Hans J. Scholl Marijn Janssen
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LNCS 7443

Electronic Government

11th IFIP WG 8.5 International Conference, EGOV 2012
Kristiansand, Norway, September 2012
Proceedings

ifip

Lecture Notes in Computer Science 7443

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

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11th IFIP WG 8.5 International Conference, EGOV 2012
Kristiansand, Norway, September 3-6, 2012
Proceedings

Springer

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ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-33488-7 e-ISBN 978-3-642-33489-4
DOI 10.1007/978-3-642-33489-4
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012946879

CR Subject Classification (1998): K.5.2, J.1, K.4.1, K.4.4, H.3.4-5, H.4, K.6.5, H.5.3

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

IFIP EGOV 2012 was the 11th annual international conference on electronic government research and practice organized by the International Federation for Information Processing Working Group 8.5 (Information Systems in Public Administration), or IFIP WG 8.5 for short. This conference has repeatedly been ranked as a core conference worldwide in the research domains of eGovernment and eGovernance.

For more than a decade, the series of IFIP EGOV conferences has attracted scholars from around the world. This was again the case in 2012, when the conference brought together scholars and practitioners from five continents and 29 countries.

As in previous years, IFIP EGOV was co-located with IFIP ePart, the IFIP Conference on eParticipation, which aims at presenting advances in both social and technological scientific domains, seeking to demonstrate new concepts, methods, and styles of eParticipation. IFIP ePart is closely aligned with the IFIP EGOV conference. The chairs of both conferences maintain close links and are committed to continuing the co-location of the two events in the years to come, which intentionally allows for exchange and cross-fertilization between the two communities.

The IFIP EGOV 2012 "Call for Papers" attracted over 80 submissions, more than half of which were completed research papers. The remaining submissions comprised work-in-progress papers on ongoing research (including doctoral papers), project and case descriptions, as well as five workshop and panel proposals. Among the full research paper submissions, 23 papers (empirical and conceptual) were accepted for Springer's LNCS proceedings. These papers have been clustered under the following headings:

- Foundations
- Adoption and Diffusion
- Open Government and Transformation
- Infrastructure and Technology
- Evaluation
- Citizen Perspective, Social Inclusion, and Social Media

As in past years, Trauner Druck, Linz/Austria, published accepted work-in-progress papers and workshop and panel abstracts in a complementary proceedings volume. This year, that volume covers 33 paper contributions, workshop abstracts, and panel summaries from both, IFIP EGOV and IFIP ePart conferences.

As in previous years and per recommendation of the Paper Awards Committee led by Prof. Olivier Glassey, IDHEAP, Lausanne, Switzerland, the IFIP EGOV 2012 Organizing Committee granted outstanding paper awards in three distinct categories:

- The most interdisciplinary and innovative research contribution
- The most compelling critical research reflection
- The most promising practical concept

The winners of each category were announced in the award ceremony at the conference dinner, which is a highlight of each IFIP EGOV conference.

It takes many people to make large events like this conference happen. We thank the 101 members of the IFIP EGOV 2012 Program Committee and dozens of additional reviewers for their great efforts in reviewing the submitted papers. Carl Erik Moe, Leif Skiftenes Flak, Øystein Sæbø, and their team at the University of Agder in Kristiansand were major contributors who tirelessly organized and managed the zillions of details locally. We would also like to thank Adam Taplin and Christine Malinowski of the University of Washington, Seattle, USA for the administrative management of the academic review process and the compilation of the proceedings.

The host of IFIP EGOV 2012 was the Department of Information Systems in the School of Economics and Social Sciences at Agder University, Kristiansand, Norway. Established in 1839 as the Kristiansand Teacher Training College, the University College of Agder was formed through the merger of six public colleges in 1994 that already had a long academic tradition at that time. In 2007, the college was granted the status of university covering the academic areas of business, economics, engineering, technology, the humanities, mathematics, nursing, teacher education, and the fine arts. With approximately 8,000 students and an academic staff of 1000, the University of Agder is a bustling and intellectually diverse academic hub near the southern tip of Norway.

Kristiansand was founded in 1641 by King Christian IV of Denmark and Norway in an area that has been inhabited by humans since ancient times. It is a uniquely located and charming coastal city with a historic center at the mouth of the Otra river and a population of some 81000. Today, Kristiansand is a hub of commercial activity, overseas trade, culture, research, and education. The city has a reputation for its warm, sunny, and long summer nights. It was a great pleasure to hold IFIP EGOV 2012 at this special place.

September 2012

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The Current State of Research on eGovernment in Developing Countries: A Literature Review

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Abstract. This paper reports a review of literature on eGovernment in the context of developing countries published between 2005 and 2010. The insights emerging from this review may guide researchers in their continued investigation of eGovernment implementation, especially in the context of developing countries. From a review of 108 papers, the study found some substantive changes in the field of eGovernment research. These included increased adoption of interpretive paradigm and increased use of theories in the research. Some future research direction from the methodological perspective were provided: paying more attention to research paradigm and methodology, preserving multiculturalism in eGovernment research, encouraging action research and longitudinal studies, and improving the research quality by grounding it on theories.

Keywords: eGovernment, developing countries, literature review.

1 Introduction

In a review of mainstream eGovernment literature from 2001 to 2005 (84 papers), Heeks and Bailur [1] unearthed several interesting findings. Here are some of them: no papers adopted interpretive paradigm, only one paper used theory, and more than one-quarter papers had no discernable research method. However, good practices were also identified [1], include significant recognition of human and other contextual factors that influenced the impact of eGovernment, use of a diverse range of ideas from other research domains, use of a range of different research methods and broad use of primary data. Although the study was not specifically on eGovernment research in the context of developing countries, but rather in a general context, it provided insights that can serve well as a starting point. Has something substantive happened in the meantime? Answer to this question is expected to provide insights to guide researchers in their continued investigation of eGovernment in the context of developing countries.

This paper aims to provide a more recent picture of eGovernment studies in the context of developing countries[1] from 2005 to 2010. This paper focuses on state of the eGovernment research.

[1] A list of developing countries drawn up by the International Monetary Fund in April 2010 was used as the reference base (http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/groups.htm#oem).

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 1–12, 2012.

Through a systematic process, this study reviews 108 papers dealing with the eGovernment research in the context of developing countries. Since the aim is to present the state of the eGovernment research, the review focuses on five main areas, i.e., research paradigm, knowledge framework, methodology, application, and focus of research [1].

The research questions addressed in this study are: (a) what is the current state of research on eGovernment in the context of developing countries?; and (b) what substantive changes we can observe from the development of eGovernment research in the period of 2005-10?

The analysis and detailed findings are presented as follows. Section 2 describes the research method for selection and analysis of the papers. Section 3 presents the findings, followed by discussion in Section 4. Section 5 concludes the paper.

2 Research Method

2.1 Selection of Literature

The set of guidelines proposed by Webster and Watson [2] for carrying out a systematic literature review was followed. This study focused on papers that explicitly dealt with eGovernment research in the context of developing countries published between 2005 and 2010. