This means that information needed from an external authority (e. g. registration office) can be incorporated into the application as soon as the citizen has submitted the application without the authority responsible being required to make active contributions. For this, it receives special access to the application form stored temporarily on the form server via an Uri at the same time receiving only those particulars relevant to their sphere of responsibility. Once the external authority has checked or completed these data, it confirms their accuracy by giving a digital administrative signature.

For the acquisition of the data contained in a XML format application, a flexible and configurable mechanism is required allowing to control the creation of the case paper containing the application document and the initialization of the workflow for the case paper. Being controlled by SOAP actions and thus forming the interface between "external" and "internal" e-Government processes, the data acquisition is substantially effected in three steps: Creation of a case paper, Creation of the application from the XML data, and Initialization of the workflow.

2.2 Application Handling and Settling Through the Electronic File

For the electronic file and case processing and archiving, the European countries have adopted their national concepts. These concepts differ as to the structural and procedural organization.

2.3 Cross-Authority Exchange of Files by EDIAKT or ELAK-Workflow

The interface underlying the cross-authority exchange of files is called EDIAKT. For this, the base technology offers XML. Files and documents are exported from the system using pre-defined XML patterns and are then ready to be sent off via electronic media such as e-mail or Web service. Thus EDIAKT allows cross-authority cooperation through various channels such as exchange of files or access to files on a cross-community, state, or ministry scale.

The project "ELAK im Bund" (electronic files in the federal government) is an example for this where cross-authority processes have been implemented through an EDIAKT interface integrated. The existing file is updated or – in the event of a new file – a new file is created. All meta data contained in the file, the documents stored in the file and workflow information are applied before the workflow is started according to the subject area as pre-defined process or with a start activity in case of an ad-hoc processing.

In the event several authorities use one system in a multiple client environment, the functionality of EDIAKT is not indispensable as all persons dealing with a case are

working within one and the same workflow system. Implementation and configuration of several clients within one domain allows client-specific settings and coordinated access rights without affecting the handling of other clients.

The implementation of the ELAK in Austria is also an example for this. The ministries are assigned the state as own clients and are within an EIB domain. All documents and files are handled in dependence upon the individual client through workflow. The access is controlled through an ACL (Access Control List); in doing so, the processing rights can be assigned actively for the process period through orders issued to other ministries and organizational units.

2.4 Delivery: Model of the Electronic Delivery Server (zuse –1.0)

The model of the electronic delivery server of the Chief Information Office describes the foundations and the process model of the electronic delivery. While doing so, the directives defined recommend the use of a modular, universal and efficient delivery service as to interfaces, infrastructure, submission of supporting documents and signature on the part of both the citizen and the authority. Within the frame of the model of electronic delivery, the signature given by the authority is worked on by the development of another MOA model for generic server signature components.
http://www.cio. gv.at/onlineservices/delivery/Zustellung_Modell_20030506.pdf

3 Conclusion

From technical view a comprehensive e-Government scenario can be resolved accomplishing international and national concepts, standards and guidelines. However, due to heterogenic hardware and software infrastructures successful implementations are difficult and complex which only can be solved by further international standards.

But e-Government projects must be understood primarily as organizational projects and not only IT-projects. e-Government presupposes a different thinking in processes that lead to a cultural change from traditional paper filing to electronic filing and workflow. Additional clear directives from management are needed as well as the creation of proper legal framework. e-Government must be seen as an alternative distribution channel, which offers public authorities other service possibilities.

Advancing the Government Enterprise Architecture – GEA: The Service Execution Object Model

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Abstract. In this paper, we propose a detailed object model for the execution phase of the public service provision. The model is part of our general effort to model the domain of the governance system, and to present a coherent Government Enterprise Architecture (GEA). It is based on two higher-level GEA object models, which were developed as part of our previous work, and remains compatible with them.

1 The Governance Enterprise Architecture

The public administration (PA) domain currently lacks commonly agreed content standards, definitions and vocabularies, not only at the global level among administrative systems worldwide, but even within each country. Attempting to address this problem, during the last years, we have created the Governance Enterprise Architecture (GEA).

At the current stage of development, GEA consists of five high-level models.

1. The GEA Mega-Process Model of the Overall Governance System [1].
2. The GEA Interaction Model of the Overall Governance System [2].
3. The GEA Public Policy Formulation Object Model (strategic planning) [3].
4. The GEA Service Provision Object Model [4].
5. The GEA Object Model for the Overall Governance System. [5]

In this paper, we elaborate on and investigate deeper into the last two models. Specifically, the latter model (item 5, in the list) constitutes a top-level object representation for the governance system. This system has been modeled in GEA as the aggregation of the "public policy formulation" and the "service provision" subdomains, as described in the GEA Mega-Process Model of the Overall Governance System (item 1, in the list) [1]. As defined in the GEA Object Model for the Overall Governance System, administration performs a set of primary Functions. At a high level there are three types of such functions, as derived by the linguistic metaphor we employed, using insights from the Speech Act Theory [6, 7], Communicative Action Theory [8, 9] and the Language Action Perspective [10-13]. In the society – administration "conversation", three types of interaction are identified: Declarative, Directive and Interrogative. The directive administrative function is further broken down into two categories with two sub-categories in each: Imperative/Permissive and Incentive/Supportive.

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Administration sets Objectives to be attained. By doing so, administration chooses from a superset of potential objectives, the subset to be realized. Objectives are related to the three primary Functions through the "fulfill" relationship. They are politically defined, and administration sets them as targets to be met. In order to attain the Objectives, administration must organize and provide Public Services. We identified four generic types of Public Services:

- Certification
- Authorization
- Control
- Production

Public Services are considered to consist of Objects and Processes (here called Primitives). Their appropriate organization is governed by a set of structural rules, which is called Administrative Grammar. Detailed description of this model can be found in [5].

The GEA Service Provision Object Model (item 4 in the list) describes the participating objects and the existing relationships amongst them in the "service provision" sub-domain. This model was based on the Common Government Information Model (GCIM) proposed by the UK Office of e-Envoy [14]. At the current stage of development, we have added to the GCIM model a knowledge layer with additional objects (such as Outcome Type and Evidence Type) and their relationships with the operational entities of GCIM [4].

Elaborating on these two object models, we construct a new one, which results from a more in-depth analysis of the service provision sub-domain. Conceptually this new model is at a lower level of description than the GEA Service Provision Object Model (item 4, in the list). Specifically, it focuses on the *service execution phase.* We prioritize this phase in our research agenda and consider it critical due to the fact that it lies at the core of the public service production process that occurs in every public organization. A large number of e-government initiatives worldwide aim their efforts at automating this particular process. The model proposed here could create the basis for a common language and serve as a blueprint for this type of initiatives.

2 The GEA Service Execution Object Model

2.1 The Overall SEP Model

The overall model for the Service Execution Phase (SEP) is presented in Fig. 1.

The model elaborates on five central entities taken from the GEA Service Provision Object Model: Service, Rule, Outcome, Evidence, and Subject. Three of these entities can be found at the upper level of the GEA Object Model for the Overall Governance System: Rule (presented there as Grammar), Public Service with its types, and Subject.

What is new in the SEP model?

1. The relationships and the participating objects between a Public Service and the Evidences needed for its execution.
2. The entity of Evidence Placeholder and its various types.
3. The entity of Preconditions and its types.
4. The various types of the Subject entity.
5. The various types of the Outcome entity.

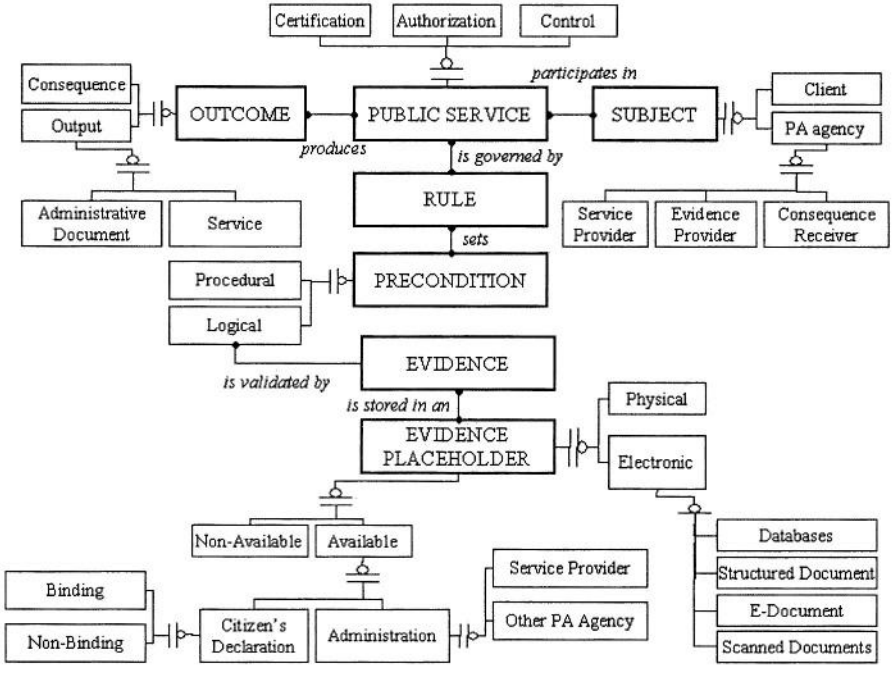

Fig. 1. The GEA Object Model for the Service Execution Phase (SEP model).

In the part that follows we present a detailed description of the model's various entities and relationships.

2.2 Detailed Description of the SEP Model

We analyze the model in two parts, for better comprehension. In the first part we present the Public Service, Rule, Precondition, Evidence, and Evidence Placeholders entities, with their relationships and categorizations. In the second part the Outcome, and the Subject entities are presented.

2.2.1 Public Service, Rule, Precondition, Evidence, and Evidence Placeholders

We start the description from the top part of the model as depicted in Fig.1.

There are three types of Public Services[1] [5]:

1. Certification
2. Authorization
3. Control

All these types of Public Services are executed according to a Rule that governs the execution process. The whole set of Rules for a public administration system constitutes the Administrative Grammar of this system.

[1] Actually production is the forth type of public service, but it consists a special case of public service that is not differentiated from production in the private sector, thus is not interesting for our analysis

The Rule sets the Preconditions for the service execution. There are two types of Preconditions: Procedural and Logical.

Procedural Preconditions refer to provisions enforced by the Rule on the procedure of service execution. This type of Precondition sets the general framework in which the service should be performed. Examples of Procedural type of Preconditions are, "Definition of the administrative layer responsible for the service provision (e.g. Prefecture)", "Definition of a specific service provider organization (e.g. National Centre for Public Administration)", "Setting deadlines for administrative responsiveness (e.g. a reply should be given to the applying citizen in three working days)", or "Setting quality standards for the service execution (e.g. Citizens' applications for the provision of service X can be sent via fax or e-mail)".

Logical Preconditions refer to the underlying business rules that should be fulfilled for the successful execution of the Service. In order for a Public Service to be executed there is always a set of Logical Preconditions that should be met. Examples of such Preconditions are, "In order to apply for a driving license, you have to be over 18", "In order to get a birth certificate, you should prove your identity when applying for it", "In order to renew your business operation license, the health department should inspect your business premises". The Logical Preconditions can be formally expressed as a set of "If ...then...else..." clauses.

The Service Provider checks the compliance of the set of the Logical Preconditions set by the Rule through the use of Evidences. Evidence is a piece of information that the service provider should have access to in order to check the validity of a Precondition. As Evidence is primarily pure information, it is stored in Evidence Placeholders. The many-to-many relationship between the two entities stresses the fact that specific Evidence can be found in numerous different Placeholders. For example, a citizen's age, serving as an Evidence in a service that sets age limitations, can be determined by the ID card, the passport or the birth certificate. These are considered as alternative Evidence Placeholders.

Various types of Evidence Placeholders are depicted in the model. The distinction between Available and Not-Available Placeholders is an important categorization of Evidence Placeholders for practical administrative operation. The Non-Available path indicates that the specific Evidence cannot be found anywhere "packed" in an accessible and reliable Evidence Placeholder. In this case administration usually has to trigger an operation that will finally create a valid Placeholder.

For example, in a previous example we stated, "In order to renew your business operation license, the health department should inspect your business premises". The Evidence needed here is a "Yes" flag from the health department, in the question "Are these premises compliant with the health standards set by the law?" This answer is time-sensitive. So administration periodically checks the value of the flag. At the beginning of a new year, there is no Evidence Placeholder available for this information. Administration has to check the "real world" (the premises) and then to create a valid Evidence Placeholder (a report, decision, etc). This Evidence Placeholder can be used further for executing the service of business operation license renewal, as it stores one of the Evidences required (the "Yes" flag).

Following the other path of the Available Evidence Placeholders, there are two options. The Evidence Placeholder may be available through the citizen applying for a service, in the case the public service type is "Authorization" or "Certification", or through the subject of the control in case the public service is of "Control" type. In cases where the Evidence is perceived as important, the administrative system de-

mands a legal commitment by the citizen for the validity of the information he/she provides (Binding Declaration, Fig.1). In other cases, there is no need for legal commitment (Non-Binding, Fig.1).

The other option of the Evidence's Placeholder availability is through the administrative system. In this case, we can distinguish two alternatives. The Evidence Placeholder is either available inside the service provider, or it is available somewhere else in the administrative system outside the organizational boundaries of the service provider. The latter case acquires great interest nowadays, as it generates the requirement for public administration interoperability [15].

The "type of" an Evidence Placeholder is also an important dimension that is depicted in the model. There are two possible types: Physical Evidence Placeholders and Electronic Evidence Placeholders. The latter obviously have been made available during the last few decades. At the current stage of technological development we can identify at least four broad categories of Electronic Evidence Placeholders. They are listed in hierarchical order based on the criterion of their being processed and queried:

- Databases (and spreadsheets)
- Structured Documents (e.g. XML based)
- e-Documents (e.g. MS Word, Adobe Acrobat or HTML files)
- Scanned Documents (document as pictures)

Returning back to the Rule entity, it is interesting to mention that sometimes the Rule may specify not the Preconditions but directly the Evidence Placeholders needed for service execution. In these cases the Preconditions are present implicitly through the "purpose" of the Placeholder. As an example we present the two alternatives in the followings:

- Rule setting Precondition: "In order to get a driving license, you must be 18 years old".
- Rule demanding a specific Placeholder: "In order to get a driving license, you must present a birth certificate, or a valid passport".

In the latter, the business logic is not present in the Rule. Though an age limitation most probably have been set somewhere else (perhaps in a different law).

2.2.2 Outcome, and Subject

All Public Services produce Outcomes. This is a fundamental assumption in GEA, and can be found also in the GCIM [14]. There are two types of Outcome:

- Outputs, and
- Consequences

Outputs are the final products or services produced by the service provider and received by the client who initiated the service execution.

Consequences are all the by-products of the service execution. Clients usually are not interested directly in them. A consequence is usually information related to the executed service that is of interest to third parties (other PA agencies). A consequence must be communicated properly to the interesting parties if information consistency amongst public administration agencies is to be achieved. As an example, in Greece someone can adopt a child through a service provided by the Prefecture of the foster parents' residence. The municipalities where the foster parents were born will then have to be informed about the event, in order to update their registries. This is a Consequence of the adoption. Currently, the citizen takes care of such information flows

by physically visiting the municipalities and providing them with the certification of adoption (actually a Physical Evidence Placeholder). The requirement for interoperability amongst public agencies' information system emerges again in such "consequence handling" cases.

Returning to the Outputs, we identify two options: there is an important difference between the Administrative Document and the Service itself.

The Service is the actual permission, certificate or restriction and/or punishment each of the three types of Public Services (authorization, certification, control) finally provide to the citizen. It is the reason why the citizen initially contacted the administration. In cases where administration refuses the provision of a service (e.g. applying for a driving license at the age of 12), the Service obtains the null value.

The Document is perceived as a kind of Service placeholder, having much in common with the Evidence Placeholder presented above. Administration has to report the execution of each Service, by a physical or electronic means. Although currently administration uses physical documents to report its formal decisions, we can imagine that this could (and will) be done by electronic means (e.g. changing a value in an electronic registry, without the need to produce any kind of physical document). It is challenging to assume that there is no public service execution, without an Administrative Document creation (as defined here).

In our model, there are two categories of Subjects: Clients, and public administration agencies (PA Agencies). The client is either the entity that initiates the service (for authorizations and certifications) or the entity for which the service is initiated by the administration (for controls). We can further categorize the Clients of public administration in various interesting ways, but this is out of the paper's scope.

On the contrary, the categorization of the PA agencies interests us a lot. Based on the role a PA agency can acquire during the service execution phase, we identify three options:

- Service Provider[2] is the agency that provides the service to the Client.
- Evidence Provider, is the agency that provides necessary Evidence to the Service Provider in order to execute the service. It is the case where an Evidence Placeholder is available inside the administrative system, but in another agency and not inside the Service Provider's jurisdiction.
- Consequence Receiver is the agency that should be informed about a service execution.

3 Conclusion – Future Work

In this paper, we proposed a detailed model for the execution phase of the public service provision. The model is part of our general effort to model the overall governance system, and to present a coherent Government Enterprise Architecture (GEA). It is based on two higher-level GEA object models, namely the GEA Object Model for the Overall Governance System, and the GEA Service Provision Object Model and remains compatible with them.

An interesting implementation direction for the SEP model could be to employ it in order to build a PA domain specific e-service ontology on top of other established domain-neutral (generic) e-service description specifications (e.g. OWL-S).

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[2] In a detailed analysis, we could separate the Service Provider from the Service Producer.

At the same time, we continue our modeling effort focusing on different segments of the GEA top-level models.

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References

1. Tarabanis, K. and V. Peristeras, *Towards an Enterprise Architecture for Public Administration : A Top Down Approach.* European Journal of Information Systems, 2000. 9 (Dec. 2000): 252-260.
2. Peristeras, V., T. Tsekos, and K. Tarabanis. *Building Domain Models for the (e-) Governance System.* in *International Conference on Politics and Information Systems: Technologies and Applications (PISTA '03).* 2003. Orlando, Florida, USA.
3. Tarabanis, K., V. Peristeras, and G. Fragidis. *Building an Enterprise Architecture for Public Administration: A High Level Data Model for Strategic Planning. 9th European Conference on Information Systems.* 2001. Bled, Slovenia.
4. Tarabanis K. and Peristeras V., *Knowledge Management Requirements for Pan-European Public Administration Service Delivery,* in *Knowledge Management in Electronic Government: 4th IFIP International Working Conference, KMGov 2003, Rhodes, Greece, May 26-28, 2003. Proceedings.* 2003, Springer-Verlag Heidelberg: Rhodes Island, Greece.
5. Peristeras V. and Tarabanis K. *The Governance Enterprise Architecture (GEA) Object Model*. in *Knowledge Management in Electronic Government: 4th IFIP International Working Conference, KMGov 2003.* 2004. Krems, Austria.
6. Austin, J.L., *How to do things with Words.* 1962, Cambridge, MA: Harvard University Press.
7. Searle, J.R., *Speech Acts. An Essay in the Philosophy of Language.* 1969, London: Cambridge University Press.
8. Habermas, J., *The Theory of Communicative Action 1, Reason and the Rationalization of Society.* 1984: Beacon Press.
9. Dietz, J.L.G. and G.A.M. Widdershoven. *Speech Acts or Communicative Action?* in *2nd European Conf. on CSCW.* 1991. Boston: Kluwer Academic Publishers.
10. Winograd T., *A Language/Action Perspective on the Design of Cooperative Work.* Human-Computer Interaction, 1988. 3 (1): 3-30.
11. Medina-Mora R. et all. *The Action Workflow Approach to Workflow Management Technology*. in *4th Conference on Computer Supported Cooperative Work.* 1992.
12. Goldkuhl, G. *Generic business frameworks and action modeling.* in *1st International Workshop on Communications Modeling - The Language/Action Perspective.* 1996: Springer Verlag.
13. Reijswoud Van V.E. and J.L.G. Dietz, *DEMO Modeling Handbook.* 1999.
14. Office of e-Envoy UK, *e-Services Development Framework Primer v1.0b.* 2002.
15. Tarabanis, K. and V. Peristeras, *Requirements for Transparent Public Services Provision amongst Public Administrations,* in *Electronic Government: First International Conference, EGOV 2002, Aix-en-Provence, France, September 2-5, 2002. Proceedings.* 2002, Springer-Verlag Heidelberg: Aix-en-Province, France. p. 330 - 337.

Modeling e-Government Service Workflows Through Recurring Patterns

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Abstract. Inherent complexity of the e-Government application domain is also reflected in the workflows of e-Govemment service provision. This paper reports on how some real examples e-Government service workflows were modeled in a simple and structured fashion by recognizing and re-using recurring segments. Such an approach, drawing from current workflow modeling trends, presents important potential to facilitate e-Government workflow modeling by enabling systematic and rapid design of new service workflows, as well as progressive construction of a repository of e-Government workflow segments that could also host best practice workflows.

1 Introduction

Nowadays, workflow technology has matured and commercial workflow products can model and manage very complex series of processes.

Appropriate representation of a workflow is always crucial for proper implementation of the corresponding process. As discussed in Section 2, a number of workflow modelling approaches have been proposed and some representation formalisms that allow collaborating parties to mutually understand the workflow models of one another have already gained consensus, whereas an issue still open is how to introduce in workflow modelling structure and re-usability based on patterns, i.e. recurring workflow segments that can be abstracted from existing models and re-used in new ones.

Building on this background, Section 3 additionally considers common traits of typical workflows from the e-Government application domain and Section 4 introduces first results of identifying recurring patterns in e-Government service workflows. This approach has been tested on some real e-Government services.

As preliminary results show, this effort could continue to classify recurring workflow patterns in a taxonomy, used as a "palette" for designing new models. Additionally, semantics could also be used on top of structure to recognize recurring workflow patterns. Section 5 concludes the paper and discusses directions of future work.

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2 Trends and Open Issues in Workflow Modeling

This section briefly overviews some major workflow modeling trends and discusses open issues. The Workflow Process Description Language (WPDL) (http://www.wfmc.org) was established by WfMC as a meta-language for batch exchange of workflow process models. Based on the WfMC workflow reference model, the XML Process Definition Language (XPDL) (http://www.wfmc.org) has also been introduced for encoding process definitions; XPDL actually employs XML parlance to formally define business processes and support workflow management.

Other approaches to workflow representation include PIF (Process Interchange Framework) [1], a textual process description notation that supports abstraction levels and inheritance and allows explicit representation of similarities between processes and generation of alternatives. PIF has been merged with the Process Specification Language (PSL) [2] developed by NIST as a model-neutral notation for exchanging business process descriptions.

Business Process Modeling Language (BPML) is an XML- based metalanguage which allows to model workflow (tasks, control logic, exceptions) as well as transactional concepts (atomic, nested transactions, compensation logic, et al.); BPML is becoming one of the most popular approaches for designing and communicating process collaboration models [3].

Petri nets (PNs) present inherent potential for modeling workflows and support both event- and state-based analysis as well as formal semantics on top of their graphical nature. Shortcomings of PN-based workflow models, mainly related to management of multiple workflow instances, have led to the work by v.d.Aalst et al on Workflow Patterns [4] and YAWL (Yet Another Workflow Language) [5].

With the WPDL and XPDL proposals gathering consensus as workflow representations that collaborating parties can understand in common, one important workflow modeling issue is to achieve economy of effort by defining workflow segments that can be re-used – possibly with adaptations - in new designs. On the premise that substantial benefits are possible for specific application domains, and in particular for e-Government workflows, an approach is presented next on working with re-usable patterns in workflows for e-Government service provision.

3 Workflow Modeling for e-Government Service Provision

As mentioned in key e-Government literature (e.g. UN [6], OECD [7] and EU [8] reports), an objective that underpins electronic citizen-oriented service delivery is to overcome complicated and disintegrated administrative procedures. The bureaucratic complexity of administrative service provision is increased by inherent variety in terms of beneficiary entities (citizens or businesses), scope of interest (ranging from local to national to cross-border) [9] and content (ranging from first-counter information to full transactions, possibly legally binding and financially charged) [10, 11]. Typically, e-Government services are provided through complex multi-step – possibly fuzzy – workflows, involving exchange of administrative information and documents with increased security, privacy and time-critical requirements. Such workflows may cross multiple agencies and even span national borders, so that they come across different regulatory frameworks and cultural contexts.

Complexity of e-Government service provision workflows creates a need for solutions to facilitate the e-Government workflow modeling lifecycle, and one such solution is to exploit some recurring service provision patterns. Indeed, provision of both informational and transactional administrative services often has similar "backbone" workflow logic of the form "acquaintance with service – submission of request – processing of request – delivery of results". For transactional services these steps may be more complicated, e.g. "submission of request" may include assembling a whole dossier of documents or "processing of request" may encompass numerous background checks and approvals, without however necessarily departing from the general workflow pattern. Additionally, a number of operations that complement core service delivery, such as PKI certification of electronic communication, document translation and postage or payment of fees often recur in e-Government service provision workflows. Though such similarities are more visible within workflows of the same e-Government service provider they also exist between different providers, due to common administrative practice or even due to adoption of best practices.

Therefore, there is not only the need to facilitate e-Government workflow modelling but also the grounds to do it, through identification of recurring workflow patterns that can be re-used or adapted in new workflow designs.

4 A Case of Recurring e-Government Workflow Blocks

The work reported in this section has been performed upon workflows for one-stop e-Government service provision designed in the context of the CB-BUSINESS EU-funded R&D project (IST-2001-33147, http://www.cb-business.com, also see [12]), that aims at improving cross-border G2B administrative service provision. Participating e-Government service providers include administrations and chambers of commerce and industry, and the CB-BUSINESS hub currently provides more than 20 e-Government service offerings, including informational (information on business opportunities, partner search, etc.) and transactional services (Carnet ATA certificates for cross-border transports, certificates of origin for goods, etc.), in most cases offered through collaboration of multiple service providers. Provision workflows of all service offerings have been modeled using the WfMC-compliant three-faceted (encompassing process, data and organizational aspects) workflow modeling formalism of the FORO-WF™ workflow engine, that also powers the CB-BUSINESS hub[1].

All service provision workflows consider the hub as single intermediating party between end users and service providers and have been designed using a similar logic. Departing from two basic workflows for informational and transactional service provision, all other workflows can be modeled as variations, extensions or compositions of the former ones; this has been a first result of design re-usability. Additionally, in the course of workflow modeling work it has become clear that, in order to minimize the need for adaptations, factorization of initial designs at a finer level of granularity allows to isolate design segments that can be re-used as-is. The notion of workflow "blocks" has been introduced: a workflow block is considered as a non-trivially recurring group of consecutive (in the sense of control flow) workflow nodes, with well defined (preferably single) inputs and outputs and meaningful application-level se-

[1] FORO-WF™ is a registered trademark of SchlumbergerSema sae.

mantics that can be isolated as an autonomous segment of a container workflow. Important work has been reported in [13] concerning the identification and re-use of workflow components, which proved to be useful as a theoretical background to our work with the workflow blocks.

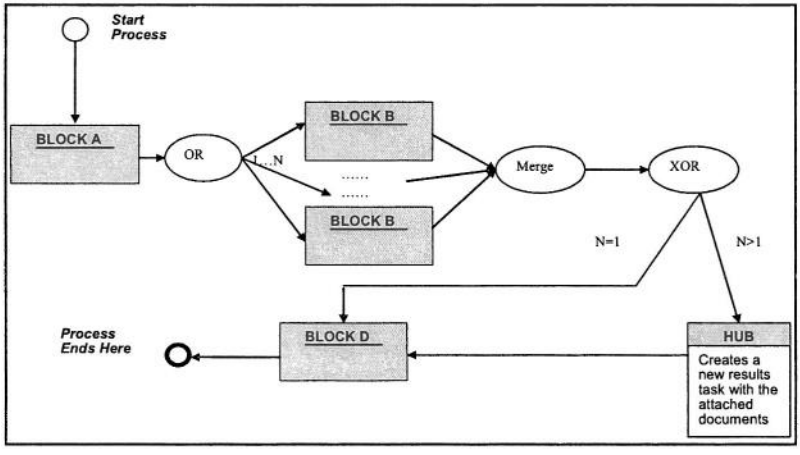

Fig. 1. A block version of the basic informational service workflow.

It has been possible to abstract a number of recurring workflow blocks, including blocks with the following application semantics:

- submission and forwarding of end user requests End users submit requests by filling in an on-line application form and posting by email or fax accompanying input documents (if any); upon reception it is checked if additional input documents are needed from other service providers and the latter are asked to provide them; these additional documents are also submitted and the complete request dossier is forwarded to the competent service provider.
- receipt of requests and production of results A Contact Point Officer from the competent service provider receives a request dossier, processes it and produces results.
- postage delivery Results are delivered by paper mail and end users are electronically notified about postage.
- electronic delivery Results are uploaded to some web space and end users are electronically notified about upload.

A number of additional blocks (e.g. a block for payment) have been identified, and it has been possible to express all service provision workflows in terms of the recognized blocks and some standard connection logic. The latter is taken from the Workflow Patterns collection of v.d.Aalst et al [4]. Figure 1 and 2 show how the basic informational and transactional service provision designs can be expressed in this way (block labels “A” to “D” refer, respectively, to the blocks defined above) also rendering better comparable their control structure.

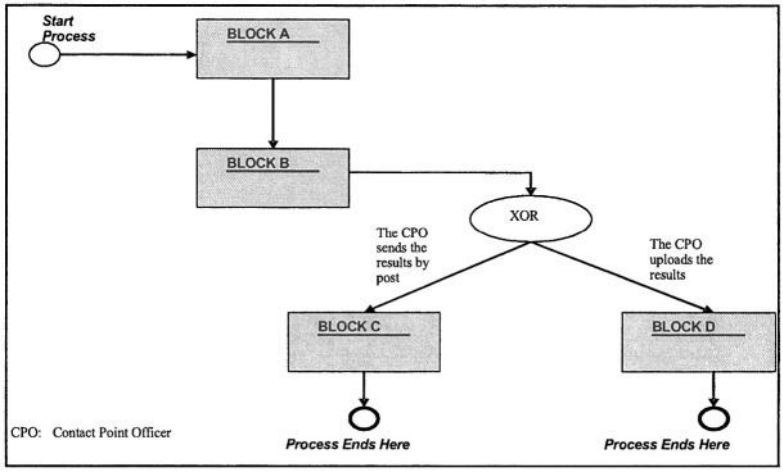

Fig. 2. A block version of the basic transactional service workflow.

5 Conclusions and Future Work

The work reported in this paper has departed from a set of real e-Government service provision workflows and identified a number of recurring segments, based on similarities in workflow-level control structure and application-level semantics. Moreover, semantics of identified segments seem sufficiently general to allow including them into some higher-level taxonomy.

Even at this early stage of work, usage of recurring workflow blocks to model e-Government service provision presents important advantages. From a workflow modeling perspective, designs become more compact and better comparable, well defined recurring blocks can be independently re-engineered or optimized and modeling per se becomes easier and less prone to errors. From an e-Government perspective, the idea is promoted of building on and contributing to good patterns for administrative service delivery, and this translates to facilitation of adopting best administrative practice.

This approach, however, opens us many new issues. The most important one is to construct a systematic methodology for recognizing how any two workflows are similar or different in terms of both workflow-level control structure and application-level semantics. This calls for annotating workflow models with application semantics, an issue that can best be solved at the level of modeling formalisms. Apart from that, linguistic constructs are also needed for defining, re-using and re-defining recurring workflow blocks; existing representation languages such as YAWL could be extended in this way, whereas design tools need to offer support accordingly.

As a concluding remark, the idea of building generally useful artifacts is a classic common theme behind software procedures, object classes, AI agents and even web services; we argue that application of this idea to e-Government service workflow modeling presents substantial potential for managing the complexity of this domain and facilitating design and re-use of best practices for e-Government service provision.

Acknowledgements

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References

1. Lee, J.; Gruninger, M.; Jin, Y.; Tate, A.; Yost, G. et al: *The PIF Process Interchange Format and Framework Version 1.2.* The Knowledge Engineering Review, 13 (1998) 1, Cambridge University Press, March 1998, pp 91-120.
2. Schlenoff, C.; Gruninger M.; Tissot, F.; Valois, J.; Lubell, J.; Lee, J.: *The Process Specification Language (PSL): Overview and Version 1.0 Specification.* NISTIR 6459, National Institute of Standards and Technology, Gaithersburg, MD, 2000.
3. Rajesh Kumar T.; Ashis Kumar Pujari; Amit Kumar Srivastava; Visweswar B.K.: *BPML: A business process modeling language for dynamic business models.* IEEE Workshop on Advanced Issues of E-Commerce and Web-based Information Systems, 2002
4. van der Aalst, W.M.P.; ter Hofstede, A.H.M.; Kiepuszewski, B.; Barros, A.P.; *Workflow Patterns.* Distributed and Parallel Databases, 14(3), pages 5-51, July 2003.
5. van der Aalst, W.M.P.; ter Hofstede, A.H.M.; *YAWL: Yet Another Workflow Language.* QUT Technical report, FIT-TR-2003-04, Queensland University of Technology, Brisbane, 2003.
6. Ronaghan, S.A. (ed); *Benchmarking E-Govemment: A Global Perspective.* United Nations Division of Public Economics and Public Administration, in collaboration with the American Society for Public Administration, New York, May 2002.
7. OECD Policy Brief; *The e-Government Imperative: Main Findings.* March 2003.
8. Commission of the European Communities; *The Role of e-Govemment for Europe's Future.* Brussels, 26.9.2003, COM(2003)567 final.
9. Gouscos, D.; Lambrou, M.; Mentzas, G.; Georgiadis, P.; *A Methodological Approach for Defining One-Stop e-Govemment Service Offerings.* 2nd International Conference on Electronic Government (EGOV 2003), Prague, September 2003, Springer-Verlag, Lecture Notes in Computer Science vol. 2739, pp. 173-176.
10. Anghern, A.; *Designing mature Internet business strategies: the ICDT model.* European Management Journal, 15(4), August 1997, pp.361-368.
11. Commission of the European Communities; *eEurope 2002 – Impact and Priorities.* Brussels, 13.3.2001, COM(2001)140 final.
12. Verginadis, G.; Gouscos, D.; Legal, M.; Mentzas, G.; *An Architecture for Integrating Heterogeneous Administrative Services into One-Stop e-Government.* eChallenges Conference 2003, Bologna, October 2003.
13. Zhuge H.; *Component-based workflow systems development.* Decision Support Systems 35 (2003), pp. 517-536

Web Services and Value Generation in the Public Sector

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Abstract. Two basic questions are investigated in this contribution: 1) How can we explain the value generation process in the public sector? 2) What is the potential role of Web services technology in this process? Our approach has been to make use of the process theory on business value generation developed by Soh and Markus (1993), adapting the original framework of analysis to the public sector. According to these authors, IT can generate business value through a three-phase process: conversion, use and competitive deployment. We focus on the first stage of the model, where IT expenditures are converted into IT assets. The role of Web services technology in this conversion process is then depicted, evidencing some implications connected to its adoption in e-Government (e-Gov) projects. The analysis is intentionally limited to the intra-organizational level (i. e. we do not consider inter-agency systems) and to the first phase of the value generation process. In the future it may be possible to delineate a more complete picture of the e-Gov value generation process and the potential role of the Web services technology.

1 The Value Generation Process in the Public Sector

The analysis of the role of IT in value generation in the public sector is not a totally new concept: for example, in [3], Kim Viborg Andersen has proposed the "political value chain" model, in which the classical Porterian framework of analysis is adapted to the public administration (PA) domain; a similar framework has also been used for the preliminary analysis given in [14] where the potential role of Web Services technology as a sort of "value reconfiguration catalyst" for inter-organizational activities is prefigured.

The strategic and economic value of IT investments has been extensively and deeply analysed with reference to the business sector: for example, already in 1993 the collection of selected works in [4], was accompanied by a bibliography of almost 600 papers and books on the topic. One of the papers that appeared in this influential book was written by Markus and Soh, [9], and focused its attention on the "theory of IT conversion effectiveness", tracing down from Weill [16] and elaborations on his work [see, e.g. 17].

The main idea underlying the theory is that organizations differ in their IT conversion effectiveness, i.e. "the ability to convert expenditures into assets that provide value to the investing firm". IT conversion effectiveness is, in turn, influenced by

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internal managerial processes (like, e. g., organizational commitment and experience with IT) as originally pointed out by Weill. In addition, Markus and Soh evidenced the importance of structural factors, like firm size and industry structure.

The theory of IT conversion effectiveness is based on three fundamental hinges:

1) Value is not generated by IT expenditures until they are converted into *IT assets;* accumulated IT assets include IT applications and IT infrastructure;
2) Structural factors can influence IT conversion effectiveness; and
3) Internal management factors can influence IT conversion effectiveness as well.

In a further conceptualization, Soh and Markus [12] notice how the "IT Conversion Process" is only the first of three major phases that characterize the business value generation process: the second stage is the "IT Use Process", and the third is the "Competitive Process", as shown in Figure 1. Not wishing to discuss this model as a whole, in the present paper we focus on the IT conversion process, re-examining the issue in the context of the public sector.

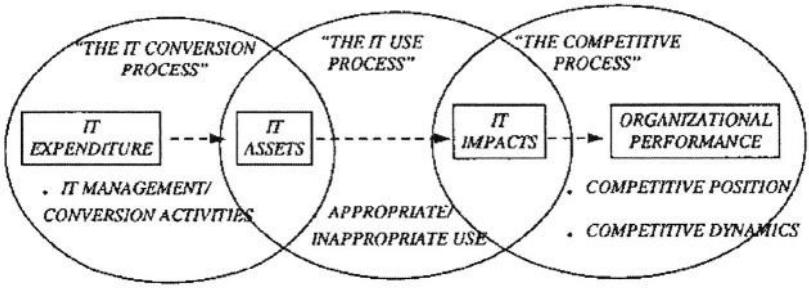

Fig. 1. How IT creates business values according to Soh and Markus [12].

1.1 Effectiveness of the IT Conversion Process

The three fundamental concepts underpinning the IT conversion process relate to: *accumulated IT assets, structural factors* and *internal management influences.* In what follows, we summarize each of them.

Accumulated IT Assets

The central assumption here is that "It may take several years of spending to develop "productive" IT assets. Thus, we need a concept of accumulated IT assets to reflect the realized value of firms' [...] IT expenditure" ([9], p. 379).

The value of IT stems from know-how, specifically from "users' ability to operate computing equipment and software and to integrate these resources effectively into their work" (ibidem p. 380), together with other kinds of know-how, like the professional and technical competences of IT operations units and the business knowledge embedded in software applications.

IT assets include applications and infrastructure. Applications are believed capable of creating direct business value ([10]; [7]) "[...] Thus the breadth and quality of a firm's portfolio of IT applications, more easily measured than the concept of IT know-how, is a potentially useful surrogate for the value of a firm's accumulated IT assets" ([9], p. 380). Tangible IT resources, along with the people and procedures

required to manage them, are categorized as IT infrastructure. "A critical role of the IT infrastructure is to maintain existing applications and to "enable" or generate new applications in the future".

Structural Factors
According to Markus and Soh, industry and firm size are the main structural factors that may affect a firm's ability to benefit from IT investments. In particular, returns from IT spending seem to be greater in firms belonging to information-intensive industries.

Another structural factor is the size of firms. The theory of economies of scale suggests that big firms have greater coordination and control needs and so may be more likely than small companies to benefit from IT. Moreover, large firms have more bargaining power in IT purchases.

Internal Management Influences on IT Conversion Effectiveness
In addition to accumulated IT assets and structural factors, the ability of organizations to effectively transform their IT investments into IT assets is due to four interrelated managerial processes, originally introduced by Adler [1]: (i) formulating IT strategy, (ii) selecting an appropriate organizational structure for executing IT strategy, (iii) developing the right IT applications, and (iv) managing IT application development projects effectively.

1.2 Application of the Model to the Public Sector

In short, Markus and Soh contributed to highlight, and put into a testable theory, the most important factors that might affect firms' ability to leverage IT potential. Is it possible to apply this conceptual framework to the civil service context? The conceptualization by Soh and Markus - being of general use – does not distinguish between public and private contexts. In principle, when applying this framework to the public sector, one should take into consideration the joint influence exerted on all three key processes (IT conversion, IT use and competitive process) by a greater number of contextual elements than are present in the private sector.

A very wide and rich research agenda would be opened in this way. For example: what happens in the third stage of the value generation process? What is the process that corresponds to the "competitive process" in Figure 1?

Just to take an example, most studies aimed at comparing public and private organizations fail to consider areas where government is a demand leader for IT. According to [11, p. 67] these areas include: ubiquity of services, trustworthiness, information access, and confidentiality. In other words, government-provided services have an extra-burden of guaranteeing high levels of security and privacy for constituents.

More generally, the process ranging from the definition of IT needs to the evaluation and monitoring of IT systems follows a sometimes radically different path to the one that features in the private sector. One of the most important principles informing public sector activities (which, in the private sector, typically plays no role) is that of the "public interest", which often leads to different ways of assigning tasks and responsibilities and of providing organizational control and coordination of activities, etc.

We intentionally leave this issue open here as a stimulus for further work. Endeavouring to overcome the limitations of applying the Soh and Markus model in a partial manner to a public sector context, our attention in this paper is exclusively directed to the left hand side of the schema, i.e the "IT conversion process". In the following section we draw a quick sketch of the current state of the Italian eGovernment Action Plan.

2 The Italian e-Gov Action Plan

After answering the first question by way of introducing an appropriate framework for interpreting the value generation process in the Italian public administration (PA) and focusing on a specific area of the model, we now pose our second question: What is the role of Web Services technology in this process?

The Italian eGovernment Action Plan views the rapid development of e-Government as a way to improve efficiency and quality for citizens and businesses. One of the main general objectives is that "any service should be available at need by any authorised administration, regardless of its territorial jurisdiction or localisation" ([6] p. 326). At present, most e-Gov services offer mere information to constituents. The average level of provision of fully interactive services is very low: for instance, less than 10% of the official Italian PA websites allow on-line interaction with public offices.

A first step towards joining up the different parts of the Italian public sector was taken some years ago with the implementation of the Public Administration Unitary Network (the so-called RUPA). This infrastructure presently connects central and local government bodies on a nation-wide basis. Theoretically, ICT infrastructures like RUPA should enable the adoption of e-Government initiatives. In practice, there are still significant differences among (and within) public organizations with respect to the quality of IT application portfolios currently supporting front-office and back-office activities. These differences, in turn, imply inefficiency and poor coordination.

Recently, the diffusion of practices such as application software integration and reuse has become the main objective for the Italian Ministry of Innovation. In this respect, the Action Plan has identified a cluster of technologies (i.e. Web services) as one of the technical enablers of application integration across administrations (a more in-depth evaluation of the Plan is reported in [13]).

"Web services are self-contained applications capable not only of performing business activities on their own, but also possessing the ability to engage other Web services in order to complete *higher-order* business transactions" ([18] our emphasis). This technology is seen as a standard way (i.e. based on Internet protocols) for heterogeneous systems to exchange and manipulate information within and across distinct organizations. With it new opportunities for governments to redesign front-office and back-office activities could arise in a wide variety of public service domains.

The Italian Action Plan explicitly recognizes that the delivery of most services goes beyond the jurisdiction of a single agency or public bureau. Furthermore, the Plan addresses its attention to the need to develop and implement information systems quickly (i.e. from an existing pool of application components) and reuse them in various different applications (e.g. the delivery of e-Gov services over the Internet). In complex and heterogeneous environments, where thousands of public agencies typi-

cally use their own IT resources (which themselves consist of disparate "islands of automation"), interoperability across platforms, applications and programming languages is a key issue. As has happened in the past with other emerging technologies such as middleware and object-oriented programming languages, Web services are the latest promise of full-fledged software applications that allow systems running in different environments to interoperate.

We argue that the extent to which such a technology will be adopted by public sector bodies will depend on a number of factors contingent to the specific environment where it is implemented. More generally, implementing even a modest degreee of integration in a structure as complex as the Italian public administration is a formidable undertaking. For this reason, we espect Web service technology to be employed within government agencies rather than across them.

In order to provide answers to our research questions, in the next section we consider how Web services can influence the IT conversion process in an intra-organizational domain.

3 The Role of Web Services

At present, within Italian public agencies, situations characterized by substantial innovation co-exist with situations in which progress towards innovation is still hampered by substantial obstacles. Thus, the process of the accumulation of IT assets is still in its initial phase. Given this situation, what role could be played by Web services technology in order to improve the IT conversion effectiveness?

Our line of reasoning is based on a fundamental assumption: IT conversion effectiveness is positively influenced by the degree of integration of the application portfolio. In fact, a high level of integration among software applications enhances an organization's ability to benefit from IT investments. A full and seamless integration with "legacy systems" is a key requisite for IT investments to be efficiently converted into IT assets.

At present, Web services are not the only integration technology available on the market. Moreover, they have only recently appeared. Still in their infancy, compared to technologies like XML and DCOM, they are much less well-known and far less widely accepted. While any integration technology can help organizations to benefit from their IT investments, Web services are the only one which is characterised by the strategic combination of a particular set of key features. These are: contract-based reusability [19] (typical of component-based technology, like DCOM), extensibility and the use of Internet infrastructure. The latter two (i.e. extensibility and use of Internet infrastructure) are typical of XML, but until now, no integration technology has been able to incorporate all the three mentioned features, as Web services do.

As such, because of their ability to easily enable inter-application communication, ubiquitous access and incremental adoption, Web services show a great potential to help heterogeneous and distributed systems to work together. Thus, in the context of public organizations, the value of Web services could range from enabling the development of entirely new services (by exploiting preexisting software applications) to the integration and optimization of internal processes.

Therefore, though the present analysis is only briefly sketched and would need further elaboration, we could argue tentatively that Web services may significantly en-

hance IT conversion effectiveness in the Italian PA. Precisely because it involves a maximisation of the potential for integrating software applications, it provides significant opportunities for effectively realising the process of the accumulation of IT assets.

Markus and Soh's findings also indicate that the IT conversion process is influenced by a number of internal IT management policies (see Section 1.1 above). An in-depth discussion of these interrelated assumptions is beyond the scope of this paper. The interested reader may refer to [9]. A more complete analysis of the role of Web services in the public sector would necessarily include a consideration of political, organizational and economic barriers that hinder agencies from developing interoperable systems (see [8], [2]). Given the large number of potential threats to IT conversion effectiveness, it would hardly be surprising to discover that not all public administrations were able to achieve advantages from their IT projects *even* by using Web services.

However, it is useful to note that, as in any other emerging field, the current generation of Web services tools shows the typical problems of early software. Some issues relating to security and performances are still unsolved.

4 Final Remarks

The above considerations lead us to suggest that Web services should be adopted as the preferred technology when interoperability projects occur entirely within an agency rather than among distinct agencies. Furthermore, and following the Markus and Soh findings reported in Section 1.1, we foresee that larger agencies may be more likely than smaller ones to benefit from this kind of technology.

To sum up, the theory of IT conversion effectiveness points the way to some necessary but not sufficient conditions which need to be recognised and supported in the first phase of the value generation process depicted in figure 1. A high quality application portfolio (both in quantitative and qualitative terms) is believed capable – along with IT infrastructure - of creating value from current and past IT spending. The model also indicates some managerial areas requiring active support.

Our study assumes that interoperability projects could be more easily implemented within a single agency.

The main conclusion from the paper is that IT conversion effectiveness is strictly related to the degree of integration of the application software portfolio. In this regard Web services, as a powerful integration technology, may play a key role in the value generation process in public administration.

We should not forget that Web service is just a technology. In order to benefit from it, organizational work is absolutely essential.

References

1. Adler, P. S., 1989. Technology strategy: a guide to the literature, in R. S. Rosenbloom and R. A. Burgelman (Eds.) Research on technological innovation, management and polity. Greenwich.
2. Andersen, D., and Dawes, S., 1991. Government information: a primer and casebook, Prentice-Hall, Englewood Cliffs.

3. Andersen, K.V., 2001. Reengineering public sector organisations using information technology, in R. Heeks, (Ed.), Reinventing Government in the Information Age: International Practice in IT-Enabled Public Sector Reform. Routledge. London.
4. Banker, R., Kauffman R. and Mahmood R., 1993. Strategic information technology management: perspectives on organizational growth and competitive advantage, Idea Book, Harrisburg.
5. Bozeman, B., and Bretschneider, S., 1986. Public Management Information Systems: theory and prescription, Public Administration Review, n. 46, Special Issue.
6. EITO, 2002. European Information Technology Observatory, Frankfurt am Main.
7. Keen, P., 1991. Shaping the future: business design through information technology, Harvard Business School Press, Boston.
8. Landsbergen, D., and Wolken, G., 2001. "Realizing the promise: government information systems and the fourth generation of information technology". Public Administration Review, Mar/Apr., vol. 61, Issue 2.
9. Markus, M. L., Soh, C., 1993. "Banking on Information Technology. Converting IT spending into firm performance", in R. D. Banker, R. J. Kauffman and M. Mahmood (Eds.), Strategic Information Technology Management. Idea Group Publishing, Harrisburg.
10. Parker, M., Benson, R., Trainor, H., 1988. Information economics: linking business performance to information technology, Prentice-Hall, Englewood Cliffs.
11. Scherlis, W., and Eisenberg, J., 2003. IT research, innovation and e-Government, Communications of the ACM, January, vol. 46, n. 1.
12. Soh, C., and Markus, M. L., 1995. How IT creates business value: a process theory synthesis, Proceedings of the 16th International Conference on Information Systems, Amsterdam, December.
13. Sorrentino, M., and Virili, F., 2003. Socio-technical perspectives on e-Government initiatives, in R. Traunmueller (Ed.), Electronic Government, Second International Conference EGOV 2003, Prague; Springer-Verlag, Berlin.
14. Virili, F., 2001. The Italian e-Government Action Plan: from Gaining Efficiency to Rethinking Government. Proceedings of the DEXA 2001 International Workshop on e-Government, Munich.
15. Virili, F., and Sorrentino, M., 2002. Reconfiguring the political value chain: the potential role of Web services. Proceedings of the DEXA 2002 International Workshop on e-Government, Aix en Provence, Springer-Verlag, Berlin.
16. Weill, P., 1988. The relationship between investment in information technology and firm performance in the manufacturing sector. Doctoral dissertation, New York University.
17. Weill, P., and Olson, M., 1989. Managing investment in information technology: minicase examples and implications, MIS Quarterly, March, vol. 13, n. 1.
18. Yang, J., 2003. Web service componentization, Communications of the ACM, October, vol. 46, n. 10.
19. Meredith, L. G., and Bjorg, S. 2003. Contracts and types, Communications of the ACM, October, vol 46, n. 10.

Electronic Services in a Decentralized State

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Abstract. The Netherlands puts much effort in establishing itself as a modern country and as one of the leading countries in the information age. At the same time, however, it has been losing its position as a forerunner in the electronic delivery of public services. This is mainly due to the fact that most public services are delivered at the level of the Dutch municipalities. At this level eService development is almost stagnant because of a) lacking municipal resources and limited potential benefits and b) a reserved, soft attitude by central government which has adhered to the Dutch institutional principles of municipal autonomy and the consensus model. In recent years, however, we see some developments which may help to solve the existing stalemate and may indeed bring the Netherlands back on track.

1 Introduction

At first glance, the Netherlands seems to provide excellent conditions for the development of electronic services: its population is well educated, trust in government is high, there is a good technical infrastructure, a high internet penetration among citizens and well organized central registrations [1]. It is, therefore, not surprising that the Netherlands has long been one of the countries leading in the electronic delivery of public services. From the early beginning of public sector informatization, many Dutch *national* agencies have played a leading role in the world. These agencies were early to invest considerable resources in the implementation of ICTs in their high-volume services, such as income tax returns, student bursaries, housing subsidies and child allowances. In general this investment has been effective in that it has resulted in the availability of several sophisticated electronic services.

In recent years, however, we see a serious stagnation in this field. Where other countries still show considerable progress in the development of electronic service provision, the Netherlands does not and according to international benchmarks, the country is slowly but surely overtaken by almost every other developed country [2, 3]. Partly this stagnation can be explained as a ceiling effect and as an effect of the disadvantage of being ahead; countries that were behind the Netherlands in the past, were able to build on previous experiences. A more important explanation for the current position of the Netherlands can be found in a subtle but important shift in the governmental level at which new electronic services are developed. Where early development took place at the *national* level, further growth largely depends on the *local* level of the municipalities. As about 70 percent of public services is provided at

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this municipal level in the Netherlands, this is the level that really counts when it comes to further development of eService delivery. It is, however, also the level at which the least progress is made. According to national benchmarks, such as http://www.webdam.nl and http://www.advies.overheid.nl, some municipalities really invest in electronic service provision for their clients, but most in fact do very little. In general, progress is slow and eService maturity at the municipal level is not very high [4]. The fact that all municipalities are officially on-line, albeit only recently, cannot hide the fact that the sophistication of most municipal websites is very diverse and in general rather limited. Many municipalities come little further than providing some basic (tourist) information on their websites and few go beyond the level of simple information provision about municipal products and services, with some downloadable forms at best. Transaction services, or even tailor made advice services are still largely lacking and in fact citizens satisfaction with these municipal eServices is fairly low [5].

This paper takes a closer look at the reasons for this lagging development of eServices in the Netherlands, mainly drawing upon earlier research of our group [4, 6-11]. The paper is organized as follows. In the next section we will first discuss the reasons why Dutch municipalities are not taking up the challenge of eService development. Then, in section three we try to explain why, although electronic delivery of public services is also a national issue, Dutch national government, until now, has not succeeded in its efforts of bringing the municipalities any further. Section four then presents some light at the end of the tunnel. Finally, after years of stagnation in public eService delivery several recent developments give rise to some hope.

2 Reasons for Local Inaction in e-Service Development

A simple thought, which still dominates much thinking about electronic service development, is that eService development can best be left to the organizations which are responsible for these services in the first place. These organizations know the procedures and have experience with administrative practices. They understand what their clients need, and are in the best position to determine where and how new ICTs can be applied to get the best results. Thus, in the Netherlands and elsewhere, it seems only reasonable that the development of the electronic provision of municipal services is left to the municipal organizations.

A more careful analysis, however, shows that development of eServices at this level is rather problematic [7-9], and that at the Municipal level there are a least three good reasons why eServices are not developed:

- The limited capacities of individual municipalities (in terms of budgets and specialist personnel);
- The limited benefits for individual municipalities and their political leadership;
- Legal limitations.

In the first place, developing and maintaining sophisticated eServices generally takes a lot of effort. As discussed earlier, large national agencies in the Netherlands have done a good job in implementing eServices, but this is the result of huge investments. The Dutch internal revenue service, for example, maintains a special IT-department with almost 2,500 (specialized) staff and a yearly IT budget of 350 million Euros. In this perspective, it is clear that very few municipalities, if any, will be

able to implement eServices on the same scale and with the same sophistication. The average municipality in the Netherlands has about 20.000 inhabitants and thus a limited staff, with at best only one or two IT staff and a very limited IT-budget. With this level of resources it is not really feasible to implement eService delivery for the large number of municipal products (400+), at more than a superficial level.

Second, as Hoogwout [12] compellingly argues, it is not very clear how extended eService delivery benefits small municipalities and their political leadership. On the one hand, efficiency gains induced by eService delivery are generally more limited than one may think. Many services are hardly used by citizens. And even the most popular ones show relatively low volumes (a passport is required once every 5 years by 70% of the population, a driver's license once every 10 years by 60% of the population). On the other hand, little can be gained in terms of client satisfaction. In the Netherlands, citizens are generally content with public service delivery as it is. In other words, for the politicians responsible for eGovernment on the local level, there is little to be gained by pressing for eServices: eGovernment does not win any votes or money. Moreover, implementing eServices may cause much unrest in the municipal administration and touches on power structures, roles and responsibilities. This means that the political risks of implementing electronic service delivery are serious and worth avoiding.

Third, and this is often overlooked, municipalities that try to develop eServices often encounter serious institutional barriers, with respect to what they are and what they are not allowed to do in this respect. One example is the issue of identification and authentication. In the Netherlands, municipalities are not allowed to use the social-fiscal number and/or to distribute electronic identity cards, a fact which in practice seriously hinders the development of on-line transactions. Another example is the Land Registry Act that prevents local authorities to include land registry data (property ownership, for instance) in their eService modules, even though they have electronic access to these data and citizens can obtain the data at the physical desk.

So, in sum when electronic service delivery is left solely to the Dutch municipalities, it is clear that we should not have high hopes.

3 Questions of Effective National Stimulation

So, what about the national level? When, indeed, it is the ambition of the Dutch national government to develop the Netherlands into one of the leading information societies, what have been its strategies for taking public eServices beyond the current level? Should not the state have enforced or stimulated the development of local eServices? Answering these questions require some insight into the constitutional limits to state involvement in the Netherlands and into the ineffectiveness of softer measures which have been deployed by the state, so far.

Important Constitutional Limits

When we look at National eGovernment Strategy in the Netherlands, a key issue is the constitutional make-up of the Dutch state. The Netherlands is generally referred to as a decentralized, unitary state [13]. This means that in essence there are three separate layers of government: the national, the provincial and the local. The position of municipalities and provinces is recognized in the Dutch constitution and is intended to create a system of checks and balances of political and governing powers. Municipal

and provincial authorities are set up as government bodies with their own democratic underpinnings and their own responsibilities, thus having independent authority in many fields. They have the power to raise taxes and develop policy on areas not restricted to the national level by law. This gives them a high level of autonomy, especially compared to more centralized countries.

It is from this perspective that any policy concerning eGovernment and electronic service delivery has taken shape. The fact that most services are provided under local authority and local responsibility implies that the Dutch national government has not taken up this task itself, nor has applied direct authority over the innovation of local service delivery. For most services the issue of electronic provision is regarded to be in the hands of the municipalities and with respect to these municipalities, the Dutch national government has only used softer policy instruments to convince and stimulate the municipalities to take action.

The Ineffectiveness of Softer Measures

As we have described elsewhere, the Netherlands has indeed been a champion in applying softer policy in this field [4]. During the last decade, several national eGovernment programs have been developed to stimulate local authorities to pick up on eServices. Well known programs are the OL2000 project (1997-1999) and more recent the SuperPilot project (2001-2004). In the OL2000 project, the central government provided subsidies for pilot projects to implement eServices. The SuperPilot project focuses on three large cities: The Hague, Enschede and Eindhoven/Helmond. These cities have received 2.7 million euro matching budget to develop eServices.

The point is, however, that despite all the national plans, programs and projects, the real effect on the municipalities has remained limited, to say the least. All the compelling stories about the future of modern government and the need to innovate with ICT have had a very limited effect in the past, and since the ICT bubble burst at the turn of the century, these stories seem to have lost much of their power anyway. And although the strategy of stimulating eGovernment with financial incentives has been rather effective in some towns, serious questions can be raised about the more general relevance. Indeed, given enough money, any town can be persuaded to take up eService development. The question remains, however, whether the subsidized pilots and super-pilots will have any serious catalyzing effect as envisioned by national policy makers. As it is, it is especially hard to imagine that the hundreds of smaller municipalities in the Netherlands will be able to adopt and maintain the technologies which are currently being developed in a few larger cities.

To summarize, in the past years, the Netherlands has been caught in a stalemate position in which the municipalities were not in a position to invest in electronic service delivery and the state is was not in a position to enforce or effectively stimulate local eServices.

4 Some Light at the End of the Tunnel?

The analysis presented above provides a good explanation for the disappointing developments in public eServices in the Netherlands during the last decade when the Dutch central government produced many appealing, but unrealistic and ineffective policy reports.

But what about the future? Will the stalemate continue? At the time of writing, there seems to be some light at the end of the tunnel. Three recent developments worth mentioning are:

- some preparedness for stronger state intervention in sectors with a strong (local) autonomy;
- the removal of unnecessary barriers and the creation of a decent national infrastructure;
- inter municipal co-operation in concert with the private sector.

A More Powerful State?

As discussed above, the Dutch national government always has focused on consensus building and voluntary participation of the government agencies involved. In recent years, however, we slowly but surely see some developments in the Dutch "polder".

At least in some sectors of Dutch society we see the recognition that public eService delivery requires more vigorous central steering and that at some points the national government may force breakthroughs by setting standards and by requiring (autonomous local) actors to adopt certain eServices. One example, which concerns autonomous regional police districts, is the online declaration of small crimes. Whereas electronic declaration has been possible in some of the 25 Dutch police districts, it was not in many of the larger ones. Recently (May 2004), the Dutch minister of Justice has decided to break with the consensus tradition and decreed that all police districts are to offer online declaration for small crimes.

With respect to data standards similar changes are imminent. In the past, different agencies and government bodies have been allowed to develop and maintain their own datasets, even in domains where much of the data involved the same objects or persons. The central government is now harmonizing data standards for authentic registers, by means of legislation, paving the way further eService development.

Removal of Barriers and the Improvement of the National Infrastructure

Developments on the local level have seriously been hindered by unnecessary barriers and a lack of an adequate technical and institutional infrastructure. Also in this respect we see some changes for the better.

On the legal front, some necessary components of the eServices infrastructure have been implemented. The implementation of the EU directives on electronic and digital signatures was completed in the summer of 2003. Also, legislation seeing to electronic communication and transaction between government and businesses and citizens was adopted in the Spring of 2004.

On the operational level, facilities and services are currently under development. An example is the national authentication service (NAV in Dutch), which will offer a secure means for electronic authentication. Another example is the Government Transactional Portal (OTP). This key project, run by the major ministries involved in eService delivery – Economic Affairs, Finance and Social Affairs – offers a single postbox for transactions in areas such as customs, taxes and social insurance.

Joint Ventures in Concert with the Private Sector

On the local level an obvious way to make progress is by joining efforts. In a previous contribution to Dexa [9] we have suggested that this is possible because the diversity in local policy practices is less than one might expect, given formal local autonomy. Recently, this suggestion has been supported by Muijsers who has investigated the

practice of municipal tree felling (logging) policies [14]. His report supports our claim that many municipalities can easily join efforts in developing such products, since over 60% of the municipalities in fact make use of the same reference bylaw developed by the Dutch Association of Dutch Local Governments.

That this is recognized more and more is also illustrated by the uptake of joint service development by consortiums of local authorities aided by consultancy firms that kick start projects by writing project proposals, organize meetings, and applying for funding. One example is the central server project for building permits. This project is collectively run by 14 municipalities to test the feasibility of a joint server for electronic filing of applications for building permits (Hoogwout and Te Velde, this volume).

5 Conclusion

In this paper we have discussed the stagnant development of electronic services in the public sector in the Netherlands. After almost a decade of ambitious policy papers on this topic, citizens and businesses still have to go to town hall for most of their businesses with government and there seems little hope of sudden improvement.

As we have tried to explain, this stagnation is caused by two related problems. First of all, there is the level problem. For agencies serving the Netherlands as a whole, there are sufficient resources to develop eServices and for most of them developing eServices is a sensible thing to do. However, the strong position of the municipalities in most public services suggests that eService development is taken up at this local level and here the sums do not add up. For the individual municipalities and local politicians the costs and risks involved are generally higher than the potential benefits.

The second problem is that, until now, the Dutch national government did not seem to have any effective means of solving this level problem. Municipalities could not be convinced by still more policy papers, and given the constitutional make-up of the Dutch state more active steering and control were always avoided.

However, something had to give in this situation sooner or later. And indeed, now something seems to happen. There are some indications that the Dutch state is taking a stronger position with regard to local inaction. A sense of urgency is resulting in the development of the necessary national infrastructure. Local authorities are finding ways to make the sums add up by joining up and developing joint services. At the same time, we are pleased to report, the rating of the Netherlands in the most recent international benchmark study is improving again [15]!

References

1. Oakley, K., Egovernment: an international study of online government commissioned by Cables & Wireless Communications. 2000, Cables & Wireless Communications: London.
2. CGEY Cap Gemini Ernst & Young, Online availability of Public Services: How is Europe progressing? Fourth measurement, 2004, EU Commision, DG information society.
3. Accenture, eGovemment Leadership: Engaging the Customer, 2003, Accenture.
4. Leenes, R.E. and J.S. Svensson, Local eGovemment in the Netherlands, H. Drücke, Editor. 2004 (forthcoming), Francis: Berlin.
5. Bongers, F., et al.. Burgers aan het woord: Oordelen en klachten over de elektronische overheid. 2002, Dialogic Innovatie & Interactie.

6. Hoogwout, M., Organizing for online service delivery: The effects of network technology on the organization of transactional service delivery in Dutch local government, in Electronic Government. First International Conference, EGOV 2002, R. Traunmüller and K. Lenk, Editors. 2002, Springer: Berlin/Heidelberg, p. 33-36.
7. Hoogwout, M., Super Pilots, Subsidizing or Self-Organization: Stimulating E-Government Initiatives in Dutch Local Governments, in Electronic Government. Second International Conference, EGOV 2003, R. Traunmuller, Editor. 2003, Springer: Berlin etc. p. 85-90.
8. Kraayenbrink, J., Back to the Future: Centralization on its Revival? Problems in the Current Organization of Public Integrated Service Delivery, in Electronic Government - First International Conference, EGOV 2002, R. Traunmüller and K. Lenk, Editors. 2002, Springer: Berlin/Heidelberg, p. 10-17.
9. Leenes, R.E. and J.S. Svensson, Size Matters-Electronic service delivery by municipalities?, in Electronic Government - First International Conference, EGOV 2002, R. Traunmüller and K. Lenk, Editors. 2002, Springer: Berlin/Heidelberg, p. 150-156.
10. Leenes, R.E., Fast Forward. Boosting e-Government development by looking at the neighbours, in E-Govemment: Modelling Norms and Concepts as Key Issues, R. Traunmuller and M. Palmirani, Editors. 2003, Gedit Edizioni: Bologna, p. 27-36.
11. Leenes, R.E., Abort or Retry. A Role for Legal Knowledge Based Systems in Electronic Service Delivery?, in Knowledge management in electronic government, KMGov 2003, M.A. Wimmer, Editor. 2003, Springer: Berlin, Heidelberg, p. 60-69.
12. Hoogwout, M., Leuker kunnen we het niet maken, maar willen we het wel makkelijker? Waarom overheden geen haast hebben met het verbeteren van de dienstverlening, in Klantgericht werken in de publieke sector: Inrichting van de elektronische overheid, H.P.M. Van Duivenboden and M. Lips, Eds. 2001, Uitgeverij LEMMA BV: Utrecht, p. 149-166.
13. de Jong, H.M. and P.A. Schuszler, Staatkunde Nederland in drievoud. 1999, Bussum: Coutinho. 166.
14. Muijsers, K., Samen meer bereiken. Een onderzoek naar de aard en variëteit in gemeentelijke dienstverlening ten behoeve van schaalvergroting in de ontwikkeling van elektronische dienstverlening. 2003, University of Twente, Msc thesis: Enschede.
15. Accenture, eGovernment Leadership: High Performance, Maximum Value, 2004, Accenture

e-Government Success Factors

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Abstract. Electronic Government (eGovernment) has been seen as the silver bullet for modernizing public administrations over last few years. But fact is that the broad variety of eGovernment initiatives results in an evenly heterogeneous picture regarding the quality of eGovernment services provided. Within an international context differences in eGovernment quality may result from nationally specific factors such as e-readiness, legal restrictions, existence of a nation-wide eGovernment strategy, and so forth. But what are the factors which have influence on eGovernment success and which do not result from national characteristics? In order to answer this question we conducted an empirical study in the northern German region "Muensterland". The goal of this article is to present this empirical study. Internal data from 56 and external data from 70 local municipal administrations was gathered and analyzed with regard of the question: What are eGovernment success factors?

1 e-Government Status Quo

Public administration has been confronted by a series of new demands on the one hand and has been forced to cost and staff cuttings on the other hand. There is a conspicuous trend towards growing individualization, whereby there are increasing demands by individuals on the state, to provide solutions to a variety of problems. Simultaneously, in the context of national and international competition, efficient and effective state activity and support for entrepreneurial activities in a region or country are becoming an increasingly decisive factor in location decisions. For some years, the term 'eGovernment' [1-4] has been universally proposed as a way of closing the public administrations' modernization and performance gap.

Hence many public administrations started with eGovernment initiatives. Most of them deal with an improvement of their websites to so called "Virtual Town Halls". However, most of the administrations just focus on an enhanced information quality and do not take into account the reorganization potential of communication and transaction processes. But especially those eGovernment services which are fully transactional provide real added value to the customers (e.g. enhanced service quality and time saving) as well as to the municipal administration itself (e. g. cost reduction and avoidance of media breaks).

Based on this process oriented approach, eGovernment can be defined as follows: the simplification and implementation of information, communication and transaction processes, in order to achieve, by means of information and communication technol-

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ogy, an administrative service, within and between authorities and, like-wise, between authorities and private individuals or companies [5]. Accordingly, eGovernment success is heavily depending on the existence and the quality of administrative services, especially those which are fully transactional.

2 Research Method

To measure eGovernment success and to find out influencing factors we conducted an empirical study [6]. The analysis takes into account two different perspectives to measure and to benchmark the quality of eGovernment activities. To ensure a representative sample in terms of a) national characteristics and b) demographic and sociological structure all investigated public administrations are settled in the same region – the "Muensterland" which is a North-Rhine Westphalian region in Germany. It comprises 1.5 million inhabitants spread out over 4 counties, one county-independent city, and 65 municipalities.

On the one hand, an external perspective was examined which deals with the citizens' and businesses' perception of eGovernment activities. This external perspective is used to define the quality of eGovernment initiatives which can be seen as dependent variable. With a catalogue of criteria the internet portals of all 66 municipality and 4 county administrations in Muensterland were analyzed. The focus of this evaluation was the "Virtual Town Hall" which is the part of the internet portal where administrative services are provided. eGovernment initiatives which provide a large quantity of administrative services were considered more successful than those who don't. Regarding a single service, those were considered more successful which offer a high interactional degree (transaction > communication > information). Furthermore, the navigation concepts to and within administrative services offered was also regarded as core element of eGovernment success. Beside the scope of administrative services the overall impression (e. g. graphical design and layout structure) of the website and the amount and quality of offered information were evaluated.

An internal perspective deals with the self-assessment of the local public administrations. The data collection was made by the use of a questionnaire which was structured into five categories concerning the following topics: a) Status-quo of eGovernment activities, b) scope of the internet portal c) software applications in use, d) perspective of future eGovernment activities, and e) organizational and technical environment concerning eGovernment activities. The questionnaire was sent to all municipality and county administrations and after two weeks of process time 56 of 70 questionnaires had been answered which results in a representative 80 % rate of return. The evaluation indicates that the questionnaires were answered by the organizational units which are responsible for eGovernment activities in the regarded administration and therefore own the essential knowledge regarding the questionnaire. This concludes adequate data-quality of the self-assessment in this empirical study. Additionally, statistical data from other state offices was used to validate information provided by each questionnaire (e. g. population in each city or county). The questionnaire was used to collect data about potential influence factors on eGovernment success which can be regarded as independent variables.

3 Potential Success Factors

Several potential success factors have been analyzed:

1) Organizational responsibility for eGovernment
2) eGovernment awareness
3) Budgetary funding
4) Organizational Change

Taking organizational change (4) as an example, successful eGovernment initiatives achieve the provision of (fully) transactional processes. But in many cases existing administrative (back office) processes are inapplicable to eGovernment. In the move of an integrated organization and information system design, the implementation of transactional eGovernment processes and the optimization of business/administrative processes are interdependent. But only about 50% of the persons in charge for eGovernment see this coherence (cp. figure 1).

The main advantages of eGovernment perceived are (still) up to date-information (88%) and better customer service (88% as well).

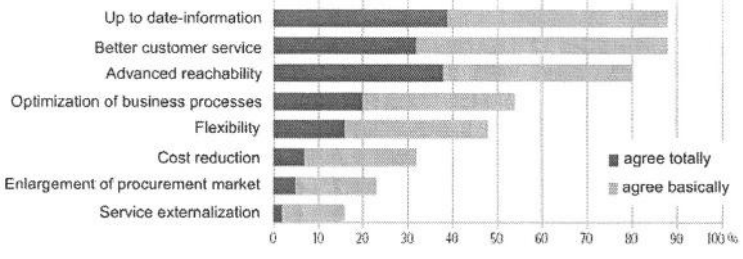

Fig. 1. Main advantages of eGovernment? [n=56].

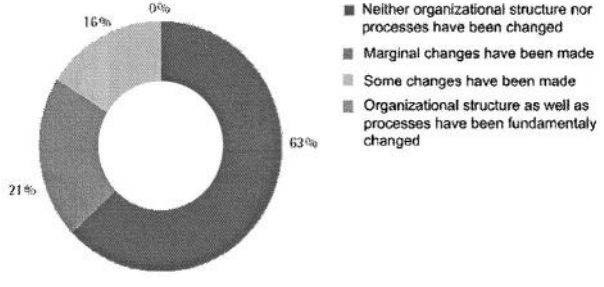

Fig. 2. Impact of eGovernment initiatives on organizational structure? [n=56].

The answers to the question "What impact had eGovernment initiatives on your organizational structure and your processes to date?" were consequent. In 84 % of the public administrations eGovernment has lead to none or only marginal changes in the processes and the organizational structure. Though in most cases existing administrative services were perceived as non-applicable to eGovernment, only 16% of the administrations have undertaken efforts to change some of the processes in the move of eGovernment. None of the administrations had its organizational structure as well as processes changed fundamentally (cp. figure 2).

4 Conclusions and Further Research

The results show that the degree of interaction of most services does not reach the level of transaction. The majority of the municipalities only describes the services (information) or provides contact information (communication). However significant benefits can only be realized when a public service offers the chance for transactions and hence becomes an eService. Before classic public services can be offered as eServices it is advisable to reorganize the underlying processes and organizational structure in the back office. Those municipal administrations which have already undertaken changes tend to perform better than those which have neither changed their organizational structure nor the underlying processes in the move of eGovernment.

As further research we intend to conduct the empirical study on a regular basis. Furthermore, we will compare our findings with other empirical studies which also address eGovernment success factors which do not directly depend on national characteristics.

References

1. Falck, M. (2002). Business Process Management - As a Method of Govern-ance. In Electronic Government, First International Conference, EGOV 2002, Aix-en-Provence, Proceedings (K. Lenk and R. Traunmüller Ed.), 137-141, Springer, Berlin et al.
2. Lenk, K. (1997). Business Process Re-Engineering in the Public Sector: Op-portunities and Risks. In Beyond BPR in Public Administration. Institutional Transformation in an Information Age (J. A. Taylor, I. T. M. Snellen and A. Zuurmond Ed.), 151-163, IOS Press, Amsterdam.
3. Scherlis, W. L. and Eisenberg, J. (2003). IT research, innovation, and e-government. Communications of the ACM, 46 (1), 67-68.
4. Traunmüller, R. and Wimmer, M. (2001). Directions in E-Government: Processes, Portals, Knowledge. In Proceedings of the Proceedings of the DEXA International Workshop "On the Way to Electronic Government", 313-317, IEEE Computer Society Press, Los Alamitos, CA.
5. Becker, J.; Algermissen, L.; Niehaves, B. (2003): Electronic Government – Status quo and development perspectives. Working paper no. 94 - Depart-ment of information systems, University of Muenster. Muenster.
6. Becker, J.; Algermissen, L.; Delfmann, P.; Falk, T.; Niehaves, B. (2004): Virtuelles Rathaus 2004. Muenster.

Integration of Pre-existing Heterogeneous Information Sources in a Knowledge Management System*

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Abstract. We present information integration features underlying the ICONS knowledge repository supporting data extraction from a variety of heterogeneous sources, such as structured data (i.e. relational data bases), semi-formatted data (i.e. XML, HTML files), text documents (i.e. plain text files, word processor files, PDF files), binary data (i.e. image files, audio files). The principal challenge is to insert and maintain integrated data objects within the structure of the ICONS repository data model defined in the Knowledge Schema. We discuss the ICONS Knowledge Schema, ICONS Concept Glossary and the advanced graphic interface features supporting storage and manipulation of the integrated heterogeneous information artefacts, access to external data sources with the use of a generalized wrapper architecture, and advanced information categorisation based on machine-learning techniques. The ICONS information integration capabilities are illustrated by a running example.

Introduction

The knowledge management life cycle supported by the ICONS platform [1,2] entails providing support for organization of knowledge artefacts within a formal, yet user-friendly, semantic data model based on a common ontology facilitating storage and manipulation of knowledge artefacts typically comprising information gleaned from pre-existing heterogeneous information sources. Information may be inserted into the ICONS repository content objects by an explicit user action performed on the object representation rendered in the graphic user interface, or implicitly by the appropriate object class method specified either as an application method or inherited from a system object class. Access to the repository is supported by powerful graphic interface features such as knowledge maps, intentional and extensional data model graphic navigation interface, and content object graphic presentation features based on electronic forms.

The content objects may include actual data providing information snapshots pertaining to a particular time frame (a time interval, an instance), or references to external information sources, thus representing virtual data to be materialised and presented to users at content object access time. Materialization of structured and semi-structured data is controlled by the wrapper generation rules. The ICONS integration architecture is presented in Fig. 1. Information integration may also be supported by

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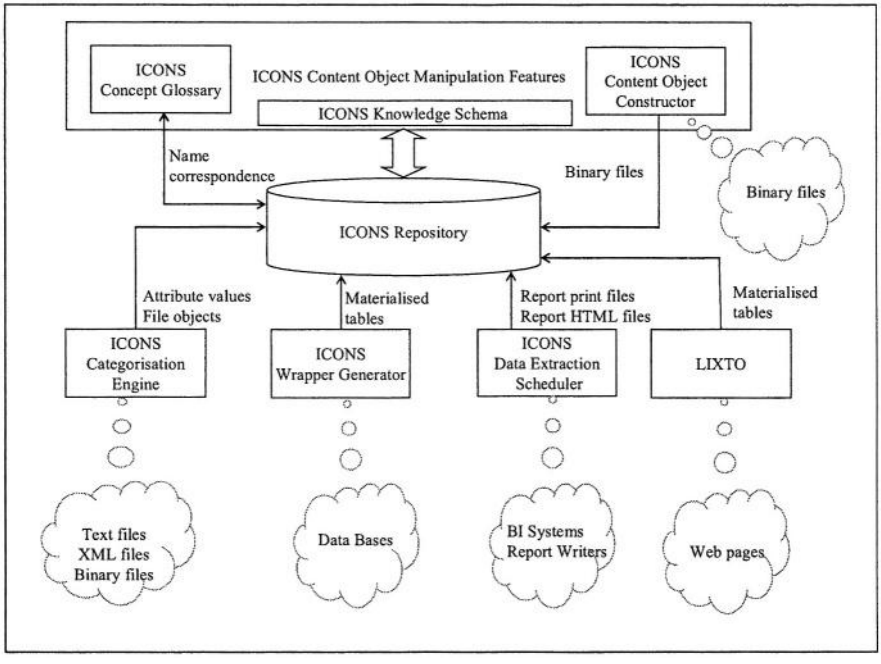

Fig. 1. The ICONS information integration architecture.

third party data extraction and report generation tools. Such information may be stored in the ICONS repository to be subsequently accessible with the standard ICONS content object categorisation, selection and browsing features. This feature may be used to integrate information from external systems, such as business intelligence systems or transactional systems, to supplement content to be accessible via a knowledge management application.

Our approach to develop an information integration platform integrated with a knowledge management portal featuring an XML-based object repository is similar to integration architectures presented in [12,14]. Special requirements of content integration in the e-business context are exhaustively presented in [18].

In the following sections we present selected aspects of the ICONS Knowledge Schema pertaining to information integration, relevant aspects of the ICONS graphic user interface and content object manipulation, wrapper generation for structured data, integration and semantic reconciliation of structured data based on Disjunctive Datalog inferential content object class methods, as well as categorisation of text documents and binary files. Finally, we conclude highlighting the up to date production application experience and pointing at future research efforts pertaining to information integration.

Selected ICONS Knowledge Schema Features

The multi-paradigm Knowledge Schema [3], representing a conceptual view of the domain specific knowledge to be managed by the ICONS platform application, sup-

ports three principal knowledge representation paradigms, namely the structural knowledge, the declarative knowledge and the procedural knowledge paradigms.

The "Structural Knowledge" representations provide meta-information mechanisms for modelling content object class relationships, content object class behaviours, content object class grammars governing the internal object structure, and the object categorisation maps. The "UML Semantic Model" provides facilities to specify the class relationship structure as well as the class behaviour inheritance structure. The internal object class structures are defined with the use of the respective XML schema specifications. The "Content Object Structure" is determined by the corresponding XML Schema providing the grammar for parsing of content objects belonging to a given class as well as for generating default content object electronic form representations and XML editor renderings. The content objects are XML text files representing arbitrary trees compatible with the XML schema grammar defined for the corresponding object class.

The "Knowledge Map Model" provides facilities to represent object categorisations and to manage categorisation trees collectively constructing a knowledge map defined within an ICONS KM application. The object categorisation modes includes the "Value-based Categorisation" providing the principal mechanism for dynamic materialization of categorisation tree control structures, the "Manual Categorisation" supporting information-bearing relationships between a categorisation tree and the corresponding set of content objects, and the "Automatic Text Categorisation" using ontology-based machine learning techniques for text analysis and classification. The automatic text categorisation algorithm inserts the appropriate ontology term(s) into a predefined content object field(s) to provide required values for the consecutive value-based categorisation. The manual categorisation to be performed by the ICONS user is the principal mechanism for constructing the manually maintained categorisations trees stored in the Content Repository as static control structures, or for creation of user defined collections of content objects and relationships called the "Collection Objects".

The ICONS Concept Glossary, based on the Topic Maps ISO standard [3,16,17], provides a mechanism to enforce and maintain ontological consistency of integrated data objects. Consistency is maintained through the name correspondence constraint meaning that all schema element names must be defined in the Concept Glossary. The explanation feature is supported by meta-information comprised in the Concept Glossary data structure, namely the concept definitions and concept relationships.

Relevant features of the Structural Funds Project Knowledge Portal presented in [4,15] are used as our running example illustrating the ICONS information integration features. The system comprises knowledge management features typical for the e-Government application domain. The SFPKP Content repository comprises content object classes comprising information on statistics data. *Statistics* are the important statistical indicators (economical, social, etc.) that are monitored in the structural funds implementation system. *Statistics values* are statistical indicator data, that are extracted and integrated from external sources. Objects are presented and manipulated in a uniform way in a graphic interface as electronic forms (see Fig. 2). Initially eForms is generated automatically for a given taxonomy and than it can be modified manually. Taxonomy is derived from object grammar defined in XML Schema.

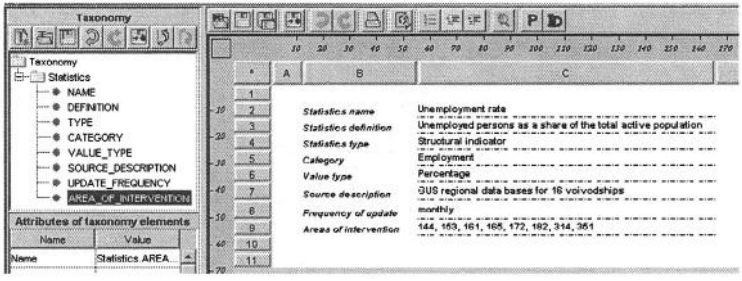

Fig. 2. Presentation of a content object in the ICONS GUI.

Structured Data Wrapper Generation

Wrappers providing access to pre-existing relational databases are generated in the form of SQL queries on base tables and views defined in the corresponding database schema. The SQL query results are stored as materialised table attributes of the content objects invoking the wrapper process. The wrapper specification defined within the ICONS Knowledge Schema is based on a parametric Query by Example facility, where parameters are either a reference to the corresponding content object attribute values, or provide slots for values to be provided at the wrapper invocation time by the object method. The wrapper process (SQL query) is either invoked at the content object creation moment to store the materialised table snapshot data within the corresponding content object, to be possibly refreshed within the specified time intervals, or is invoked by an operation accessing the virtual materialised table attribute performed directly by the user on the content object form or by an appropriate content object class method. An arbitrary number of "materialised table" attributes may be defined within the object class XML schema.

In SFPKP statistical data are extracted from 16 regional data bases. Sample regional databases containing the unemployment data are shown in Table 1.

Table 1. External data sources tables.

1.Region: MAZOWIECKIE

Month	Year	Uneployment [%]	Unemployment Rate - Women	Unemployment Rate - Men
01	2003	12	15	10
02	2003	14,1	13,3	11,8

2.Region: MAŁOPOLSKIE

Date	Total Uneployment Rate
January 2003	0,135
February 2003	0,145

These regional databases are regarded as the external information sources. Sources are associated with adequate wrapper instances. Each wrapper takes responsibility for retrieval and transformation of data residing at the associated source. The range of wrapper types supported by given system depends on its needs, this example considers only one wrapper type – Data Extractor Wrapper (see Fig. 3).

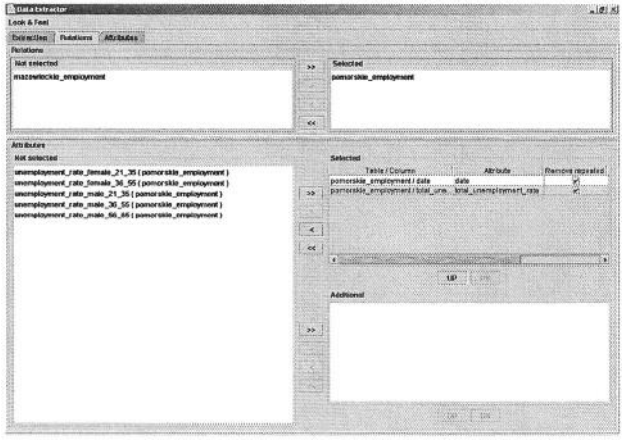

Fig. 3. The relational data wrapper generation screen.

The external source content, that is to be retrieved by given wrapper, is described by the external source schema. The external source schema aim is to describe only the data relevant for the system. Thus the wrapper associated with given external source retrieves and transforms data to the form compliant with mentioned schema. Wrapper execution process includes the following actions: data retrieval, data cleaning, data storage (inside the Internal Data Store).

Sample external source schema looks as follows (notice that DATE attribute content is created during the cleaning data process on the basis of external source MONTH and YEAR attributes content.):

```
<xsd:schema
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<xsd:complexType name="MAZOWIECKIE_UNEMPLOYMENT_RATE">
<xsd:all>      <xsd:element name="DATE"
type="xsd:string"/>      <xsd:element
name="UNEMPLOYMENT" type="xsd:string"/>    </xsd:all>
</xsd:complexType></xsd:schema>
```

Additionally, each schema element is mapped to the corresponding element name registered within the ontology of the SFPKP. The ontology elements are stored and managed as concepts in Concept Glossary Manager. Each concept can have multiple names and multiple definitions. Concept names and definitions can be distinguished by their scope (e.g. language, visibility to SFKP end user, information source etc.).

Generation of semi-structured wrappers used for the web page information integration has been based on the LIXTO system exhaustively described in [5,13].

Integration and Semantic Reconciliation of Structured Data

We have taken an application-oriented approach allowing the knowledge application developer to specify inferential methods (i.e. Disjunctive Datalog programs) of the corresponding content object class to provide a facility to manipulate materialized table data in order to produce data integrated over several distinct pre-existing databases and, in particular, for reconciling existing semantic discrepancies.

The first issue in this context is the interpretation and merging of the data extracted from different sources. Interpreting data can be regarded as the task of casting them into a common representation. Moreover, the data returned by various sources need to be converted/reconciled/combined to provide the data integration system with the requested information. The complexity of this reconciliation step is due to several problems, such as possible mismatches between data referring to the same real world object, possible errors in the data stored in the sources, or possible inconsistencies between values representing the properties of the real world objects in different sources [6,7,8].

The ICONS materialized table integration entails two distinct integration steps; (1) data extraction step resulting in creation and storage in the ICONS repository of materialized tables, (2) integration of materialized tables extracted from different database views and/or web pages. The second integration step creating a resulting set of integrated data tables stored in content object attributes as new "materialized table" attributes is to be performed by the respective content class inferential method.

Presence of data cleaning action results from the need of eliminating a number of inessential inconsistencies (e.g. different date formats), that lead to semantically worse integration results. Data cleaning support should be regarded as the extension of wrapper functionality. Further data cleaning and reconciliation is performed by executing a DLV program. DLV rules are generated dynamically and executed on the data stored in corresponding content objects of the ICONS repository, that combined with Concept Glossary ontology data constitute DLV facts. As a result the extracted data are integrated and presented in a uniform SFPKP display format. Additionally the consistency of the data is verified and written is a *status* attribute value.

The corresponding DLV program looks as follows:

```
status(X,consistent) v status(X,inconsistent) :- sta-
tistics_value(display,X,percentage,date).
status(X,inconsistent):-
statistics_value(display,X,_,_),X<0.
status(X,inconsistent):-
statistics_value(display,X,_,_),X>100.
statistics_value(display,X*100,_,_) :- statis-
tics_value(małopolskie,X,_,_).
statistics_value(display,X,_,_) :- statis-
tics_value(mazowieckie,X,_,_)
```

ICONS Integrated Information Categorisation

File elements stored within the ICONS content objects are processed by appropriate categorisation modules matching the respective element type. The categorisation functions produce keyword values (character strings) to be stored in content object attributed to be subsequently used by the knowledge map and object relationship materialisation algorithms. In the case of XML documents the categorisation algorithm is simply copying the appropriate fields, marked by tags predefined as categorisation source data, into the corresponding attributes of the content object. Similarly, values extracted from binary files, specified by address displacement and byte length, are copied to appropriate content object attributes.

Categorisation of text documents [2] is based on an implementation of known text categorisation algorithms exploiting machine-learning techniques, such as the KNN (k Nearest Neighbours), Rocchio algorithm, and SVM (Support Vector Machine) selected dynamically by the text categorisation module depending on the text characteristics and the categorisation goal. An exhaustive discussion of the above text categorisation algorithms may be found in [9,10,11].

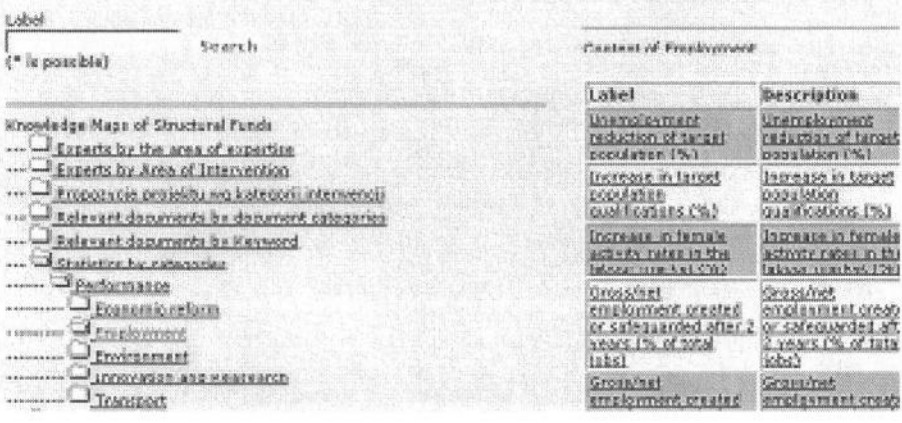

Fig. 4. Knowledge maps of the integrated statistical information.

Statistics objects are categorized and presented to the user as a partially closed Knowledge Map (see Fig. 4), where the first node, the type comes from dictionary, inserted manually, whilst the second node, the category is based on the taxonomy of structural indicators used by Eurostat. The category attribute is determined by the automatic text categorisation process. When the value of the definition attribute is written in the content repository, it becomes an input document for the Text Categorisation Engine module After the module performed categorisation, the result categories are stored in the category attribute. The accuracy of the categorisation is guaranteed by the high-quality classification algorithms and document preprocessing (native format to pure text, tokenization, stemming, removal of stop words, development of the words information gain).

Conclusions

The current research work is concentrated on the ICONS platform usability assessment through development of pilot knowledge management applications. Information integration features have already been ported to the OfficeObjects® content management platform.

References

1. The IST-2001-32429 ICONS Consortium, Intelligent Content Management System. Project Presentation, www.icons.rodan.pl, April 2002

2. The IST-2001-32429 ICONS Consortium, Specification of the ICONS architecture, www.icons.rodan.pl, February 2003
3. The IST-2001-32429 ICONS Consortium, The Multi-paradigm Integrated Knowledge Schema, www.icons.rodan.pl, February 2003.
4. The IST-2001-32429 ICONS Consortium, The Structural Fund Project Knowledge Portal, www.icons.rodan.pl., February 2003
5. Baumgartner, R., Flesca, S., Gottlob, G., Declarative Information Extraction, Web Crawling, and Recursive Wrapping with Lixto, Proc. of VLDB 2001
6. Bouzeghoub, M., and Lenzerini, M., Special issue on data extraction, cleaning, and reconciliation. Information Systems, 2001.
7. Calvanese, D., De Giacomo, G., Lenzerini, M., Nardi, D., and Rosati, R., Data integration in data warehousing. Int. J. of Cooperative Information Systems, 10(3), 237–271, 2001.
8. Galhardas, H., Florescu, D., Shasha, D., and Simon, E.. An extensible framework for data cleaning. Technical Report 3742, INRIA, Rocquencourt, 1999.
9. Joachims, T. 1997. A probabilistic analysis of the Rocchio algorithm with TFIDF for test categorisation. In Proceedings of ICML-97, 14th International Conference on Machine Learning (Nashville, US, 1997), pp. 143–151.
10. Joachims, T. 1998. Text categorisation with support vector machines: learning with many relevant features. In Proceedings of ECML-98, (Chemnitz, DE, 1998), pp. 137–142.
11. Joachims, T. 1999. Transductive inference for text classi.cation using support vector machines. In Proceedings of ICML-99, 16th International Conference on Machine Learning (Bled, SL, 1999).
12. Lee, J., Siau, K., Hong, S., Enterprise Integration with ERP and EAI, Communications of the ACM, Vol. 46, No. 2, February 2003.
13. Lixto Visual Wrapper User Manual, Technical University of Vienna, 2002.
14. Mecella, M., Pernici, B., Designing wrapper components for e-services in integrating heterogeneous systems, The VLDB Journal 10: 2-15, 2001.
15. Staniszkis, W., Staniszkis, E., Intelligent Agent-Based Interactions in a Knowledge Management Portal, In: Proc.of EGOV2003, Volume 2739, LNCS, Springer Verlag, 2003.
16. ISO/IEC 13250, Topic Maps, Information Technology Document Description and Processing Languages, December 1999.
17. Pepper, S., The TAO of Topic Maps, STEP Infotek, www.infotek.no, November 2000.
18. Stonebraker, M., Hellerstein, J.M., Content Integration for e-business, Proc. of ACM SIGMOD Int. Conference, May 21-24, 2001, Santa Barbara, CA, USA.

Encoding of Public Records and Procedures in Electronic Registries

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Abstract. An electronic registry is the main mechanism for the official distribution of public records, which are created within the framework of administrative procedures and business transactions. The encoding of public records within a registry is realized according to a certain format to facilitate information management. However, these formats do not refer to semantics, which are considered essential for: a) the description of the administrative procedures, and b) efficient information retrieval. This paper aims to provide a digital library architecture for the encoding of public records and administrative procedures. It introduces the usage of semantic tools for the management of knowledge within the proposed integrated system.

1 Problem Statement

The main condition for the development of government information systems is the ensuring of interoperability for public services to exchange data in machine-readable form. Hence, worldwide interoperability frameworks (e.g. NZ e-GIF [10], UK e-GIF [15]) and thesauri (e.g. EUROVOC [3], FONZ [4], SONZ [14]) have been developed, in order to determine the required information matrix for the encoding of public records. However, public records management requires the representation of administrative procedures and transactions, along with their semantics and relations.

Administrative transactions refer to dealings with professionals or citizens, as well as dealings that are realized exclusively between public services and are intended to meet the fundamental needs of public administration. The first category may be divided into: a) the transaction that a citizen/professional has with the responsible public service (G2C), given the fact that he/she needs to be informed about the documentation requested, and/or submit an application in order to initiate the procedure, and b) the internal procedures within the public service (G2G) independently of citizen/professional's request. G2C transactions maintain personal interest and therefore the search and retrieval of information is based on personal criteria. On the other side, G2G transactions require the existence of several access points since an information search needs to be based on the semantic correlations between records. However, both transactions are part of an information and workflow cycle that may be distinguished according to the following five stages that a public service needs to follow: a) accomplish the required tasks by creating the records needed, b) handle the delivery of the file either to internal departments or to external services, c) manage and control the

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transactions, d) update the database regarding the service that accesses / creates the file in a given instance, and e) carry out any transactions necessary for the completion of the administrative action.

Currently, public services use different systems for record-keeping and workflow supervision. Thus, electronic registry meets only the first two stages of the information life cycle, while the remaining stages are managed and controlled by specialized workflow systems.

Our proposal ensures the management of public records and procedures within the same information context enforced by semantic indexes. In particular the main objective of our approach is to: a) modulate an advanced registry for the monitoring of public records using thesauri, taxonomies and ontologies, and b) to encode the administrative procedures, as well as the workflow of public services within the same registry as public records. The proposed architecture introduces the creation of taxonomies for the structure of public administration and uses these taxonomies for the monitoring of public records and administrative procedures.

2 Information Needs

2.1 Bibliographic Information Metadata

Bibliographic metadata are mainly used to uniquely identify a public record by encoding, for example, its title, the date of mail / delivery, the register number, as well as the name of sender(s) and receiver(s). They may be described implementing the ISO 15489 standard, which defines the technical specifications for the management of public records and classifies the criteria for their efficient control [7].

Bibliographic metadata encoding for public records may be realized by adopting and implementing standards such as Dublin Core, which is considered to be an open standard for the development of interoperable online metadata [2]. However, the offered meta-fields cannot describe government information in its entirety, as only a 15-element set of descriptors [9] are offered. Over and above indicative meta-fields for the encoding of the official records, there may be: a) the administrative "functions" of the Service from which the public records are derived, b) the "availability" of the records and how they can be obtained, c) the "audience", i.e. the target group of the encoded official records, d) the "mandate" that requires the record to be created, i.e. acts, regulations, rules, court cases, e) the conditions of their "disposal" and "preservation", and f) the "location" of the official records. Due to the lack of essential fields for the depiction of the aforementioned metadata, many countries have proceeded with an extension of the Dublin Core standard, in order to meet the information needs of public records. Such cases are: a) GILS (Government Information locator Service) [5] for United States of America, b) e-GMS (UK Government Metadata Standard) [16] for United Kingdom, c) AGLS Metadata Standard (Australian Government Locator Service) [1] for Australia, and d) NZGLS Metadata Standard (New Zealand Government Locator Service) [11] for New Zealand. Due to different extensions of the Dublin Core standard, the aforementioned countries proceeded to issue crosswalks, in order to ensure interoperability and system compatibility [8].

The depiction of the process and the accomplishment stages of an administrative procedure are considered as an essential parameter in the management of administra-

tive data. However, public administration procedures are totally dependent on the public records that justify them. Public Records become an entity as soon as they are inserted in the registry. Therefore, the meta-fields for the encoding of administrative procedures need to be developed in absolute correspondence with the electronic registry. In these meta-fields it is essential to encode: a) the responsible organization and its qualified department/office for this procedure, b) the stages of processing required, c) the services involved, d) the stage of the transaction in a given moment, e) the public service processing the file at a given instance, and f) time estimation for the closure of a particular file. The encoding of such information may be implemented only on a semantic basis. In particular, the values of these meta-fields need to be derived from knowledge management tools that depict the hierarchy of public services and their corresponding procedures.

2.2 Semantic Information Metadata

The proposed architecture implements two knowledge management tools:

- A semantic network built according to thesaurus principles, in order to: a) establish administrative controlled and interlinked terminology, and b) represent the hierarchy of administrative procedures as they depict the stages required for the fulfillment of an administrative action.
- A taxonomy for the: a) encoding and depiction of the administrative hierarchy of the public sector, and b) navigation by end users of the structured information representing the arrangement and relationships of each hierarchical level.

The proposed system interlinks: a) names of corporate bodies - public services in central, regional and local administration, b) geospatial names - places of state that fulfill some form of administrative activity, and c) topical terms which are conceptually related. Geospatial relations link names of places with public services and organizations holding some form of administrative activity. These categories represent the geospatial and thematic hierarchy of the public sector and form a semantic network. Apart from these hierarchies, government information also calls for representation and depiction of the administrative hierarchy, which refers to terms that need to be linked due to administrative activity and is essential to connect public services with procedures. However, the thesaurus may represent the conceptual and geospatial connections but is unable to depict multiple hierarchical levels each of them related with the proportional procedures. In particular, the development of administrative hierarchy within conceptual relations results in the usage of the same indicators (Broader Term, Narrower Term, Relation Term) for different concepts, i.e. topical terms and corporate bodies.

Consequently, the administrative hierarchy may be represented in a taxonomy schema capable of establishing multiple hierarchical levels all connected with the corresponding procedures and public authorities derived from the semantic network. An algorithm has been proposed to detach the corporate bodies from the semantic network and to organize them into a hierarchical structure based on their vertical associations (broader and narrower terms) [13]. The proposed algorithm may also search and detach the entries of the procedures of public services. Within the scope of the taxonomy, these procedures are linked with the responsible hierarchical entity. Since the taxonomy derives from the semantic network, clearly the two knowledge

representation and management tools interact and complement each other, providing an integrated framework for the management of government information. The coexistence of the thesaurus and taxonomy forms an ontology, which enables the management of the semantic information derived from public records. Moreover, ontology provides for navigation tools allowing the map-reading of the public sector's hierarchy tree. Furthermore, the ontology ensures data interoperability and policy compliance between different information systems, even if the latter do not adopt the same terminology, due to the fact that it provides for a common realization of the conceptual world [6].

The two knowledge management tools support the depiction of the administrative procedures. Specifically, the semantic tools accommodate values for the following elements: the responsible organization and its qualified department / office for an administrative procedure, the services involved, and the public service processing a file at a given instance, which are derived from the taxonomy schema. On the other side, the stages required for an administrative procedure are derived from both the thesaurus and the taxonomy since the thesaurus represents the administrative functions and these are correlated with 'services' in the taxonomy.

3 Architecture

Each public service handles and manages the administrative actions that correspond to its transactions. Therefore, the public authorities are responsible for: a) creating documents in the registry and connecting them with the corresponding transactions, and b) updating the registry regarding the stage of an action's fulfillment. This activity may be enforced by governments' initiative to unify the format of all public record types. Electronic registry development and update is realized by each authority separately, according to the in-house policy for public record management and organization. Within the framework, a network of digital registries is generated, where every public service creates and updates a local digital library of public records.

Each digital library consists of: a) the digitized data of public records, b) the bibliographic metadata that uniquely identify public records and procedures, c) a semantic network, and d) a taxonomy.

According to Figure 1, the end-user can make queries concerning the follow-up of G2C or G2G transactions and their related records that have been inserted in the electronic registry of a public service. A harvester handles the query by crawling within the digital libraries metadata. The bibliographic metadata identify the records related to the query, while semantic metadata provide the harvester with interlinked and correlated information regarding the administrative structure and procedures.

By using harvesting protocol principles, the distributed electronic registries efficiently disseminate their content, as different repositories, while the harvester effectively collects the metadata residing in different digital libraries. According to Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH), Dublin Core is the common metadata format for interoperability on bibliographic metadata [12]. However, other metadata schemas (i.e. NZGLS, AGLS, etc.) can be harvested provided those are encoded in XML schema.

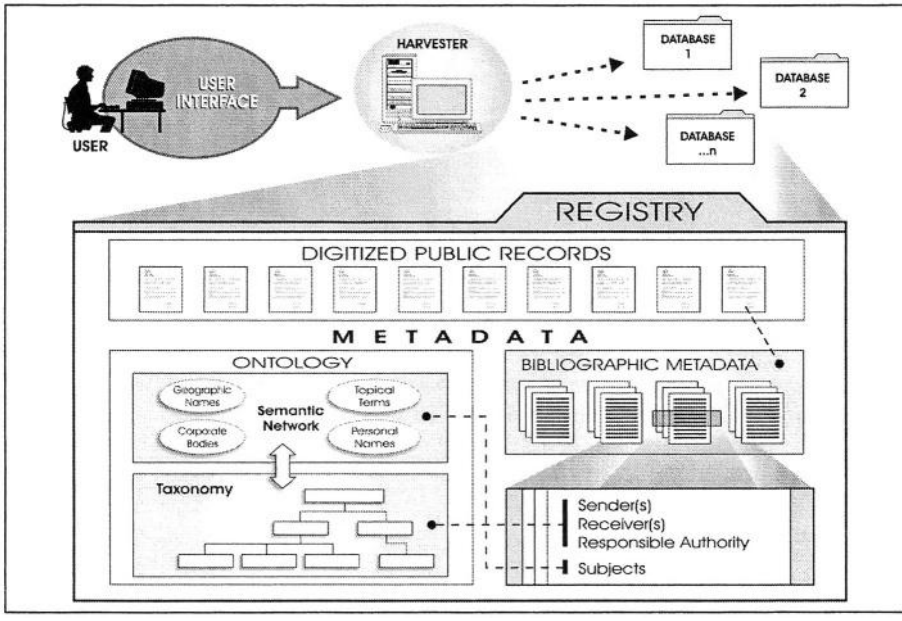

Fig. 1. The proposed architecture

4 Conclusions

The main objective of this paper is to introduce a schema for the encoding of public records and procedures running within the same information environment, given the fact that the latter determine the creation and official distribution of public records. The proposed architecture of electronic registry for public record and transaction-encoding facilitates G2C and G2G dealings by providing advanced and upgraded services for information management and retrieval, as well as semantic interoperability. The most important features are the ability to: a) support decision-making procedures by registering all the required data (history of a service's actions, responsible and involved public authorities, etc.), and b) facilitate citizen-state and inner service administrative procedures by registering all the incoming and outgoing records, as well as a service's transactions. The development of a decentralized network of electronic registries with a digital library structure possesses the following features:

- ensures multiple access points for the execution of sophisticated queries
- provides for user navigation through structured information
- supports the qualitative data entry and retrieval of public services, contributing to the better depiction and search of their hierarchical structure
- enables the location of data that reside in different information environments
- facilitates the control of the public administration's transactions
- holds out the development of a classification scheme, in order to execute specialized queries and printouts for the support of decision-making procedures
- contributes to data homogeneity and system interoperability, and
- adopts and maintains a common policy for record keeping, management and distribution.

References

1. Australian Government Locator Service [online]. Available at: http://www.naa.gov.au/recordkeeping/gov_online/agls/metadata_element_set.html Dublin Core [online]. Available at: http://dublincore.org/
2. EUROVOC Thesaurus. [online]. Available at: http://www.europa.eu.int
3. Functions of New Zealand Thesaurus (FONZ) [online]. Available at: www.e-government.govt.nz/nzgls/ thesauri/fonz/fonz220.pdf
4. Government Information Locator Service [online]. Available at: http://www.gils.net
5. Guarino, N.: Formal ontology and information systems. In: Proceedings of FOIS'98. IOS Press Amsterdam (1998) 3-15
6. Healy, Susan: ISO 15489 Records Management: its development and significance [online] (2001). Available at: http://mustafa.emeraldinsight.com/pdfs/rmj1.pdf
7. Kane, T. O': Mapping the similarities and differences between metadata standards: Dublin Core, AGLS and NZGLS: the GUIDE Project [online] (2001). Available at: http://www.e-government.govt.nz/docs/metadata-standards-differ/mapping-diff.pdf
8. National Information Standards Organization: The Dublin Core Metadata Element Set. NISO Press Maryland (c2001)
9. New Zealand e-Government Information Framework [online]. Available at: http://www.e-government.govt.nz/docs/e-gif-v-2/
10. New Zealand Government Locator Service [online]. Available at: http://www.e-government.govt.nz
11. Open Archives Initiative Protocol for Metadata Harvesting [online]. Available at: http://www.openarchives.org/OAI/openarchivesprotocol.html
12. Prokopiadou, G., Papatheodorou, C., Moschopoulos, D.: Integrating Knowledge Management Tools for Government Information. In Government Information Quarterly, Spring Issue (under publication). Elsevier Amsterdam (2004)
13. Subjects of New Zealand Thesaurus (SONZ) [online]. Available at: www.e-government.govt.nz/nzgls/ thesauri/sonz/sonz120.pdf
14. UK e- Government Information Framework [online]. Available at: http://www.nhsia.nhs.uk/egif/pages/default.asp
15. UK Government Metadata Standard [online]. Available at: http://www.govtalk.gov.uk/schemasstandards/metadata_document.asp?docnum=840

Registers as Part of Back Office Integration: The Austrian Experience

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Abstract. Public administration's legacy systems are not networked. Therefore early e-government applications are not so effective. For a substantial reorganisation shared registers and databases are necessary but privacy is also to be obeyed. The framework of the Austrian E-Government Act balances both requirements and establishes a basis for efficient back office processes. First implementations generate benefits.

1 e-Government Within Public Administration's Legacy Systems

Public administration's legacy systems are characterised by independent authorities, each responsible for it's special task. In a federal state like Austria, in addition these authorities are organised on levels of the state, the provinces and the municipalities. In many cases in fact it is the duty of the citizen, to apply for a document at one authority and to submit this document to another authority. We can name this a citizen driven administrative network.

Early e-government applications often were implemented just to allow additional access for the citizen. Multi channel access was the buzz phrase. No changes were made to the administrative network as a whole. Therefore benefit of early e-government was limited.

Even if the workflow within the offices was optimised and even if back office automation was established, the outward interfaces stayed untouched and stand alone systems were implemented. It was still the job of the citizen to keep the system running, e.g. by carrying documents from one authority to the other.

2 Requirements for a Substantial Reorganisation

2.1 Shared Registers and Databases

Before mentioned old structures and old processes should be broken up, complex, but smart processes, both for the front office and especially for the back office are required. Underlying registers and databases – in the past maintained by different authorities – now can be accessed and maintained simultaneously by all authorities concerned, or even by autonomous authority agents, which perform the citizens' applications. Effective one stop government becomes possible.

Which are the prerequisites for this scenario? There are lots of registers and databases needed, to hold the required information in store. Additional, in some cases,

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authorities' access to private companies databases is required, e.g. access to the income data of employees, stored in the IT-systems of their employers.

In some cases, additional services can be provided to citizens on base of an "opt in"-model, e.g. in case of domicile changing, it should be possible for the citizen to choose whether the authority should notify the new address to various private companies, as banks, insurance or mail-order companies.

2.2 Privacy Requirements

Driven by the Austrian tradition of federal structures and separated competences there is a big need for privacy. It would not be in accordance to the Austrian culture to assign a source identification number (sourcePIN) to a person and to use this one and only sourcePIN as key to access every data concerning this person.

On the one hand, there are sector-specific personal identifiers necessary to avert uncontrollable access to the citizens' data. On the other hand, the problem of correct and unambiguous attributing the citizens to the several registers is to be solved.

3 The Austrian Implementation

3.1 The Austrian e-Government Act

As a result of the Austrian e-government initiative the Austrian E-Government Act[1] *(E-Government-Gesetz – E-GovG)* entered into force on 1 March 2004. Inter alia it establishes the "source identification number (sourcePIN)" *(Stammzahl[2])* [1] to identify natural and legal persons and other data subjects unmistakeably. This sourcePIN is built by derivation from a persons registration number *(ZMR-Zahl)* in the Central Register of Residents (CRR) – *(Zentrales Melderegister (ZMR)[3])* using strong cryptography. The Austrian Data Protection Commission *(Österreichische Datenschutzkommission[4])* acts as sourcePIN Register Authority *(Stammzahlenregisterbehörde).* For companies, associations and other non-natural persons their entry in the respective register is used as sourcePIN.

In data files of controllers in the public sector, the identification of natural persons is to be represented only in the form of a sector-specific personal identifier (ssPIN) – *(bereichsspezifisches Personenkennzeichen (bPK)),* derived from the sourcePIN, by the sourcePIN Register Authority, using an irreversible procedure [1]. The use of that ssPIN is limited to that sector of state *(staatlicher Tätigkeitsbereich),* which is served by this data file. In case a public body is authorised by statute to access to a citizen's data belonging to another sector, the asking public body can get the encrypted ssPIN

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[1] Authentic German Version:
http://ris1.bka.gv.at/authentic/findbgbl.aspx?name=entwurf&format=pdf&docid=COO_2026_100_2_30412
English Version:
http://www.cio.gv.at/egovernment/law/E-Gov_Act_endg_engl_Fassung1.pdf

[2] http://www.cio.gv.at/it-infrastructure/sz-bpk/

[3] http://zmr.bmi.gv.at/pages/home.htm

[4] http://www.dsk.gv.at/ or http://www.dsk.gv.at/indexe.htm

of this other sector from the sourcePIN Register Authority. Using this encrypted ssPIN the request can be sent to the other sector, which is the only one able to decrypt this ssPIN and to send back the answer by using the encrypted ssPIN again.

Above described constructs of the E-Government Act enable the Austrian public bodies to cooperate in an efficient way and to guarantee the required privacy.

3.2 Shared Registers and Databases

There are several shared registers and databases, partly established by the Austrian E-Government Act, partly established by other laws and already productive:

- Central Register of Residents (CRR) – *(Zentrales Melderegister (ZMR)*[5]*):* Contains domicile and personal data of every person living in Austria.
- Supplementary Register for Natural Persons *(Ergänzungsregister natürlicher Personen):* Contains natural persons not living in Austria, but in contact with Austrian authorities, e.g. abroad citizens or citizens of foreign states not living in Austria but in contact with Austrian authorities.
- SourcePIN Register *(Stammzahlenregister):* Contains the source identification number (sourcePIN) – *(Stammzahl)* derived from the person's registration number *(ZMR-Zahl)* in the Central Register of Residents or in the Supplementary Register.
- Register of Company Names *(Firmenbuch*[6]*).*
- Central Register of Associations *(Zentrales Vereinsregister (ZVR)*[7]*).*
- Supplementary Register for legal persons *(Ergänzungsregister für juristische Personen):* Contains legal persons not contained within the Register of Company Names or within the Central Register of Associations, which are in contact with Austrian authorities, e.g. consortia of natural or legal persons.
- Real Estate Database *(Grundstücksdatenbank*[8]*),* buildings and domicile register *(Gebäude- und Wohnungsregister (GWR)*[9]*),* register of valid addresses[10].
- Other registers, e.g. central trade register *(Zentrales Gewerberegister (ZGR*[11]*),* register of industrial plants, passport register, driving licence register, weapons register and criminal records *(Strafregister*[12]*).*

The use of all these registers enables public bodies to collaborate in an efficient way, but also to observe the E-Government Act. Using the system of sector-specific personal identifiers (ssPIN) each public body has access to these registers in accordance to it's competency and authorisation, either for queries or for updates.

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5 http://zmr.bmi.gv.at/pages/home.htm

6 http://www.bmj.gv.at/db_firmenbuch/index.html

7 http://www.bmi.gv.at/vereinswesen/

8 http://www.bmj.gv.at/db_grundbuch/index.html

9 http://www.statistik.at/adress-gwr-online/gwr.shtml

10 http://www.statistik.at/adress-gwr-online/adress.shtml

11 http://www.bmwa.gv.at/BMWA/Themen/Unternehmen/Gewerbe/Gewerbeordnung/gewerberegister.htm

12 http://www.help.gv.at/Content.Node/30/Seite.300000.html
https://labs.cio.gv.at/egov/polizei/strafregister/

3.3 New Back Office Processes

The aforementioned legal framework and its system of shared registers form a basis for back office reorganisation. The former paradigm of the administrative agencies as a network driven by the citizens' efforts is no longer valid. It is no longer necessary to apply for several documents in several local e-government portals. In many cases data necessary for a decision can be retrieved by the competent authority just using these registers. Therefore citizens' applications can be handled by the agencies all at once. E.g. whenever one's domicile data, personal status or nationality are needed, they can be accessed by the concerned authority using the Central Register of Residents.

One stop government [2] [3] [4] becomes reality: The whole application can be done with one contact to the authority, using every possible communication channel, including the internet. As a result a citizen oriented public administration comes into reach. In a next step local competences of authorities can be broken up; e.g. the Austrian E-Government Act enables local authorities to lodge applications with all Austrian authorities, irrespective of their material or organisational competence.

References

1. Arno Hollosi und Rainer Hörbe. 2004, Bildung von Stammzahl und bereichsspezifischem Personenkennzeichen (bPK)
2. Dimitria Pappa and Constantin Makropoulos. 2004. Designing a Brokerage Platform for the Delivery of E-Government Services to the Public, in Maria A. Wimmer (Ed.), Knowledge Management in Electronic Government. 5th IFIP International Working Conference, KMGov 2004 Krems, Austria, May 2004, Proceedings, pp 162 -173
3. Efthimios Tambouris and Maria Wimmer: Online One-Stop Government: A Single Point of Access to Public Services, in Wayne Huang, Keng Siau and Kwok Kee Wei, Electronic Government Strategies and Implementation, Idea Group Inc. 2004 (to appear)
4. Maria Wimmer and Efthimios Tambouris. 2002. Online One-Stop Government: A working framework and requirements. In Traunmüller (Ed.), Information Systems: The e-Business Challenge. Proceedings of the 17th World Computer Congress of IFIP in Montreal, Kluwer Academic Publishers, Boston et al, pp 117 - 130

Electronic Access to Public Sector Information: Some Key Issues

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Abstract. The concurrence of various developments makes access to, as well as ownership, use and commercialisation of information held by the public sector a challenge for public policy, particularly in Europe. Underlying are trends and issues at different levels: technical (digitisation, Internet), political (EU policies, democratic deficit), social (digital divide, access to services), and economic (expanding information economy, European information industry). The paper points out some key issues of public sector information policy, illustrates these with empirical evidence and outlines policy initiatives at EU level. One conclusion is that up to now the emphasis has been on the commercial rather than citizen rights aspects of public sector information and that a balance of policy priorities has yet to be found.

1 Introduction

Advanced information and communication technologies (ICT) play a pivotal role in the digital revolution and facilitate access to information. They constitute integral components of "e-government" and "open government" as public sector reform projects. Transformed access to public sector information (PSI) has been stimulating the discussion and design of public information and IT policies in Europe already over many years. Main reasons are the potential economic value at stake for commercial exploitation and increased demands by citizens to access government information. The significance for EU policies is indicated by various steps of political and legislative initiatives, culminating in a recent directive on the re-use of PSI [5]. Creating an EU framework for the exploitation of public sector information is, among others, motivated by the goal to stimulate a European information industry which is expected to contribute to economic growth and job creation. At the same time governments worldwide are increasingly adopting Freedom of Information Acts which tends to improve the transparency of their activities [1].

The contribution will first explore the value of PSI, outline basic PSI policy models and review policy development on PSI at EU level. The last part will address remaining policy issues and challenges in the light of some examples, before drawing some conclusions.

2 The Value of Public Sector Information

In the emerging knowledge society information has become one of the most important goods. The public sector is the biggest single producer and owner of a large variety

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and vast amount of information, reaching from administrative and government information to a diversity of non-administrative contents: e.g. legal and regulatory norms, political information, statistical, financial, and economic data, public registers, geographic, meteorological and environmental data bases as well as scientific, technical, medical and cultural information. This information or digital content is important for several stakeholders: for citizens and civic organizations, for private businesses and for different agencies within the public sector. For citizens and civic organizations much of public sector information is essential for exerting their citizen rights and enabling democratic participation. It is "the currency of democracy", as Thomas Jefferson is cited to have expressed the unique character of information in a free, democratic society [7]. Burkert has pointed out the multi-functional character of rights of access to PSI [2], which in addition to fulfilling individual information needs, also complement mechanisms of control, influence behaviour and legitimise establishment of related infrastructures for public administration. For business it is a key resource for the creation of value-added information products and services by the information industry. According to a study undertaken for the European Commission [6] the economic value of this information in EU Europe is estimated to be around 68 billion. Geographical information represents a large proportion. The report suggests that this value could even be multiplied through an improved use of the economic potential of PSI.

3 Policy Models and the EU Directive on PSI

Basically there are two contrasting models of public information policy [7], [8]. In the US, federal information policy is based on open and unrestricted access to PSI, a diversity of channels and sources of information, including the release of PSI at no more than the cost of search and duplication. Advocates of this "open access" model argue with prosperity effects by stimulating the private sector information industry and related employment. These effects are expected to be maximised when PSI is sold at marginal cost, i.e. costs related to the dissemination of PSI only. The other basic model – which is regarded more typical for European approaches – is called 'government commercialisation' or 'cost recovery'. In this model government agencies primarily seek to recover costs of PSI directly from users and act as commercial providers on the information market themselves. Although European countries vary substantially in their PSI policies, the UK used to be the example of 'government commercialisation' based on 'Crown Copyright' but has also been gradually changing its approach. Weiss argues that "(c)harging for public sector information may be counter-productive, even from the short term perspective of raising direct revenue for government agencies" [8]. The gains from dropping charges are expected in mainly two forms: higher indirect tax revenues from higher sales of PSI-based products and higher income tax revenues from employment gains.

At EU-level the issue of PSI came on the agenda already in the late eighties. Prepared by work of the Legal Advisory Board and a series of PUBLAW reports in the nineties, the Commission published a Green Paper in 1999 [3]. It concentrated largely on the commercial potential but also pointed out the relevance for citizens and tended to take the direction of the US model of 'open access'. Finally, by end 2003, the decisive legal document was published – the directive on the re-use of PSI [5]. It is seen

as a major step towards greater harmonisation of existing political and legislative frameworks within Europe and has to be transposed into national law until July 2005. One of the biggest hopes is to remove the disadvantages compared to the US information industry. It intends to make it easier for content producers in the EU to use and add value to PSI, both providing useful content and making it more accessible to larger numbers of people. The directive aims at transparency, legal certainty, deadlines for changes and prescribes rules which are guided by single market and competition policy goals. The issue of access for citizens is no longer the topic; the focus is exclusively on the commercial exploitation of PSI.

Moreover, the solution of a number of issues remains yet to be seen [4]: e.g. discretion of public authority in handling the right to access; creation and maintenance of asset registers (costs, integration); cultural change within the public sector; defining boundaries for public agencies acting commercially; absence of a single regulator). Various examples of tensions could be reported from Austria alone: e.g. conflicts between public authorities and private providers of value added services on a commercial business register; on free access to legal databases offered by the government; or on opening public employment service databases to private competitors. On the other hand, city and municipality administrations demand 'fair compensation' of costs for providing geographical data to federal authorities.

4 Conclusions

The accessibility of information on government issues has become essential to citizens and businesses alike and can influence their legal, economic and social position. If public sector information is not easily accessible then this can discriminate particular groups of individuals or organisations vis-à-vis others and would hamper the growth of a European information industry. The relevance of these issues is underlined by the adoption of Directive 2003/98/EC. However, at earlier stages of the discussion at EU level the citizens rights aspect of access enjoyed greater attention. There is a need for renewed efforts to improve effective access for citizens to PSI and to balance citizens' and commercial interests. A discussion of a more timely definition of the universal service concept, including basic information services, might be considered as instrumental here.

Among the many topics around the design of PSI policies, the questions of which public information should be accessible, to what extent and under which conditions, are of central importance. This includes issues such as:

- Which rights do/should citizens and businesses have regarding access to PSI?
- How should different aspects of access to PSI be taken into account in the design of policies? (technical: e.g. infrastructure requirements; social: e.g. democratic rights, privacy; economic: e.g. costs and benefits; access for different user groups: e.g. citizens and businesses as end-users vs. information industry as intermediaries or producers of added value)
- How to distinguish basic information and value-added, commercial information services based on PSI? (incl. universal service issues)
- How can different approaches in the provision of electronic government services be balanced? (citizen vs. business-oriented approaches)

- Which issues arise from different forms of provision of information services based on PSI? (e.g. government vs. private sector; different models, e.g. exclusive license, competitive products).

A number of further requirements for an enhanced access to public sector information in electronic format concern socio-economic, organisational and technical factors. They include, among others, the provision of low cost access facilities, practical skills, search and navigation support, barrier-free solutions for users with special needs, efficient architectures for the encoding of public records and administrative procedures, strategies for guaranteeing high levels of information quality and protection of privacy.

References

1. Banisar, D.: The www.freedominfo.org global survey. Freedom of information and access to government record laws around the world [Online source] (2003)
2. Burkert, H.: Wieviel Information gebührt dem Bürger – Freedom of Information? In: Kubicek, H., Braczyk, H.-J., Klumpp, D. et al.: Multimedia @ Verwaltung. Marktnähe und Bürgerorientierung mil elektronischen Dienstleistungen. Jahrbuch Telekommunikation und Gesellschaft, Bd. 7. R. v. Decker, Heidelberg (1999) 301-309.
3. CEC (Commission of the European Communities): Public Sector Information – A Key Resource for Europe: Green Paper on Public Sector Information in the Information Society COM (1998)585, Brussels (1999) <http://www.echo.lu/info2000/en/publicsector/greenpaper.html>.
4. Corbin, C.: New Issues for the European GI Strategy: Public Sector Information, D 2.9.3. Project GINIE: Geographic Information Network in Europe. October (2003)
5. European Parliament and Council (The European Parliament and the Council of the European Union): Directive 2003/98 on the re-use of public sector information (17 November). Official Journal of the European Union, L 345/90-96, 31.12. (2003)
6. PIRA International Ltd: Commercial exploitation of Europe's public sector information. Commission of the European Communities, Brussels (2000)
7. Weiss, P.N., Backlund, P.: International Information Policy in Conflict: Open and Unrestricted Access versus Government Commercialization. In: Kahin, B., Nesson, C. (eds.): Borders in Cyberspace. Information Policy and the Global Information Infrastructure. MIT Press, Cambridge MA, London (1997) 300-321
8. Weiss, P.N.: Borders in Cyberspace – Conflicting Public Sector Information Policies and their Economic Impacts. In: Aichholzer, G., Burkert, H. (eds.): Public Sector Information in the Digital Age. Between Markets, Public Management and Citizens' Rights. Edward Elgar Publishing, Cheltenham (forthcoming) 136-159

Integration of Public Information at the Regional Level – Challenges and Opportunities*

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Introduction

The Bulletin of Public Information *(BIP)* has been introduced by the Polish law in 2001 year as the mandatory manner of the official information publication on the web sites. This law put the publications obligations on the all administration units and on many enterprises.

What is fundamentally important that information is collected in a standardized and documented manner in predefined points, which are well represented in the geographical information systems. Moreover, the same collection of information is measured in different times in a given point. In this way, a huge amount of a spatial, dynamic data is collected in the public databases.

The collected public data can be used in modeling of a variety of activities in the Region and in their parameterization. Such parameterization of the region which is based on the reliable data gives a chance to reach the objectivity standards. It is particularly important in evaluations and comparisons of the region's activities at the national and European level. For example, new e-government services could be designed and objectively evaluated in this way.

Podlasie - Region in Poland

There are two hierarchical levels of administration in each voivodship in Poland. The voivodships are divided into the counties (pol. *powiat*) and the counties are divided into the communities (pol. *gmina*). The voivodships are governed by the voivode (the state administration) and by the marshal (the self-government administration).

In Poland there are 16 voivodships. The Podlasie voivodship is divided into 17 counties and into 118 communities. An economic and technological status of the communities in the Region is varied. Generally, the Podlasie province does not belong to the richest or to the industrial regions in Poland. The Podlasie region is described as *the green lungs of Poland* with many forests and lakes.

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Fig. 1. The map of the Podlasie region.

Structure of the *BIP* Data

The all 17 counties and 118 communities in the Podlasie region have their own Bulletin of Public Information *(BIP).* Apart of this, in the Region is functioning 194 Bulletins of other enterprises.

The Center of Information Society Technology *(CTSI)* at the Computer Science Faculty TU is servicing actually the most (75 %) of the Bulletins in the region. The *CTSI* is servicing 50 % *BIP*'s of public administration and 80 % *BIP*'s of other entities. Servicing of so many *BIP*'s by the *CTSI* Center increases chance for developing standards of the public data gathering and warehousing.

The information published in the Bulletin by Public Administration Units (*PAU*) are divided into a following main categories:

- foreign and internal politics
- internal organization of *PAU*
- activity of *PAU*
- *PAU* property
- other public information

Large part of the public data is collected in the text form. From the computational viewpoint it is convenient to represent such data in a standardized numerical form. We are assuming for this purpose the data representation in the form of the *n*-dimensional feature vectors and data matrices as it is done in the pattern recognition methods [1]. The *j*-th feature vector $\mathbf{x}_j(t) = [x_{j1}(t),.....,x_{jn}(t)]^T$ represents the state of the *j*-th object $O_j(t)$ (administration unit or enterprise) at the time moment *t*. The component $x_{ji}(t)$ of the vector $\mathbf{x}_j(t)$ is a numerical result of the *i-th feature* (i=1,...,n) of a given object $O_j(t)$ (j = 1,....., m) characterized at the time moment *t*. We assume that the feature vectors $\mathbf{x}_j(t)$ can be of a mixed type, because they contain both binary features ($x_i(t) \in \{0,1\}$) as well as the real value ($x_i(t) \in R$).

The state of the all objects $O_j(t)$ at the time moment *t* is represented in the form of the data matrix $X(t)$ with the *m* rows constituted by the dynamical feature vectors $\mathbf{x}_j(t)$.

$$X(t) = [\mathbf{x}_1(t) , \mathbf{x}_2(t),....., \mathbf{x}_m(t)]^T \quad (1)$$

The components $x_{ji}(t)$ of the feature vectors $\mathbf{x}_j(t)$ and the data matrix $X(t)$ are stochastic processes. It is natural to assume that each process $x_{ji}(t)$ is piecewise constant

$$(\forall(j,i)) \quad (\forall t: t_k < t \leq t_{k+1}) \; x_{ji}(t) = a_k = const \quad (2)$$

where t_k represents the *k-th* time moment (for example the *k*-th day)

$$t_1 < t_2 < ..... < t_K \quad (3)$$

The above assumption is justify, when for example we know that the changing of the *BIP* content can be done only ones per day.

Designing e-Services Based on Public Data

The Internet services based on the public data of the e-Government can be divided in the following categories which differs in respect to the levels of information aggregation:

i. actual information about one administration unit
ii. actual information about group of administration units
iii. historical information about one administration unit
iv. historical information about group of administration units

The e-services of the first group (category *i.*) are the most popular in practice. This group includes the all e-services which facilitate findings of actual information related to only one administration unit. For example, an adequate e-service could support findings of the best free farms in a given county in particular price and facilities categories.

The e-services of the second group (category *ii.*) have to include the **interoperability** mechanisms aimed at the effectively exchange of information between public administration units. The e-services of the second group could be seen roughly as the

services of the first group enriched by the interoperability mechanisms between the administration units.

The e-services of the categories *iii.* and *iv.* should be enriched by additional mechanisms of historical information aggregation. This includes comparisons between the data profiles in different time periods. Such comparisons should be based on the dynamical models of the administration units.

Mathematical Models of Data Integration

Interoperability of public administration units, citizens and business should be the key concept in the future development of the e-Government systems. The interoperability implies possibility of effective cooperation and information exchange between the public administration units. The necessary condition for the informational interoperability is data standardization and integration. Such standardization could be achieved through data representation in form of the feature vectors $\mathbf{x}_j(t)$ and data matrix $\boldsymbol{X}(t)$ (1).

Data integration should be based on adequate mathematical data models. It is widely accepted the fundamental role of the linear data models. We are taken in the consideration a general linear model in the following form

$$\sum_{k=1,\ldots,K} \sum_{j=1,\ldots,m} \mathbf{a}_j(t_k)^T \mathbf{x}_j(t_k) = c \tag{4}$$

where $\mathbf{a}_j(t_k) = [a_{j1}(t_k),\ldots,a_{jn}(t_k)]^T$ is the parameter (weight) vector of the j-th object $O_j(t_k)$ at the time moment t_k.

It could be seen, that by a specific choice of the parameter vectors $\mathbf{a}_j(t_k)$, the basic discriminant or regression models can be specified [2]. The choice of the parameter vectors $\mathbf{a}_j(t_k)$ means the imposing of some additional conditions on these vectors. It is done in order to avoid the overfitting phenomena and to obtain a model with a greater generalisation power.

We are using the convex and piecewise linear *(CPL)* penalty and criterion functions for estimation of the parameter vectors $\mathbf{a}_j(t_k)$ (e.q. [3]). The parameter vectors $\mathbf{a}_j(t_k)^*$ constituting minimum of the *CPL* criterion functions are using in definition of the optimal linear model (4). The basis exchange algorithms, similar to the linear programming allow to find efficiently minimum of the *CPL* criterion functions [4].

Conluding Remarks

The parameterisation of the administration units or enterprises $O_j(t_k)$ in the form of the feature vectors $\mathbf{x}_j(t_k)$ (1) open the way for integration of public information. Key role is played here by choice of the standards of such parameterisation. For this purpose it is necessary to define the meaning and the measuring procedure of the each feature $x_i(t_k)$.

The data representation in form of the matrices $\boldsymbol{X}(t_k)$ (1) allows to design mathematical models of public information integration.

References

1. O. R. Duda and P. E. Hart, D. G. Stork: *Pattern Classification,* J. Wiley, New York, 2001.
2. R. A. Johnson, D. W. Wichern: *Applied Multivariate Statistical Analysis,* Prentice-Hall, Inc., Englewood Cliffs, New York, 1991
3. L. Bobrowski, M. Topczewska: "Tuning of diagnosis support rules through visualizing data transformations", pp. 15-23 in *Medical Data Analysis,* P. Perner et al., Springer-Verlag Berlin , Heidelberg 2003
4. L. Bobrowski: "Design of piecewise linear classifiers from formal neurons by some basis exchange technique". *Pattern Recognition,* 24(9), pp. 863-870, 1991.

Demand and Supply of Public Information Online for Business: A Comparison of EU Countries and the US

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Abstract. In order to address the gap in e-government research focused on information for businesses, Nomisma-NET has engaged in a study focused on the role of online public information in business development in Italy, as well as in other European countries and in the USA. The paper presents the methodology for analysis of portals and web-sites that supply public information for businesses, in particular small and medium-sized enterprises (SMEs). The analysis is carried out on two tracks: static and dynamic. The objective of the research is to analyse different sites and countries' models in supplying online public information in terms of access, content availability and degree of relationality.

1 Introduction

Current e-government policies are aimed at promoting the development of an efficient Public Administration that is capable of effectively delivering e-services to citizens, business and between administrations, both to overcome bureaucratic frictions and to improve integration throughout the PA value chain. E-services are seen as the basis for building up and operating a seamless information system supporting the efficient performance of PA functions and response to user demand. Production, processing, management, and delivery of public information is a common element in all PA activities: the mission of addressing collective needs using collective resources is achieved by reducing the uncertainties deriving from random interactions among individuals, social groups, business and policy organisations in the market and society. The PA creates value by networking and processing information resources which are generated and supplied by entities within and outside the PA systems. A primary objective of e-government, therefore, is to use ICTs to optimise (public) information management and sharing both within the PA and between the PA and users (citizens/businesses). This can be achieved through the delivery of individual and integrated e-services and by making public information as accessible, available and integrated as possible. Moreover, online information is an indispensable input in economic and social development, as it can contribute to accelerating the circulation, acquisition and management of information, which are preconditions for the knowledge creation and accumulation processes. E-government plays key roles in improving the efficiency of PA functioning, increasing the circulation of public information within the PA system, and in improving society's access to the information held by public entities.

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The supply of and demand for online public information for business is the focus of the Nomisma-NET's research work, which is based on the assumption that open access to extensive and relational public information and data sources can provide added value for firms by strengthening the knowledge base for decision-making in the global economy. Competitiveness is more likely to be achieved by companies that are better informed about market conditions in domestic and foreign markets, are aware of the laws and regulations affecting the business environment, and are able to take advantage of information on advances in research and innovation. Moreover, information produced and published by the public sector generally implies a certain level of reliability and authoritativeness, thus reinforcing its value to the private sector.

Public information is defined in the recent European Directive on the reuse of public sector information (2003/98/CE) as "any representation of acts, facts or information – and any compilation of such acts, facts or information – whatever its medium ...-, held by public sector bodies."

2 Supply and Demand of Public Information Online for Businesses

For government institutions, production of information content is an ongoing process: online information has to be constantly updated, new information has to be published and web formats have to be changed to make the web-sites more user friendly as well as incorporate information in improved and innovative ways. At a minimum, e-government access is provided to relevant legal documents, especially regulations and statutes, as well as other useful information on the administrative or legal requirements of engaging in business or regarding business obligations to government (taxes, registration, employee, social and environmental issues, consumer protection, etc.). Some governments also place higher value added materials on the Internet which can help businesses in marketing, distribution and sales, and in developing businesses plans and strategies for export and investment. Some governments generally provide the information and documents free of charge, others prefer to charge a nominal fee or try to limit access to domestic companies.

The paper presents our methodology for analysing portals and websites that supply public information for businesses, in particular small and medium-sized enterprises (SMEs). The analysis mainly focuses on the national level of e-government, though regional and local governments may also be important providers of online public information.

The methodology proceeds along two tracks of analyses: static and dynamic.

- The objective of the static analysis is to examine the main central government portals and web-sites in selected EU countries and in the USA in order to gain an understanding of the different models of online public information supply. Web-based surveys of selected central government portals have been undertaken, by categorising them according to the type of site (generalist, thematic, institutional, etc.) and by category of information provided (news, data, documents, norms and regulation, studies, etc.). Portals have been examined in terms of three main aspects *(access, structure* and *content)* and have been mapped according to their characteristics.

- The objective of the dynamic analysis is to gain an understanding of the level of correspondence of the supply of online public information with demand from business users, examining to what degree the the portals/web-sites' public information is accessible, available and relational. The dynamic analysis is based on results of a survey questionnaire submitted to 400 SMEs in Italy which seeks to understand the types of online public information that enterprises search for on the Internet. The survey focuses on three main processes: innovation, organisation, and capabilities. Additionally, the Nomisma team conducted a web-based survey of selected portals, simulating the online search processes of businesses, in order to assess the *accessibility, availability,* and *relationality* of public information as well as the effectiveness and efficiency of access in a large number of public portals. The content provides the true value added in a portal/web-site, and it becomes useful only if users are able to easily access the site and an extensive supply of information. The level, stability and efficiency of *hyperlinks* add great value to a portal, coupling the openness and pluralism of the Internet environment with focused demand for quality information.

3 International Comparison

The Nomisma team has undertaken a survey of national e-government portals and their access to online public information for business in Italy, extending the analysis also to France, Germany, the United Kingdom and the United States. The e-government portals surveyed and their associated information and services are as different as the countries that have established them. There are certain key findings, which may reflect the countries' approaches to supporting business development by providing access to relational online public information.

In terms of their approaches to business, the UK, France and the USA have dedicated gateways or portals easily accessible from the main national portal; whereas Germany does not have a general business portal/gateway even though it does have more specific portals dedicated to export or to SMEs, and Italy has a separate business portal, which is currently difficult to reach from the main national portal. Proceeding from general access to public information via each country's central government portal, the analysis examined availability and access to information of various types, including the following: dedicated business portal/gateway; national economic data; domestic market, foreign trade and investment; industry/geographically oriented information; statistics; business development; SMEs; innovation/research; taxes; social security; legislation/regulations; customs; and public procurement.

To demonstrate a concrete example of how public information dedicated to a specific theme is presented in different national e-governments, we provide a focused analysis of the public information available for businesses seeking to engage in international trade and investment. While, for example, the US government provides vast quantities of information at no cost to the user, the French government has a tremendous library of information resources, but charges up to hundreds of Euros for its detailed studies produced by the CFCE, while the Italian Institute for Foreign Trade (ICE) requires registration and charges a nominal fee for some of its country and market studies.

4 Conclusions

It is said that 'knowledge is power': governments have made significant investments in providing online information and services, seeking to achieve greater administrative integration, efficiency and responsiveness; achieve a better relationship between government and businesses; and provide new and innovative ways to perform administrative procedures. While the innovations in e-government have great potential to change the way businesses interact with their governments, it requires further in-depth analysis to understand how effective they are in terms of actual usage, access, information availability, quality and reliability, and user ease and satisfaction. The paper seeks to present some initial results from both a web-based analysis and an enterprise survey that was conducted in Italy and thus presents a partial picture of what businesses want from online public information, and how much they can actually obtain. The analysis of the actual correspondence between demand and supply of online public information leads to major questions about the governance model(s) for public Internet resources, which in turn require further research to better understand the impact of e-government on business.

Regional Developments in Global Connection

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Abstract. E-government can be regared as a construction site. Thus the overall success is strongly determined by the tangible progress that takes place in regional development projects. The workshop "regional developments in global connection" documents such actual advancements and considers them in the framework of global trends in e-government.

1 Regional Projects Ensure the Progress in the Wide

Two global streams, knowledge society - modifying how society works - and new ways of governance come together. They are main drivers for change; yet actual progress takes place in regional development projects. Thus, dissemination of knowledge, interchange of experiences and learning from practice become basic success factors. Only so e-Government services will improve, administrations will join-up, inter-linking of online services is enabled and progress can advancement in broad front. Therefore, in EGOV a workshop "regional developments in global connection" has been established.

At the very core of these issues is interconnectivity: the emergence of new information and communication technologies has contributed al lot for improvement: creating a wide range of connections that can improve living conditions all over the globe. So the First World Information Technology Forum in Vilnius [WITFOR 2003] cites:

- connections with government – permitting "joined-up thinking".
- connections between government and NGOs/citizens – strengthening accountability.
- connections between government and business/citizens – transforming service delivery.
- connections within and between NGOs – supporting learning and concerted action.
- connections within and between communities – building social and economic development."

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2 Stages in the Informatisation of the Public Sector

Informatisation of the public sector may be regarded as a sequence of themes which gradually have entered the limelight of attention:

- The late Eighties brought a considerable spreading with computing power reaching the individual working place. Attention was drawn to the internal work of an agency and the cooperation of different staff. Aim was to support production processes at their operational level and for that software was developed under the label of workflow management systems. Their implementation went hand in hand with a reengineering of administrative processes.
- In the Nineties the Internet reached the domain of public administration. Web appearance came first and was aimed at presenting the agency to the public and providing civic information. The intention was to offer citizens a helpful hand in their various situations of live.
- The next stage came in when the Internet became the medium for administrative transactions and integrated services. This turn occurred in the last third of the Nineties and was marked e-Government a label coined after e-Commerce. It brought significant changes concerning the way of doing administrative business and innovative forms of organization and cooperation came up.
- Now the whole machinery of Government has come under scrutiny. The issue is the whole governance cycle: legislature, executive, judiciary, policy formulation and democratic participation. Hence new subjects have arisen such as e-Law, e-Democracy, e-Debate, e-Voting.
- In some way governance and its basic systemic features come under consideration. A fundamental rethinking of the system is under way, the changing roles of the national state are discussed and a new balancing of public and private activities is thought on.

3 Some Key Themes in e-Government

Promoting a knowledge based economy. A main objective is the provision of high-quality e-services that support the development of a competitive knowledge-based economy and that contribute to the enhancement of job creation, productivity and overall competitiveness. A number of current city online portals delivers information in multiple languages, supporting and promoting tourism and other economic activities. Employment is another issue. So in Europe projects in this area focus mainly on freedom of movement for work across the European economic space. Another way of promoting economic development is given through support and advice for businesses, enabling access to global markets whilst providing a shop window for local goods. Other fields of application important for companies are electronic tendering as well as a more effective communication with tax offices.

Rendering information and service to citizens. A general improvement in the quality of life for citizens, households and families is expected. Some examples of information provision are: Calendar of events and entertainment, information on public transport and environment. Examples of interactive services are: requests for public documents, requests for legal documents and certificates, issuing permits and licenses, on

line tax payment, payment of online services. Particular in areas where communities are scattered and scarce resources do not allow multi-location attended service points, e-Government is big advantage. One has to be well aware that the aim of solutions is not only to increase the level of service provision and internal efficiency. Indeed, in the knowledge society, focus lies on user-friendliness, accessibility and bridging the digital divide. So, knowledge enhanced information and service provision based on user needs and understandability as well as on service self-explicability (a matter of how to present service-specific knowledge to the general public in a well understandable manner) become key.

Enhancing governmental cooperation. For providing services according to user needs, enhanced cooperation between agencies is a categorical precondition. This makes G2G-collaboration to a pivot. Some examples improving the internal workings of the public sector are: integrated human resources and payroll systems, integrated financial management systems, web-based data resources to improve decision making, intranet system to improve information flows within governmental instances. Often reorganization requires major business process re-engineering and is heavily based on back-office integration.

e-Democracy. This aims at increasing the engagement of citizens in public decisions and actions. The rationale is to make public decisions more responsive to citizen's view or needs by opening information flows from citizens to government. e-Democracy suggests greater and more active citizen participation enabled by the IT in today's representative democracy as well as through more participatory or direct form of citizen involvement in addressing public challenges. Some examples are: panels, forums and petitions, opinion polls, referendums, online voting.

4 Crucial Factors for Success

Best practice as key. Learning lessons is a key point and good practice plays a mayor role. So attention is directed towards the est practice competition of the EU [COMO 2003] at the respective Como Conference last July. There the "2003 eEurope Awards for e-Government" were presented. More information on the projects recieved and the report is given on the eEurope Awards, http://www.e-europeawards.org. A caveat has to be added; mere "replicating" is likely to fail. Even though examples of good practice are very helpful in the establishment of new structures, the design of individual systems cannot be substituted by copying successful projects. The feasibility of transferring has to be considered for each individual case.

Focus on the legal and regulatory framework. For creating a supportive environment this is a key prerequisite. The legal framework is an instrument which – like technology – should serve society as a tool to expedite the transition to a knowledge-driven economy, providing clear and stable rules and improving certainty for investors. Existing frameworks nevertheless reflect the constraints of a paper-based mode of working and communicating and should therefore be adapted so as to enable administrative procedures to be carried out electronically.

Change management. Change management techniques have to ensure a smooth transition to eGovernment, so it is necessary to commance change management at the

political level where strategic thinking and a drive for creating infrastructures are needed. On managerial levels best practice-evaluations and guidelines derived from ground-breaking projects are critical success factors. On top of this, the exchange of experience and openness for lessons learned are essential for successful change management.

Transforming administrative culture. The institutional setting influences the nature of innovation in government and determines its pace and selectivity. So one has to focus on cultural issues and involve public employees as full partners of the change process. For staff members a qualification initiative is needed.

e-Government in developing countries. This is a particular challenge as many developing countries are still far behind a normative framework in terms of good governance. Many states lack stable policies; many lack of macro-economic stability; in many, rule is by personalized leadership with rule by the executive branch that largely marginalizes the legislative and judiciary powers; it can happen that there are social cleavages along ethnic, tribal and other lines. In this context, the potential for e-governance initiatives to make a significant difference may well be limited. However, that is not a rationale for inaction, and one must recognize that IT can act as a relatively concrete lever to change.

5 Dissemination and Learning Are Key

Learning and from and encouraging each other is key. So a continuous and effective exchange of experience and best practices has to go on. Evaluation and benchmarking will help to achieve good e-Government solutions at affordable cost. Also, it is indispensable to establish a framework for exchanging best practices and experience so as to avoid a mere replication of an incentive applications. The diversity of measures is large and includes several means: competitions and awards, conferences, networks, study curricula and qualification modules, transfer events, delegations and learning journeys. In doing so learning will transform administrative culture.

6 Concluding with Some Requests from the Vilnius Declaration

The First World Information Technology – it will be proceeded with a second event in Gabarone [WITFOR 2005] – has given a global message. So we conclude our introduction in citing key requests from the Vilnius Declaration [WITFOR 2003]:

- First and foremost, Governments and international organizations, at all levels, should take into consideration the in-depth analysis of user needs and citizen requirements in E-government and E-governance projects.
- International organizations (e. g. UNESCO, ITU and other UN agencies, private sector and civil society) should increase their collaboration with professional NGOs, such as IFIP, CPSR and similar institutions, aiming at the implementation of projects leading to empowerment and participation of civil society in and through the use of ICTs.

- Governments at all levels (local and national) are invited to intensify the use of ICTs in their policies and relationship with citizens through sustainable e-government and e-governance programmes
- Efforts should made, at governmental and international organizations, including as an outcome of to further promote actions aiming at: Sharing ICT security and related data for crime prevention, increase the availability of shareware, freeware and support to software standards; promote sharing and mutual recognition of ICT accreditation schemes.
- International and national organizations are invited to approach e-government (includes both e-administration and e-services) and e-democracy as complimentary processes, through in-depth analysis of users requirements to tackle this challenge
- International and national organizations, governments, private sector and civil society are invited to promote the use of the all languages in the cyberspace, as a main tool for empowerment and citizen participation in decision making and democracy
- World Summit on Information Society Action Plan should promote low cost ICTs, aiming at further participation of those segments of population lacking of access to these technologies. (e. g. public and community kiosks and telecenters, VSAT, radio browser, voice interfaces, etc)
- Governments, International and Professional Organizations, NGOs as well as the World Summit on Information Society, should take proactive measures to prevent against a gender divide, which is an overall responsibility of all concerned.
- National and local E-governance programmes should consider the specific needs of regions and people with a low level of connectivity (e.g. rural areas, people with special needs, etc) aiming at a large and equitable digital inclusion process.

References

1. COMO 2003: Christine Leitner (ed): eGovernment in Europe: the State of Affaires, (with contributions from Jean-Michel Eymeri, Klaus Lenk, Morten Meyerhoff Nielsen, Roland Traunmüller), EIPA, Maastricht, 2003, ISBN 90-6779-182-2
2. WITFOR 2003: Dipak Khakhar, WITFOR 2003 White Book, IFIP Press, Laxenburg, 2003, ISBN 3-901882-18-9.
3. WITFOR 2005: World Information Technology Forum, 29 Aug – 2 Sept 2005, Gaborone, Botswana, http://www.witfor.org.bw/witfor/index.html.

Evolution of Information Systems in Malaysia

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Abstract. Malaysia has taken a gigantic decision by transforming itself from industrialization into an unknown territory of knowledge economy. Therefore it is important to establish a test bed to justify on the successfulness of leapfrogging onto this new bandwagon. Multimedia Super Corridor (MSC) project is the major project in the country and has been established to test this. The question is, can Malaysia achieve its dream in creating successful implementation of information systems when information systems history was full of catastrophe? This paper will discuss the findings of mapping triangle of dependencies model by Chris Sauer in order to foresee whether Malaysia has the potential to achieve successful implementation of information systems. Finally, through this investigation, we are able to outlined external influences that can nurture the continuity of information systems dependencies in Malaysia and embedded it as external factors of Sauer's model.

1 Introduction

Effective information systems requires efficient information technology infrastructure to be in place. Information system can be defined as a computer based systems where major inputs and outputs are information, which serve to coordinate the work of many different organization functions [9]. Malaysia as a new entrant onto the world of information systems has given priority in establishing a strong infrastructure of information technology before venturing onto information systems development. Malaysia has transcended from a resource-based economy to a knowledge-based economy and will be a fully developed nation by year 2020 [8]. This transformation to achieve a successful Vision 2020 was initiated by its former Prime Minister, Datuk Seri Dr Mahathir bin Mohamad and it is known as the Multimedia Super Corridor (MSC). MSC encompasses two flagship applications, known as Multimedia Development Flagship Application and Multimedia Environment Flagship Application. Four applications were planned to be developed under Multimedia Development Flagship Application, which are, electronic government, multipurpose card, smart school and telemedicine. Meanwhile, Multimedia Environment Flagship Application is the Research and Development Cluster, World-Wide Manufacturing Webs and Borderless marketing applications. Each applications consists of a number of collaborative information systems projects [1].

There have been numerous reports on information systems failures [3], [4], [11]. Based on this negative feedback, a proper understanding on the actual reasons that contributes to information failures need to be identified. Thus, these failures can be categorized as uncontrollable failures such as natural disaster, accident or economic

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failures and systems failure. We will scope our discussion on systems failures. System failures were failures from a large, complex and tightly coupled systems [3], [7] or the responsibility of designers and operators [7].

There have been reports on how to benchmark systems as a success or not. Early benchmarking adopts three different perceptions: product viewpoint [10], process viewpoint, services viewpoint [2], [5]. Meanwhile, Chris Sauer explained that most systems failure revolves around five reasons known as missed deadlines, unmet requirements, dissatisfied customers, excessive costs and unused systems. He also identified that the most crucial factor was based on whether there is sufficient support to keep the system alive. Therefore in our discussion, we would take Sauer perception as our benchmark in justifying the success or failure of information systems.

From literature, there are four distinct concepts of information system failure: correspondence failure, process failure, interaction failure and expectation failure [9]. It is also vital that each information systems project has a continuous executive support. The critical success factor in information systems success is the ability for the system to stay alive. The idea of establishing a living information system is to create a cycle of dependencies and to nurture the continuity of the cycle process and this is shown as the triangle of dependencies of information system. Based from the triangle of dependencies, we will try to map MSC strategies and practices in order to identify the lacking components in the existing infrastructure, if any.

2 Findings

Since Malaysia has strategize its economy to fit the information-era [1], we can positively say that the Malaysian government has contributed a lot thru MSC as the major information system development project that is capable to justify the future of information systems in Malaysia [6]. Consequently, we would be able to relate the support of information system implementations in Malaysia by studying the development of MSC. Based on triangle of dependencies, we can conclude that Malaysia has established the right components to generate successful implementation of information systems. Figure 1 shows the entities that inculcate in Sauer's triangle of dependencies model. Multiple project organizations had been appointed to continuously nurture and innovates information systems implemented in MSC. Since these project organizations are spearheaded by the member of National Consultative Committee on Information Technology (NCCIT), which is govern by the Malaysian Government will then determine continuous feedbacks and recommendations from the supporters as required by the project organization.

Meanwhile, project organizations will have no choice other than to continuously nurturing the system. Project organizations are generally from government agencies; therefore, at the same time project organizations are also the supporters of the system. This situation will inevitably force them to continuously be innovative in order to improve the information systems as their efficiencies and future rewards are highly dependant on the system.

To ensure continuous nurturing of the information system dependencies cycle, Malaysia has prepared several strategies. We categorize these strategies as the external factors and embedded it as an external influence for Sauer's model [1]. They are Government incentives, cyberlaws, Research & Development activities and the creation of civil society [1].

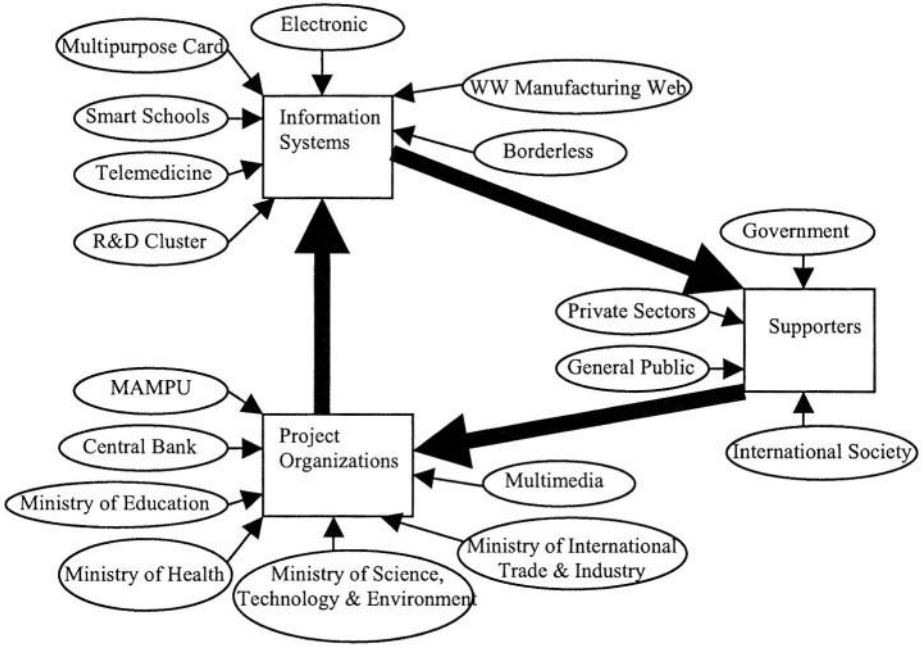

Fig. 1. Triangle of Dependencies in MSC Project.

3 Conclusion

SC is a giant project initiated by the Malaysian Government for a test bed to justify whether Information Systems implementation will be a success or not. Based on the triangle of dependencies model, we can conclude that Malaysia has already put in place the appropriate strategies to establish a successful implementation of information systems nationwide. The eagerness in creating a society of knowledge worker and government strategies to jump onto the knowledge economy managed to cultivate the correct momentum for Malaysian to enhance their knowledge and develop sharing culture. Future research will look into the risk factors and the critical success factors of these projects on the MSC triangle dependencies model established to show its successful implementation.

References

1. Azlinah Mohamed: Evolution of Information Systems in Malaysia (full text article). http//www.tmsk.uitm.edu.my/~azlinah (2004)
2. Bailey J.E. and Pearson, S.A.: Development of a tool for measuring and analyzing computer user satisfaction. Management Science, Vol 29 No 5 (1983)
3. Flowers, S.: Towards Predicting Information Systems Failure. Key Issues in Information Systems, McGraw-Hill Maidenhead (1997) 215-28

4. Forestar, T. & Morrison, P.: Compute Ethics: Cautionary Tales and Ethical Dilemmas in Computing, Basic Blackwell Oxford (1990)
5. Ives, B., Olson, M.H. and Baroudi, J.J.: The measurement of user information satisfaction. Communications of ACM, Vol. 26 No 10 (1983)
6. Mahathir Mohamad: Multimedia Super Corridor, Pelanduk Publications (1998)
7. Miller, J. and Doyle, B.: Measuring the effectiveness of computer-based information systems in the financial services sector. MIS Quarterly, Vol 11 No 1 (1987) 107-24.
8. Raman, KS.: From a Resource Rich Country to An Information Rich Society: An Evaluation on Information Technology Policies in Malaysia. Information Technology for Development, Vol 7 No 3 (1996) 109-131
9. Sauer, C.: Why Information Systems Fail: A Case Study Approach. Alfred Waller Henley (1993)
10. Whyte, Grafton and Bytheway, Andy. Factors affecting information systems' success. International Journal of Service Industry Management, Vol 7 No 1 (1996) 74-93
11. Zani, William M.: Blueprint for MIS. Harvad Business Review 48 Nov-Dec (1970)

The Challenge of Providing a Voter Registration System for Millions of Filipinos Living Overseas

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Abstract. The Philippine Commission on Elections (COMELEC) has acknowledged that the absentee vote can very well decide the final outcome of the close 2004 presidential elections. However, the absentee voter registration system has procedural and technological problems that can lead to allegations of fraud. These are the problems that COMELEC must address as it gets ready to proclaim the next president of the Philippines. Furthermore, evaluation of the absentee voter registration system now will help COMELEC prepare for the next major election in 2007.

1 Problems of the Absentee Voter Registration System

COMELEC deployed Biometric Data Capture Machines (DCMs) all over the world for absentee voter registration. The DCMs were desktop computers that featured fingerprint and signature capture devices, and a digital camera to take a picture of a registrant's face. Since many overseas Filipinos living in remote areas could not afford the cost of traveling to an embassy for registration, COMELEC tried to bring registration services to them instead. However, COMELEC encountered several problems while providing registration events. For example, COMELEC could not easily transport the heavy DCMs. Some DCMs had to be express mailed to several registration events. During two-day registration events, embassy personnel would leave the DCMs at the registration venue because of the weight and to avoid repeated handling that could damage the DCMs' fragile components. Left unattended, the DCMs were vulnerable to theft, destruction, and tampering.

Another major problem of the absentee voter registration system was the use of too many paper forms. As the number of completed application forms grew so did the risk of theft or alteration. The application forms themselves had serious flaws such as the lack of a space for registrants to write their phone numbers. COMELEC could not contact the thousands of registrants whose postal ballots were returned to embassies because of incorrectly written addresses. This eventually convinced COMELEC not to mail the absentee voter IDs that many registrants needed to vote.

2 Concern over Biometrics

COMELEC used DCMs mainly to prevent multiple and fictitious registrations from entering the Certified Voters List (CVL.) Unfortunately, the plethora of collected

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biometric data placed on the CVL could lead to criminal abuse of personal information. For instance, the envelopes containing the absentee ballots also contained the voter's fingerprint and signature. Anyone with access to the absentee ballots and the CVL could use the fingerprint and signature to find a voter's, name, face, and address. The registration system could not guarantee the secrecy of overseas Filipinos' votes. The CVL could become a means to obtain a load of personal information and infringe on a registrant's right to voter privacy. The use of digital smart cards appears capable of avoiding these privacy problems. Filipinos, however, have an aversion to national ID systems because it is reminiscent of the profiling that sent many innocent people to prison during the Marcos-era dictatorship [1]. Also, judging from the difficulty of getting plain paper IDs to absentee voters, it is very probable that applying smart cards to the voter registration system will result in many unclaimed cards.

3 Recommendations

The use of biometric devices is a trade-off between security and convenience [2]. In the case of registering millions of overseas Filipinos for elections, there appears to be too much security and not enough convenience. Registering multiple times may be extremely difficult but turnout for absentee voter registration was dismally low. Of the 7.38 million overseas Filipinos, only 362,811 or about 4% registered, way below COMELEC's initial target of 2.5 million registrants [3]. Two or perhaps even just one type of biometric data can sufficiently prevent multiple and fictitious registrations from entering the CVL. Finding multiple registrations has become far more effective now that registrants' biometric data are stored in a computerized database. Laptops should also replace the heavy desktops used for biometric data capture. This should help bring more registration events to overseas Filipinos living in remote locations. Finally, gradual, small-scale implementation is much safer than the all-at-once worldwide deployment of DCMs. This should help prevent a catastrophic failure of the entire absentee voter registration system. There are no quick answers to the problem of registration fraud that threatens the credibility of the absentee vote. Only by finding the proper solutions to the problems of the voter registration system can COMELEC increase the integrity of Philippine elections and win back the trust of the Filipino people.

References

1. Locsin, Congressman Teodoro Jr. Philippine House of Representatives. Personal interview. 19 May 2004
2. Kim, Hakil (Hale): Biometrics technology: from theory to application. Symposium on Cryptography and Information Security, Vol. 1. (2004) 465-470. 2004
3. Lacuarta, Gerald and Martin Marfil: "4% turnout in registration of absentee voters." inq7.net. 30 September 2003

e-Government Policies, Strategies and Implementation: e-Government in the Federal Country Belgium

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Abstract. This paper is a continuation of a profound international study carried out in 2002 concerning eGovernment{1}. Seven countries of the OECD were examined. Not only eGovernment policies and organizational components were taken a closer look at but also front- and back office realisations. Despite the fact that each country is developing own eGovernment facilities, there are many similarities {2}{3}. In this article we examine whether these international trends also count for Belgium. We focus on both the federal and the Flemish eGovernment policies.

1 Similarities in the Organisational Structure

Comparing the results of the different countries, we noticed that politicians often support the realization of eGovernment. In the UK, Ireland and Germany, respectively Tony Blair, Berthy Ahern and Gerhard Schröder are responsible for the realisation of the eGovernment targets. The responsibility on the administrative level, however, is often situated within an 'eGovernment team'. These coordinating eGovernment organisations predominantly monitor the implementation of the national eGovernment strategy in the central government departments; for example the Office of the e-Envoy (UK), ICTU (The Netherlands), Bundonline 2005 project group (Germany), Information Society Policy Unit (Ireland), Comité Interministériel pour la Société de 1'Information (France). In Belgium we notice at the federal level (FEDICT) as well as at the Flemish one (eGovernment project team) that similar organisations are elaborating on eGovernment. There is also support from political side. Since the federal elections of may 2003 there is a State Secretary for the Informatisation of the State at federal level. At the beginning, the Flemish eGovernment team was within the competences of the Flemish Minister President. Federal elections (18 may 2003) changed a few things. The Flemish Minister President switched place and became federal minister of Internal Affairs. The Flemish government created a special ministerial post for eGovernment.

2 Front-Office Realisations

The realisation of a national site is one of the first concerns and realisations in most examined countries. The various portal websites mainly offer online government information and (the promise of) online service delivery. There are a lot of similarities

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in the lay out, despite the visual differences. The background philosophy is similar: regulating information on a client based structure. In practice, this structure can be developed differently; working with target groups, themes, life events or a combination of these. At the moment of our international study, Belgium did not really had a portal site (there was a site but not much information could be found on it). Since 2003, however, things changed. Belgium offers now a portal site: www.belgium.be. This site is divided into three target groups: citizens, companies and public servants. Themes subdivide the citizens' target. For companies, a thematically system is used as well as a life cycle started from day one of the company till its ending. Since February 2003 the Flemish government has its own portal site www.vlaanderen.be. This site existed earlier but did not have the features of a portal site. Since the restyling in 2003 we notice a question steering philosophy as well. Information is offered on different ways: life events for citizens and contact moments for companies, a thematically division, target groups and a search function. This site was further improved in 2004.

3 Back-Office Realisations

The developments in the back-office depend on a few conditions. Two major aspects are the identification in the back-office and the authentification. Several of the studied countries have already introduced a unique identification system (for example *Personal/Business Public Service Number* in Ireland, *Social Insurance Number* in Canada). Important when coupling data and passing on data internal, is working with an authentic source, for example a person or business register. The Netherlands applies this kind of authentic source. The UK will introduce such a system as soon as the problems for unique identification of subjects are dealt with. Ireland is the only country in our study that has given a manifest role to the digital vault principle. For many years Belgium possess a central population register that guards and distributes all basic personal data. Besides this register, there are the two so-called 'crossroads banks": the Crossroads Bank for Social Security (1990) and the Crossroads Bank for Businesses (2003).

For the authentification of the end user, the most preferred (technology-driven) solution (in all studied countries) is a full-scale PKI environment, including digital certificates or electronic identity cards (eIC). There are different opinions with respect to the necessity of the eIC. In the UK, people have never liked the idea of a paper identity card, let alone a digital one. This situation has changed quite recently, however, with central government pushing for the introduction of an eIC. Irish government would like to see an increase in the use of its *Public Services Card.* The Netherlands supports the eIC and aims at a large-scale distribution in the near future. The distribution of eIC's is already a reality in Canada and Finland, but only on voluntary bases. Finland has several kinds of functional smart cards, next to its identity card. For authentification, Belgian citizens receive a SIS-card (Social Identification System-card). This card is a smart card that can only be used for social security matters. Since 2003, pilot projects for electronic identity cards have started. These projects were evaluated positively. Since 2004 the diffusion of this card started definitely. At the end of 2007 each Belgian citizen should have an electronic ID-card. As it is not the intention to create two separate identification and authentification systems, the Flemish government is not active on this part.

References

1. Janssen, D., Kampen, J., Rotthier, S. & K. Snijkers (red): De praktijk van eGovernment in zeven landen van de OECD. Research report SBOV (2003)
2. Janssen, D. & S. Rotthier: How are they doing it elsewhere? Trends and Consolidations in eGovernment Implementation. Paper EGPA, 3-6 september 2003 (2003)
3. Janssen, D., et al Internationale trends op het vlak van eGovernment. SBOV. (2003).

e-Government: A Strategy for Deploying Social Security Related Electronic Services

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Abstract. Nowadays, uunfortunately, most of the countries are still in the early stage in the shift to providing governmental services online. How to start providing e-Government is a question that no one can give a unique answer to. It depends on the economical, legal, social, and political situation in particular country, often requiring major changes in organization and legislative regulations. In this paper we try to formulate such a strategy, based on the experience gained when developing and implementing it for a Social Security Organization in Greece.

1 Introduction

The trends towards delivery of electronic services by governments ("e-government") and development of integrated customer-oriented administrative service offerings ("one-stop government") represent efforts to alleviate the problems of bureaucracy and improve the provision of administrative services by European public agencies [1]. Literature acknowledges a shortcoming regarding aids to support E-government planning [2]. Of course there are attempts to list best practices that may help planning E-government applications (e.g., by the National Association of State Chief Information Officers - NASCIO), but these lists do not yet provide a framework to systematically guide the E-government planning process.

In this paper we focus on one of the most important sectors of e-Government that of Social Security and the effort to provide e-Services through Social Security Organizations. The way to cope with the problem of planning, reforming and developing the infrastructure for providing electronic services in the social security domain, is in the establishment of an integrated structured e-government development strategy (section2). We continue with the development of this strategy for a Social Security organization in section 3. Section 4 concludes the paper and discusses directions of future work.

2 e-Social Security Strategy and Development Phases

It is true that there are several reviews that demonstrate the fact that there are still a small number of services that can currently be provided electronically and as a consequence there are only a few fully integrated Social Security-related e-Services across

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European countries [3]. Several frameworks have been proposed that more or less follow the four steps of: selecting the proper E-government applications, defining the requirements for implementing the selected applications, defining projects, ranking them, allocating resources to them and planning the implementation of the identified projects [4, 5, 6].

One might, therefore, argue that these frameworks are useful for guiding the process of planning the social Security e-Services as well. However, a drawback of applying them to this domain is that they do not go into the specific circumstances, characteristics and needs [7]. In order to emphasize on the importance of strategic planning in this area, it is necessary to understand the needs of "digital society" such as economical growth, politics in telecommunication, education (for citizens and authorities), and government services.

Trying to develop an e-government strategy for a large Greek social organization we transformed the basic steps above into the following main development phases:

a. analysis of core business processes and benchmark
b. formation of short scenarios
c. evaluation of short scenarios
d. development of action plan

The objective of the first phase is to recognize fruitful areas of developing an e-government service. Focus should be on processes that have a broad economic impact in the organization's operation (both income and payments), address to populous sets of citizens and processes that are resource consuming especially when they bring low added value to the operation of the organization. Benchmark could be a very useful tool, as it gives an overview of similar successful efforts and could illuminate areas that at first glance do not seem interesting.

The second phase aims at the formation of a set of short scenarios that each describes a potential e-government service. The short scenario's description includes the group of citizens to be served, the current business process, the way it is going to be transformed, the legal constrains to be overridden, the data needed for running the service and their origin and finally an infrastructural requirement analysis that identifies the required changes to the technological, organizational and human resource infrastructure that are necessary to be implemented.

Scenario's formation is followed by the phase of evaluation. This is the case of a classical multi-criteria evaluation. As in most information systems the criteria set is a mixture of tangible and intangible concepts, such as the alignment with current strategies of the organization, the readiness of the organization, the citizen's/entities accessibility, the improvement of service level and organization's image, the improvement of the business process and finally the pre-estimated cost of deployment.Top management has to decide the weights to be assigned to each of the above criteria according to the mission and the targets of the organization. After that, a grade could be calculated for each service and all services could be rated in a list.

For services high in the list a detailed action plan shall be prepared in the next phase, while services low in the list will be placed aside for future reconsideration. Each action plan should decompose the service's development into actions needed to address (legal/ constitutional issues, organizational adjustments, development and testing of software, creation and maintenance of databases, communication/ information inside and outside the organization, project management) and concludes to a detailed budget of the service and an estimated time schedule for the development.

3 The Case of e-Government Strategy Development

In general, a typical Social Security Organization performs 5 main categories of activities in everyday operation: collects the employer's and employee's contributions, makes provisions of pensions and benefits, performs payments for health and pharmaceutical expenses, creates and maintain records with adequate data of employees and employers, handles the procurement of office materials, equipments and services.

With the exemption of the procurement area we found all 4 other categories completely fulfilling the criteria discussed in the previous section for the development of short scenarios. By identifying the main transactions in each area we concluded in 9 short scenarios for the development of new e-government services, as follows:

1. Electronic Submission of Contribution Statements (Collection of Contributions)
2. Request and Receive Certificates of Contribution Payments (Collection of Contributions)
3. Electronic Submission of Pension and Benefits Requests (Pensions and Benefits)
4. Information about the elaboration status of Requests (Pensions and Benefits)
5. Request for Expenses Reimbursement (Health & Pharmaceutical)
6. Employer's Access to his Record (Collection of Contributions, Data Records)
7. Employees Access to their Records (Collection of Contributions, Data Records)
8. Change of contact data (Data Records)
9. Request Submission and Receive of Certificates (Data Records)

Scenario's evaluation is directly related with the characteristics of each organization and the philosophy of top management. In our case after discussing with top management, a weight factor of 15% has been decided for the "strategic alignment", "organization readiness", "citizen's accessibility" and "cost development" criteria and a factor of 20% for "service level and image improvement" and "business process improvement" criteria.

Thus 3 groups of scenarios are created, group A consisting of services of high interest and short term development potential, group B of high interest services but medium to long term development potential and group C of either moderate interest or long term development potential. Differentiation generated mainly by the criteria of organization readiness and customer's accessibility.

Surprisingly enough more than half of potential services placed in group A (scenarios No 1,2, 6, 8, 9). Those services mainly support transactions of employers, who already use efficiently e-government services provided by the Greek tax department. Group B consists of two potential services described in scenarios 4 and 7, placed in this group since the current low penetration of Internet in Greece borders the anticipated clientele and does not justify the short term development. Finally in group C placed services described in scenarios 3 and 5, mainly because transactions require a vast number of accompanying papers and certificates, that at the moment could not be sent electronically and traditional mailing would create problems in the process and time delays.

4 Conclusions and Further Research

In order to make e-Government a reality we need major changes in government organization, legislative regulations, technical support and a good strategy to define

which services must be provided in an electronic way and how. We suggested an e-government strategy in four phases in order to have an integrated and applicable way to find, analyze and implement the provision of electronic Social Security related services by the government organizations. We finally implemented the specific strategy in general, in order to come up with a framework applicable to any Social Security Organization.

Of course this work is at an initial stage but it could be the starting point for the development of a strict formal framework, which will take into consideration the specific circumstances, characteristics and needs of a Social Security organization and contributes into filling the void regarding E-government planning without reinventing the wheel. Such a framework could be supported by an intelligent, ontology based system for storing examples of e-Government planning that could lead into a <best practises e-Government repository>.

References

1. European Commission, *eEurope 2005: An Information Society For All,* Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, COM(2002)263 final, 2002.
2. Holden S. and Fletcher RD.: *Introduction.* Government Information Quarterly. 18,75-77,2001.
3. Darrell M. West: *E-government and the Transformation of Service Delivery and Citizen.* Public Administration Review, January/February 2004, Vol. 64, no1.
4. Bowman B., Davis G.B., and Wetherbe J.C.: *Three stage model of MIS planning.* Information
5. Management, 6(1), 11-25,1983.
6. Earl Mj., *Management Strategies for Information Technology,* Prentice Hall, Englewoods Cliffs, NJ, 1989.
7. Wetherbe J.C.: *Four stage model of MIS planning: concepts, techniques, and implementation.* Strategic Information Technology Mlanagement, Idea Group Publishing, Harrisburg PA, 1993.

The Complex Nature of e-Government Projects: A Case Study of Bhoomi, an Initiative in Karnataka, India

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Introduction

The Bhoomi e-government project of Karnataka is fast gaining recognition as one of the best-implemented projects in India. As of this writing, the Bhoomi model of digitizing land records and implementing a system of easy access to records, for verification and changes, is being adopted by the Government of India to replicate on a nationwide basis. This follows a felt need by the government to improve services for the bulk of India's over 1 billion population that is engaged in agriculture. The Bhoomi project is designed for the computerization of land records and all operations that surround it, such as, obtaining a copy of a land record, correction of errors on a land record, the mutation of land records, etc. The process was initiated in 1991 and to date about 20 million land records have been digitized covering the land holdings of some 6.7 million farmers in the state. Bhoomi kiosks are now located in all 177 taluks (a division of a district) of the state's 27 districts.

Bhoomi is one of numerous e-government projects undertaken by state governments in India, over the last decade, to introduce transparency and efficiency in government functioning. Such ventures are designed to enhance convenience in dealings with the government through easier, faster and smoother alternatives available to citizens. Bhoomi was chosen as a model e-government project for this study for the following reasons: 1) Bhoomi has the most comprehensive backbone application of all the projects. 2)Bhoomi is a self-sustaining project, where the sum of Rs 15 charged for each transaction generates an annual revenue of over Rs 10 million which is sufficient to cover the operating costs of the project. Further, the state government has passed legislation outlawing manual records. 3)Bhoomi's success has gained international recognition and it was awarded a Silver Medal in the CAPAM (Commonwealth Association for Public Administration and Management) International Innovations award in the year 2002.

Bhoomi computerizes records of Rights, Tenancy and Cultivation (RTC), a document that establishes ownership, records succession of ownership, and crop details. RTC documents are used by farmers while seeking loans, getting scholarships for children, bail applications and crop insurance applications. The

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manual system that Bhoomi replaced required the farmer to find the village accountant (VA), set up an appointment, make the request, pay the requisite fees and bribes, and then wait several days to obtain the document. In the Bhoomi system the farmer approaches the Taluk kiosk for the RTC, makes a request by providing necessary information to the kiosk operator. Once a request is received, the relevant record is retrieved from the system. The main difference to the farmer is the speed at which his record can be retrieved, verified and printed (15 minutes on average), on Bhoomi as opposed to the manual method (several days on average). Independent sources who have verified Bhoomi's usage through direct evaluation reported that farmers found the system to be easy to use and access, had fewer errors in their certificates and saved time in getting their records. Users also saved money in lost wages and bribes.

Complexity and Contradictions in the Bhoomi Project

Bhoomi's eventual success is not without contradictions and compromises built into the governance mechanisms. Some complex issues that arise are: 1)The digitized and databased land records are maintained in each district and any farmer can access his or her information for a nominal fee. This introduces transparency in the information related land records. However, there is no restriction on who can have access to the land information. This is a breach of privacy and could lead to misuse. 2) The process of digitization reduced the discretion of the village accountants. Their traditional base of power and prestige was ruptured by the Bhoomi system. Yet, the system designers did not eliminate the village accountants entirely. They still provide the crop updation data to the system and are key entities in the process for land mutation. 3)Bhoomi is a silo application. It was funded, staffed and promoted by the Revenue Department of Karnataka, and other departments did not participate in its design nor do they use the data available in the system. 4) One of the problems the Bhoomi project had to face was that of errors and systematic inequities that had entered the land records over the decades for which they had been maintained. The approach of the team was to ignore these problems, as they could only be addressed by a court of law. 5) The Bhoomi project did not include the digitization of maps of the farming lands and the management of these maps remains a manual process. Also, the updation process for the maps is back-logged by a few years. This is a serious impediment to the widespread adoption of Bhoomi as an over-arching land governance system for Karnataka.

Bhoomi, clearly, is not without its contradictions. Although it is a silo application that no other government department uses and one that encrusts historical inequities, yet it delivers a powerful, disruptive technology that enables governments to implement changes in existing power hierarchies. Bhoomi's main contribution is in bridging the digital divide, providing the power of digital technology to 6.7 million farmers in Karnataka and enabling, through advancements in kiosks, to package further services.

The Future of e-Government: Collaboration Across Citizen, Business, and Government

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Abstract. Governments in many countries have been implementing e-government for the purpose of better service delivery to citizen, better environments for businesses, and more efficient and transparent public administration. However, most implementations of e-government have provided temporary approaches rather than holistic view for citizen-oriented service level. In this paper, we intend to suggest three main directions that must be taken for better e-government in the future.

1 Introduction

With dramatic developments in information technology, many governments worldwide are busy in allocating resources to establish e-governments. e-government is commonly defined as "the use of information technology, in particular the Internet, to deliver public services in a much more convenient, customer oriented, cost-effective, and altogether different and better way"[1]. An e-government initiative is thus recognized as a key strategic requirement for a knowledge-based society in the 21st century.

In this paper, considering the definitions and goals of e-government, we aim to suggest some important strategies for future implementation of e-government.

2 Future Directions for Implementing an Advanced and Matured e-Government

2.1 Knowledge Management and Collaboration in Public Administration

Thanks to a remarkable development of information technology, modern citizens increasingly become to want local and central government offices to provide faster, more convenient, consistent and efficient service at lower cost. Moreover, in order to improve a citizen-oriented service and become a productive, effective, efficient, and transparent e-government, the knowledge management system (KMS) is regarded as an essential part for e-government operations.

[1] Holmes D, "eGov: eBusiness Strategies for Government", Nicholas Brealey Publishing, 2001.

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For more citizen-oriented services, e-government must construct a linkage between public authorities in the same tier of government as well as between the different tiers of government. Without doubt is collaboration in public administration – across internal, local and central government authorities – the key factor to implement a successful e-government and develop continuously toward a better e-government.

2.2 Introduction of e-Business Approach

With the successful commercialization and expansion of e-business, a new relationship between government and business sector has been emerged.

One of the examples for e-government to follow e-business is one-stop service portal site. One-stop service portal means that different public authorities and agencies provide electronic services and information through a single point of access –just one portal site. Online one-stop service of e-government requires that all government authorities must be interconnected and integrated.

2.3 CRM Strategy for Citizen-Oriented Services

CRM (customer relationship management) in government is a relatively new concept and has gone largely unexplored. By introducing the CRM concept to e-government, citizens would be regarded as "customers" who become the focus in designing government service delivery. CRM makes government agencies to create an integrated view of the citizen and to utilize this information to coordinate services across multiple channels.

Creating a citizen-focused e-government with CRM strategy must include administration process reengineering, organizational change, internal incentive program change, and a totally reformed government culture.

3 Conclusion

E-government requires an overall view of the governmental organization, social communities, their culture, systems, processes, and stakeholders – that is, citizen, business and government. The success of e-government depends on the positive participation and close collaboration within and across citizen, business, and government. In this study, knowledge management and collaboration, e-business approach and CRM concept has been suggested as three main directions for developing successful future e-government.

Framework for the e-Government Jigsaw Puzzle, a Policy Implementation of Infra-e-Service on National Basis

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Abstract. The objective of this paper is to describe and analyze the implementation of the Swedish e-Government policy. The problem to be solved by the government is to avoid problems and hindrances for rapid implementation. The Swedish government has not set up any quantitative goals for the implementation. Instead the government has used indirect methods of national framework agreements. The Swedish Agency for Public Management (Statskontoret) has made a procurement of a framework agreement of infra-services. The private market shall under a framework agreement offer e-services as ASP-solutions that will facilitate rapid implementation of e-Government in national-, regional- and local authorities. The intention by this is to lower the government's initial investments for implementation of the e-services and instead pay for use of the services.

1 Introduction

In Sweden there are three categories of governments – central governments, regional/county governments and local governments. The progress of implementation of e-government services in Sweden is most significant on the central government level. Examples of central governments with extended e-Government services are the National Social Insurance Board, Swedish Custom and Swedish National Tax Board. The main part of these e-services is implemented as traditional internet based ICT-solutions where the governments often have invested large sums in the development of the services. The implementation of e-Government services at regional/county- and local government level is much more complicated even if the local governments are obligated to offer practically identical services towards the citizens. The challenges are most significant at the local government level since there are 290 local governments[1].

2 Problem Definition – Main Problems and Hindrances to Be Solved

The economic situation: Most of the regional/county governments and local governments have difficulties with the economic balance. This have a big impact on their

[1] They are all free to decide *if, how* and *when* they will implement e-services.

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ability to make the necessary investments in IT-platforms and IT-solutions for e-government services. Solutions that minimize the investments will greatly improve the speed for implementation. *Lack of e-services that could be commonly used by the main part of the governments*: So far, most of the e-services that have been developed are tailor-made for a specific purpose for a specific government. This has resulted in expensive solutions and the solution could not be easily implemented in other governments. *The incentive to implement e-services:* There is no clear common conception what measurable benefits/effects/impact the individual e-services have. It is important to benchmark the effects and publish the results[2].

3 The Swedish e-Government Policy – The Framework for the e-Government Jigsaw Puzzle

One solution to accelerate the implementation of e-government services at all governmental levels is to let the market offer a set of standard e-services as ASP-solutions that could be implemented by most of the governments. Instead of making extended investments, the government is able to pay by use for a specific e-service. This is the core content of the Swedish eGovernment policy. This option is called *infra services.* The infra services are divided in *basic infra services* and *extended infra services.* Basic infra services are used partly to establish secure communication between authorities, partly for e-identification and e-signing when the citizens use e-services that requires a high level of integrity. Extended infra services offers are range of internal and external e-services that facilitates the work and workflow of the government. An important feature is that the work-flow is integrated in the www-portal. This gives a transparent government where citizens can follow what happens in the inner bureaucracy. Some of these e-services are today established within a government with different solutions, resulting in an inefficient overall solution.

The Swedish Agency for Public Management has made a procurement of a framework agreement of infra-services. The contracts are signed and two service suppliers are contracted[3].

The Swedish national framework agreement will be evaluated in the future and just now it seems possible that it will give significant contributions to the deployment of EGovernment in Sweden. The critical factor is the speed in business-cases and generated profits for the framework suppliers.

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[2] In the region of Sörmland with 256 000 citizens, the yearly hours used for custom related processes is estimated to 2.2 Million hours. The saving effects of implementing extended infra services are up to approx. 0.5 Million hours (21 %).

[3] The government in rule estimates the use of e-services to approximately 100 Million EURO for the next four years.

Composition of e-Commerce and Geographic Information Services for Emergency Management

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Abstract. Government agencies with a need to create emergency management applications within time constraints may find attractive the flexibility of the web services paradigm. The ACE-GIS project[1] has the goal of providing a platform to allow software developers to compose WS applications which include discovery and processing of geographic information, critical to decision-making where location is of prime concern. This brief paper describes the architecture developed and a representative use case.

1 Introduction

Geographic information - primarily digital maps and satellite imagery - is a key data source for decisions-makers during emergency planning and response. This information traditionally has been processed in geographic information systems (GIS) designed as monolithic software packages, which have been painstakingly implemented to solve rather static problems on rather static data. Emergency events, however, are not static events requiring archived data, rather, in many cases they are surprise events catching responders off-guard and requiring real-time data and custom processing. The web services paradigm promises flexibility in this regard: that programmer-users will be able to search the net for available data and processing services, bind them and, thus, produce custom software solutions for the special case at hand. Additionally, after an emergency management event is terminated, the custom services may be unbound and discarded, no long-term investment having been made. The ACE-GIS project provides a multi-tool platform for composing web services, and its initial pilot focuses on emergency management applications.

2 Geographic Information Services

In the web services domain geographic information services are normally applications implementing one of two major interface specifications of the OpenGIS Consortium (www.opengis.org): Web Map Service (WMS) and Web Feature Service (WFS). These services have become staples of major e-government portals such as the US

[1] The ACE-GIS project is partly funded by the European Union (IST-2001-37724); project partners are listed at www.acegis.net.

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GeoSpatial One-Stop (http://www.geo-one-stop.gov/) and the European Commission's EU-Geo-Portal (http://eu-geoportal.jrc.it/), designed to promote sharing of geographic information normally locked in public sector archives [1]. Such standalone web services have been successfully implemented in smaller jurisdictions as well, however a major challenge facing developers of emergency management related applications is the need to chain multiple services, to discover and display complex information on the screen. These chains must contemplate non-geoinformation services as well, such as e-commerce or semantic web services.

The use case for ACE-GIS is a hazardous gas release at a chemical plant, where the user wishes to view the probable gas plume overlaid upon a map of the region affected. The user finds (registries) and binds (workflow and composition tools) meteorological services with map services to create the information product desired from external data and processing sources.

3 ACE-GIS Tools

Two development platforms have been created, one for web service developers and one for technical end users (a technician working at the Red Cross, for example). Given the desire to promote Model Driven Architecture (see www.omg.org) a UML Model Transformation Tool (UMT) was created to allow models to generate workflows and eventually code. The Workflow Engine component facilitates the composition process, both for service development testing, and for end-user testing. A second composition methodology has also been incorporated, for cases when an incremental composition process is desired [2]. To be able to add semantic details to the workflow description DAML-S based tools have been created. UDDI and other registries have been tested, and the ACE-GIS architecture allows several implementations in this e-commerce arena. Conformance testing engines have been made available on-line. Many of the tools are available under free software licensing.

References

1. European Union: Directive on Reuse of Public Sector Information. Multilingual versions available at http://europa.eu.int/information_society/topics/multi/psi/library/index_en.htm (2002).
2. Granell, C., Poveda, J., Gould, M.: Incremental Composition of Geographic Web Services: an Emergency Management Context. In Proceedings 7th AGILE Conference on Geographic Information Science, University of Crete Press, Crete, Greece. (2004) 343-348.

Initial Experiments on the Effectiveness of Telephone Access to Government Services

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Abstract. We report on research aimed at gaining an improved understanding of how issues such as language, literacy and previous exposure to technology affect citizens' ability to access government services of different complexity via ordinary telephony. We discuss user interface issues in conditions of low literacy and where previous exposure to technology is low. The results are based on field experiments with citizens using a real government application. The experimental set-up is described and the experimental procedure and results reported.

1 Introduction

Full access to government services require alternatives to web based e-government services. In the developing world, access through ordinary telephones are particularly important due to the relatively high levels of access to telephones as well as the relatively low levels of infrastructure and user sophistication at which such services can operate [1]. We are researching electronic service delivery in a developing world context. Our research is aimed at understanding how to implement telephone based services in a multilingual, multicultural environment with varying degrees of literacy, numeracy and technological sophistication. To this effect we are conducting a series of field experiments based on a government application.

2 Experimental Approach and Results

The objectives of the experiments were to improve theory on the use of user experiments, develop design guidelines and develop an ability to predict the success of voice based government services based on biographic details of target populations and complexity of the application/service. The experiments were based on telephony interfaces to an application forming part of the Unemployment Insurance Fund (UIF) claim process [2]. Dual Tone Multi Frequency (DTMF) and Wizard of Oz [3] based voice recognition system versions of the system were implemented in English and two indigenous local languages: IsiZulu and Setswana.

Each experiment consisted of pre- and post-experiment interviews and an observed experiment. The experiments were performed at the Department of Labour in Preto-

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ria, South Africa, in November 2003. Unscreened participants were solicited from the queue of UIF applicants. 14 callers used the speech-input system, and 16 callers used the DTMF system. The majority of the participants were home language speakers of the Sotho family of languages (Sesotho, Sepedi or Setswana) preferring to use the Setswana version of the systems. Male and female users with various educational levels ranging from 25 to 54 years in age participated. Most participants had previous exposure to technology.

The experiment did not lend itself to detailed statistical analysis of system usage and success. However, a number of conclusions were reached. Although transaction-completion rates were comparable for the speech-input and DTMF systems, users were much more comfortable with the speech-based system as reflected in somewhat higher user-satisfaction scores for that system. Transaction times and the number of user errors were not significantly different between the two experimental conditions. Many users had significant difficulties with the entry of long numbers. Most users found the applications challenging to use resulting in significant baseline cognitive loading, especially in the DTMF application. Even though the experiment had been designed for users with limited literacy, the design was still too complex for most users.

3 Conclusion

Our experiments suggested enhancements to our experimental procedure, and we are currently designing a follow-up experiment that will be used to investigate the validity of the conclusions derived, as well as other issues. From these experiments, we hope to derive a general model that will allow us to predict the success of telephone-based applications for various classes of users. This research will hold application not just for government service delivery but also in financial and other services sectors. This research will stay relevant due to the continued importance of speech interfaces and the fact that speech access is likely to remain easier than other forms of phone-based Internet access.

References

1. Etienne Barnard, Laurens Cloete and Hina Patel, *"Language and Technology Literacy Barriers to Accessing Government Services",* Proceedings of the 2nd International Conference, EGOV 2003 Prague, Czech Republic, September 2003, pp 37 – 42.
2. South African Department of Labour, http://www.labour.gov.za/
3. Dey, Anind, Lara Catledge, Gregory D. Abowd and Colin Potts. *"Developing Voice-only Applications in the Absence of Speech Recognition Technology,"* GVU Center, Georgia Institute of Technology, Technical Report, GIT-GVU-97-06, February 1997.

A Process Support System to Coordinate Societal Decision Processes

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Abstract. Emergent technologies have the potential to broaden democracy by facilitating conventional interactions between electors and authority, but this aim can also be achieved through facilitation of public participation in decision making. This work proposes the use of a framework for engaging local government agencies, stakeholders and citizens in societal decision processes through technology.

Context

Citizen interaction via the internet is really in its infancy and thus the opportunity is available to widen the scope of such interaction from one of information and service provision to one of citizen participation in complex decision processes. Many Decision Support Systems are available for assisting in different aspects of decision making, however so far none take cognisance of the organisational processes in which decisions are made (Papamichail & Robertson 2002). The proposed framework (Papamichail & Robertson 2003) is an enactable model of such a process.

This framework has been informed by a Case Study which reviewed the coordination and decision making in a government agency involved in a major flooding incident. The lessons learnt relevant for technology support were:

- It is essential to maintain contact details up to date.
- There is a massive demand for information: a resource such as a Call Center is essential for dissemination.
- The emergency team must have a culture of trust, and must know the plan by heart: during an actual emergency, there is simply no time to look up references.
- Situations change quickly, and so plans have to be contingent.
- It is difficult to envisage the outcomes of decisions. Visualisation of potential situation developments would be very helpful.
- Turnover of staff results in knowledge loss and thus a clear need for managing information and resources.

Consideration of these conclusions indicated that a number of technologies must work effectively and in concert for the period of the emergency and thus that a process model could provide the appropriate balance between prescription and flexibility.

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The Process Framework

Process modelling facilitates the analysis and understanding of complex processes (Warboys et al, 1999). It has been used in our study to represent decision processes at a high level, analyse them and execute them using process support technology. This is a technology intended to support the co-ordination of activities in an organisation.

We have proposed the D2P (Decisioning for Decision Support) framework for co-ordinating complex decision processes in an organisational context. The framework decomposes decision-making behaviour into the following interdependent components:

- *Formulating.* Constructing the decision model from stakeholder input and public consultation.
- *Evaluating.* Assessing alternative plans according to agreed criteria.
- *Appraising.* Reviewing of the assessments, and commitment to action.
- *Doing.* The actual implementation of the solution, and the generating of feedback.

The case study highlighted the need to bring a range of technologies seamlessly into the decision-making process. The enactable process model that is the framework will serve to integrate a number of the technologies viz:

- *Simulation and decision aiding tools.* To explore the implications and robustness of mitigation strategies.
- *Emergency planning and mitigation plans.* Codified in the form of process models.
- *People-finder database.* To ensure high quality contact data.

Societal decisions are complex processes and the D2P could help city authorities before, during and in the aftermath of incidents by making accountability more transparent, improving responsiveness to stakeholder views and values, and generally improving services.

References

1. Papamichail, K.N. and Robertson, I. Supporting Societal Decision Making: a process perspective, Journal of Multi-Criteria Decision Analysis, 12 (2003) 203-212.
2. Papamichail, K.N. and Robertson, I. Integrating Decision Making and Regulation in Management Control Processes accepted for Omega, (2002).
3. Warboys, B.C., Kawalek, P., Robertson, I. and Greenwood, R.M. Business information Systems: a Process Approach, McGraw Hill (1999).

A Generic Architectural Framework of Municipal Information Systems: A Vision

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Abstract. This paper describes a concept of municipal information systems envisioned as a generic architectural framework consisting of multilayer distributed software components and services, accompanied by a knowledge based repository and a set of standards for integration and interoperability. The main benefit of the proposed MIS architecture lies in its flexibility and adaptability to technological and organizational changes stemming mainly from the synergetic utilization of emerging IT initiatives.

1 Introduction

This paper describes a generic architectural framework of municipal information systems (MIS), which has been proposed in a project dealing with the global IT strategy for municipalities in Serbia[1]. To include in e-Government the full enabling potential of IT [1], the proposed framework exploits emerging IT initiatives such as OMG Model Driven Architecture (MDA), Aspect Oriented Software Development (AOSD) and Peer-to-Peer (P2P) computing.

2 Description of Generic Architectural Framework

The framework is envisioned as a multilayer architecture of distributed software components and services, accompanied by a knowledge based repository and a set of standards for integration and interoperability (Fig. 1).

The *Common Objects* layer, built on top of the *Software Infrastructure* layer, consists of a collection of software components that implement objects commonly needed across MIS (*Citizen, Legal Party, Spatial and Territorial Unit,* etc). Software components and application frameworks from the *Business Processes* layer capture common functionality needed for reuse in most MIS applications. The *Programming Systems* layer is the top layer of the architecture consisting of software packages implementing a specific MIS domain.

The *Repository* is a specific component crucial for achieving adaptability, flexibility and interoperability of the whole architecture. It is envisioned as a knowledge base

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storing ontologies and meta data encompassing all levels of the OMG MDA [2], and enabling thus the whole MIS architecture to be a model driven one. In addition, the repository supports AOSD approach, i.e. separation of concerns in modelling (describing) MIS components and objects. Moreover, it permits the modelling of objects from different aspects using different ontologies, since there is usually no "best ontology" for a specific aspect. In this way, another dimension of flexibility is achieved as components can implement only certain aspects.

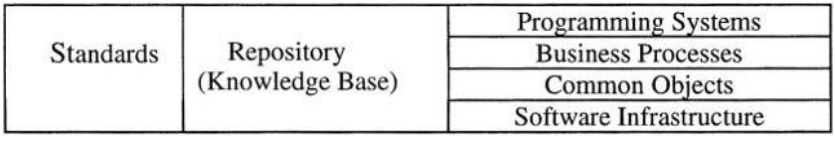

Fig. 1. Structure of MIS Generic Architectural Framework.

The framework assumes that the collaboration between MIS and their surroundings is based on P2P computing. In other words, together they form a highly decentralized complex information system consisting of peers that are autonomous in providing services and in possibly creating and using different models and ontologies.

3 Conclusion

The main characteristics of the proposed MIS architecture would be its flexibility and adaptability to technological and organizational changes. However, this vision faces many new challenges:

- Development of and interoperability between components that operate using different models, cover different aspects and execute in different implementation environments;
- Objects scattered over a network of peers where each peer has its own view of them from different aspects (possibly described using a different model and ontology);
- Mediation, mobility, synchronization and versioning of both data (persistent objects) and meta data;
- Support for global (long) transactions and business processes running across ontological and platform independent peers.

References

1. Lenk K., Tranmüller R.: Electronic Government: Where Are We Heading?, Proceedings of EGOV 2002, Aix-en-Provence, France, September 2-5, 2002.
2. OMG: Model Driven Architecture, www.omg.org/mda/

Trade Unions in e-Democracy

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Abstract. Trade unions (TU) seem to adapt very timidly and slowly to e-democracy. Electronic and networked communications challenge trade unions to develop new organizational methods of servicing their members' needs. Workers access their own e-mail in the workplace. The use of corporate intranet by TU of private as well as of public sector is becoming a legal possibility in many countries. More over, some national or international trade unions, as Connect in Great-Britain, "//syndikat" in Switzerland, a new international federation called "Union Network Organization" since 2000, are on-line and use ICT (Information and Communication Technology) to build networks with affiliates. This paper analyses these transformations and their reality in a society which both connects people and destroys social links at the same time. First, it presents the state of electronic communications' use by trade unions: the legal aspects and the apparition of new unions. Second, it examines the capacities of ICT to support trade union activities and, especially as a support to voting in professional elections.

Access to Internet by companies and network of public administration through policies of e-government have led the private sector as well as the public sector to offer their employees access to the network (intranet/internet). Generalization of corporate intranets and e-mail in the working environment has triggered legislation on the rights of trade unions to use the network in order to communicate with its members. In many countries decisions are made on this subject as the use of electronic networks develops.

Access to the internet/intranet network is strategic for trade unions. It can be a factor of change in the following areas:

- The strategies of recruitment of the union members, specifically among groups of workers who have been historically outside the union movement. It may be possible to involve workers, who find themselves cut off, e-workers, to keep in touch with dismissed workers...;
- Services offered: informing everybody in real time about laws and current debates; generalized training (by e-learning);

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- Methods of mobilizing workers for action;
- International relations between union members and trade unions in international federations. Globalization means that companies are more and more international. An adaptation of trade unions to global corporations might protect the rights of the workers in the same way everywhere and would allow mobile workers to be better informed;
- Democracy: do e-networks allow their members to participate further in the decision-making process? Are they consulted more? Can e- voting be a progress in this context?

The numerical weakening of trade unions is not only a result of loss of interest. Trade unionism is unable today to attract unemployed people, precarious workers, isolated workers (for example e-workers), employees of small and medium-sized companies even though these categories of workers reincreasing in number while important workers' collectives are being dismantled. The sociological structure of workers has changed. The ideological crisis (related to the end of the Soviet empire and what it represented) did not give place to new models of thought. As a consequence of globalization, many workers have become employees of multinationals or companies not able to exist without an international market. It has modified their class consciousness, their feeling of belonging to a homogeneous collective having common interests.

Faced with this situation, the generalization of the ICT and network communication via internet begs questions about the possible consequences of this technological revolution for trade unionism and generally for the different forms of labor mobilization. We examine this question, in the paper, while explaining first of all, how the practices of ICT have changed the trade union world. Then we show how the law is trying to answer it.

The real changes come from "e-union". These changes lie in a redefinition of the TU's role. E-unions act as a social agency providing training and support to members. This reduction of the collective strength designed for social struggle is supposed to "empower" members. They are considered, in the same time, as a communication instrument to campaign and to inform on workers problems.

For traditional unions as for e-unions, Internet and ICT create new means of mobilising. Internet allows individual initiatives to gather without a hierarchical organization which guarantees unity and coordination of actions. Internet appears also to be a "weapon" in industrial disputes: cyber picketing, strike website, union provision of online information about the dispute. National laws have to deal with these practices and they are sometimes favourable to workers in strike [4].

ICT modify union practices and facilitates the emergence of new actors (e-unions, cyber-unions) so that law is required to adapt. Known legal principles (privacy's protection at workplace, secret of mailing) don't respond to the new situations generated by ICT. While it is in progress, workers and unions and employees adopt specific agreements and charts depending on the company or the administration concerned. This "experimental system'" is built from national legislation. However, as soon as it is integrated in law, it has to face a supranational legislation. The key problem becomes: what is the relevant level to adopt a coherent ICT law within a nation based frame.

References

1. Castells, M.: *La Galaxie Internet* (French version). Paris: Fayard 2002 (for the french version; 2001 for the english one).
2. Castells, M.: *The Power of Identity,* Oxford: Blackwell 1997
3. O'Leary Stephen D.: "Falum Gong and the Internet", *USC Annenberg Online Journalism Review* 2000
4. Bibby Andrew: "Int.Unity. Building up an International trade Union Community in the Net". Report available from: www.andrewbibby.com
5. Cockfield Sandra: "Union Recruitment and organizing on the world wide web", Working Paper 23/03, May 2003, Faculty of Business and economics, Monash University, Australia.
6. Darlington Roger: "The Creation of E-Union, the use of ICT by British unions", revised 9 May 2003: www.rogerdarlington.co.uk
7. Shostak, A.B. (1999): *Cyberunion: Empowering Labor Through Computer Technology,* M.E. Sharpe, Armonk, New-York.
8. Shostak, A.B (2002): "Today's unions As Tomorrow's CyberUnions: Labor's Newest Hope", *Journal of Labour Research,* v.XXIII(2), Spring, pp.237-248.
9. Ray Jean-Emmanuel (2001), *Le Droit du travail à l'épreuve des NTIC,* Coll. Droit vivant, Ed. Liaisons, Rueil-Malamaison, 269 p., (2e ed.).
10. Delbar C. , Mormont M., Schots M., Institut des Sciences du Travail, "New technology and respect for privacy at wokplace", European Industrial Relations Observatory On-line, 2003, Report available from: www.eiro.eurofound.eu.int/2003/07/study/index.html
11. Fréchette M. "L'internet syndicaliste: État des lieux", *La Chronique de l'Itinérant électronique, Le cybermagazine des travailleurs et des travailleuses,* Vol 4, n° 17, 7 juin 2001: Available from: www.itinerant.qc.ca/arch2001/2001-06-07.html
12. Ward S. & Lusoli W.: "Dynosaurs in Cyberspace ? British Trade Unions and the Internet", 2002, p. 8: paper presented at the Politial Studies Association 2002 Conference, Aberdeen (UK), 5-7 April 2002. Paper re-drafted and published in the *European Journal of Communication,* 18 (2), p147-179
13. Lee E.: "Trade unions and the net": from: www.labourstart.org/eiarticle.shtml; this article appeared in the *Education International's quaterly magazine,* probably May 1999
14. Mekhantar J., Favier L.: "E-democracy at e-voting age. Experimentations, meanings and role of e-voting in e-democracy theorization." In: IIAS Séoul (Corée - Korea) International Institute of Administrative Sciences (HAS) Twenty-sixth International Congress of Administrative Sciences on E-Governance14/07/2004 -18/07/2004: *Challenges and opportunities for democracy, administration and law*

Knowledge and Boundaries in e-Government*

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Abstract. The new challenge for PAs is based on the exploitation of their knowledge resources in order to improve internal processes and to offer better services. This brief contribution suggests that a useful approach to knowledge issue in PAs lies in the analyses of the dynamic coordination of intangible assets produced near CoP's borders.

Community of Practices and Borders

Our analyses begin from Wenger's (1998) work on community of practices (CoPs) and her definition of boundary. In his analyses the term "boundary" is seen as discontinuities between communities created by differences in their practices, history, and language. At the same time CoPs are also able to establish connections with other groups, through two different processes: participation and reification. These processes could contribute both to the continuity and to the discontinuity of a boundary. In other terms, they could reinforce the identity of each single community (hence the boundary is more evident) or they could provide a form of coordination among these CoPS (e.g. through boundary object and brokering).

Several authors stressed the idea that the relationship between an organizational network structure and knowledge issues is particularly strong and interesting. Huge support for that idea can be found in Carlsson's work (2001): "KM has to become network-focused if knowledge intensive firms are to gain and sustain competitive advantage from KM". Moreover Kogut (2000) suggests that, in a network, the membership generates value for the organization not only assuring the access to information, but constituting in itself capabilities to support coordination and learning among different members. We will follow their network-approach in a specific way; stressing the importance of the boundary between the different nodes of the net. As Brown and Duguid (2001) suggest: "Practice creates epistemic differences among the communities within a firm, and the firm's advantage over the market lies in dynamically coordinating the knowledge produced by these communities despite such differences." (p. 198). We can see communities of practices as nodes (connected or disconnected) of a net with different levels (individual, communities in a firm, or different organizations in a market). We believe that to exploit knowledge we have to pay particular attention in analyzing the boundaries between these community and the connections

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that can cross them. Following this concept, PA could increase value of its services adopting strategies and processes that could improve and increase the connections among different parts of administration and different communities.

2 The PA's Challenging

Friis (2002) suggests that the new e-Government paradigm should become founded on some shared points: 1) services focused on the citizens' requirements and needs; 2) integrated structure that could assure a strong link among different administrations, their activities, processes and services; 3) a real and radical BPR (Business Process Reengineering) in order to change not only the technological aspects, but also the organizational processes inside PA. It is easy to observe the tendency to facilitate communication between administrations, to reduce the waiting time citizens spent, to delocalize services, to increment integration among the different parts of the PA, and also to share knowledge, information and best practices. The new public organization needs ample access to remote information and knowledge resources in order to facilitate the delivery of citizens' oriented services, a more efficient and effective communication and cooperation among administrations, and a support for complex administrative decision-making. Naturally, to develop these transformations, the PA must rethink not only its processes and its services, but also its structure.

It could be a key issue for e-government projects to analyze the boundaries among CoPs in the PA and their coordination trough different kind of connections. In that way e-government's aims could be not only the introduction of new technology in the same traditional processes, but the improvement of PA's activities exploiting internal knowledge.

3 Conclusion

This very brief document would suggest a perspective focused on "boundary and connection" among communities. Moreover this work would combine some characteristics of network based analyses with the CoPs' works. Such approach could be very useful in understanding the new challenge for PAs based on the exploitation of their knowledge resources. A consistent number of interesting questions is still open. The paper represents a first step in a national research project, and it needs empirical evidences to be improved and validated.

References

1. Brown, J.S. and Duguid, P.: Knowledge and Organization: a Social-Practice Perspective, Organization Science, 12(2), (2001) 198-213.
2. Carlsson, S.A.: Knowledge Management in Network Contexts. In Proceedings of the 9th European Conference on Information Systems (ECIS-2001), Slovenia (2001) 616- 627.
3. Friis, C.: Knowledge in Public Administration. In Proceedings of the Workshop on Knowledge Management in e-Government '02 (KMeGov'02). Copenhagen (2002)
4. Kogut, B.: The Network as Knowledge: Generative Rules and the Emergence of Structure, Strategic Management J., 21, (2000) 405-425.
5. Wenger,E.: Communities of Practice. Learning, Meaning and Identity, New York: Cambridge University Press (1998).

Law, Knowledge and Mobility in Local Planning

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Abstract. Interpretation of the law is important in the administrative decision-making process in local municipal planning, which is a co-operative process. Local mobility also plays an important role. A study of work practice highlights the need to take this into account when designing support for decision-making processes.

Introduction

A study of a municipal planning department illustrates some of the problems of designing computer support for e-government, and specifically for e-administration. The study had as its starting point the tradition of Participatory Design, which deals with enabling users to participate in and influence system design [3].

The situation studied is dependent on cooperative and distributed work, on distributed, situated and implicit knowledge, and on local mobility[1]. This raises questions regarding the role of law and knowledge in the decision-making process. These questions are important to take into account when designing support for governmental work.

e-Government and Public Administration

The use of IT in public administration has mainly benefited routine back office operations [2], and there is often an assumption that back office work merely involves routine service delivery. It is however important to take into account the role of law and knowledge in the decision making process, as legal norms are often far from clear, and serve rather as guidelines to be interpreted and considered when making decisions [3].

Law, Knowledge, Mobility and Workplace Studies

This study showed a decision-making process that was regulated by legal provisions that were interpreted in a process requiring situated knowledge of the law and of local conditions. The work was characterized by distributed knowledge and collaboration. The collaboration was seen as troublesome, as different work practices clashed, leading to breakdowns in the work process.

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Neither was knowledge limited to knowledge of the law. A decision concerning an application for planning permission led to the staff, based on their contextual knowledge, taking initiatives to make changes in a Detailed Development Plan – an instrument for the municipality to realize a local building policy. This was not simply a case of following rules, but was based on situated and distributed knowledge. The resulting cooperative work was influenced by a form of "local mobility" [1] that must be allowed for when designing for e-government.

Conclusions

The decision making process was found to be a cooperative and distributed process, affected by local mobility. It was a matter of interpreting guidelines in a process based on a situated knowledge of the law and of local conditions. The best way to support this process may be to support the cooperative and distributed aspects of the work. To do this it may be advantageous to perform close studies of actual work practice, and to involve the users in a process of Participatory Design.

References

1. Belotti V, Bly S, (1996) Walking Away from the Desktop Computer: Distributed Collaboration and Mobility in a product Design Team. In: CSCW'96, Cambridge MA USA, ACM 0-765-0/96/11,pp 209-218
2. Lenk K, Traunmüller R, Wimmer M, (2002) The Significance of Law and Knowledge for Electronic Government. In Grönlund Å (ed) "Electronic Government - Design, Applications and Management", Ideas Group Publishing, pp 61-77
3. Schuler D, Namioka A, (eds) (1993) Participatory design: Principles and Practices, Lawrence Erlbaum Associates, Hillsdale, New Jersey

Towards the Idea of a One-Stop-Administration: Experiences from the Reorganisation of the Register of Companies in Luxembourg

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Abstract. One of the central ideas of E-Government is to facilitate access to public agencies using the aid of ICT. But technology is just one element. Many E-Government projects have to cope with the integration problems related to inter-administration processes. This is what "One-stop-administration" means. The change management of this integration work is a demanding challenge. In a three years project that was scientifically supported by the CRP-Gabriel Lippmann, the Luxembourg Register of Companies was fundamentally transformed from an antiquated paper-based administration into a modern private organisation. At the same time, first steps towards the realisation of a "one-stop-administration" for enterprises were taken. This article will deal with the experiences won and problems faced in this project.

Introduction

With a population of about 450.000 and a surface of $2.500 km^2$ Luxembourg may be regarded as a small country. Yet it is comparable to its bigger neighbours in terms of the presence of all public agencies necessary to organise a modern state. Whereas all levels of public administrations are represented, the number of instances of these administrations is significantly smaller than in bigger countries. This allows the realisation of interesting E-Government projects that might have a model character and could serve as an example for similar projects.

Motivation of the Project

During the 1980s and 1990s, Luxembourg's economy achieved high rates of growth – it has doubled its GNP from 1990 to 2000. This development is also reflected in the statistics of the (now former) Registers of Companies (RCS[1]) of the country. In the aforesaid period, the number of new companies registered also doubled (actually, about 6.000 new companies per year are registered).

[1] Registre de Commerce et des Sociétés.

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The paper-based register could not cope anymore with this augmentation, due to its internal organisation, an insufficient efficiency of its procedures and especially the total lack of any ICT support. Quality and the response times of the services became intolerable for the clients and the economy as a whole. For example, it took up to several months to have a certificate of registration.

But within the administrative part of the formation of a new company, the registration at the RCS is only one step. Depending on the legal form and some other parameters, nearly a dozen organisations take part in this process. Nevertheless the RCS collects an important part of the data involved.

Hence, besides the intra-organisational reengineering of the RCS, the simplification of the overall process of the formation of a company became the second main focus of a project that was started 2001 by several partners under the coordination of the Ministry of Justice of Luxembourg.

Re-organisation of the RCS and Steps Towards the One-Stop Administration

One of the key success factors for the project was its political support. Fortunately, the Ministry of Justice was very open-minded to completely change the operating model of the RCS. A bill was created to set up a new private company which should replace the two district registers run by the district courts and controlled by the Ministry. This legal form chosen was a so-called "Groupement d'intérêt économique" (GIE). The group consists of the Ministry of Justice and the two professional chambers. The new IT of this group is provided by the "National Centre for Informatics" (CIE) and was co-developed by the CRP – Gabriel Lippmann.

This specific construction allowed at the same time maintaining public control over the Register and attaining the high flexibility of a private organisation.

The group was set up before the law could pass, in order to begin the voluminous preparation work as early as possible.

Before the new RCS could become operational, a complete business process reengineering was effectuated. This BPR has made possible the development of the IT infrastructure of the new RCS (partly based on a classical database application, but also on a CSCW environment) and the manual procedures still needed. Furthermore, the digitisation procedures of the existing records (about 80.000) were hereby prepared. The web site of the Register was developed. Currently, the site allows a file and print access to the registration procedure and basic queries of the data registered. The internal BPR project was a great success: The new register could start at the beginning of 2003 without major problems, and has improved significantly quality and response times ever since.

Throughout the whole analysis, the overall process of the formation of a company was regarded as well. This means that all interfaces with other agencies were examined, and wherever necessary, the internal processes of those agencies where analysed and taken into account. Many inter-administratition aspects could thus be improved, for example the billing of the overall procedure, or the transfer of the documents to be published from the RCS to the responsible agency. A complete model for a combined registration procedure for two agencies was designed and approved.

Lessons Learned and Conclusions

Given the starting conditions of the project, the reorganisation of the Register of Companies in Luxembourg can be regarded as a really "fundamental" re-engineering. It was essential to have a strong political support for the accompanying measures. Only the privatisation of the Register allowed a flexible and fast approach. At the same time, keeping the public control over the Register augmented the political acceptance of the approach.

From the entrepreneur's point of view, there was a high risk to have a local optimisation of the Register, without taking into account the overall procedure of the formation of an enterprise. This risk was identified from the beginning on and avoided by enlarging the focus on all involved administrations. The long-term goal of this approach is to realise a one-stop-administration for enterprises in Luxembourg.

It has been found that this approach of a local optimisation in combination with a broader view on the overall procedures is much easier to realise than a "big-bang" solution. In fact, this approach seems to us to be the only feasible one if the limited resources and a reasonable realisation time are taken into account.

Even so the change management during the project was complex, given the long-lasting parallel existence of the ancient Registers and their private successor and the amount of changes faced, and furthermore the number of different organisations to examine and coordinate.

Later projects will have to focus on two main issues: On the one hand, the RCS will have to provide full electronic registering (as demanded by a directive of the European Commission). On the other hand, the integration of further organisations in a one-stop-administration must be envisaged. Actual research in E-Government and middleware technologies seem to be auspicious to support this effort.

References

1. Feltz, F.; Hitzelberger, P. (2003): Unternehmensgründungsprozess auf dem Weg zur „One-Stop-Administration" in Luxemburg. In: Paul, H.J.; Vossen, G. (ed.): Tagungsband EMISA 2003: Auf dem Weg in die E-Gesellschaft. Arbeitsbericht Nr. 99 des Instituts für Wirtschaftsinformatik der Universität Münster 2003.
2. Feltz, F.; Hitzelberger, P. (2004): Unterstützung der Unternehmensgründung durch I-u.K-Technologie in Luxemburg. In: Geberl, S.; Weinmann, S.; Wiesner, D. F. (ed.): Impulse aus der Wirtschaftsinformatik, Physica-Verlag, Heidelberg 2004.

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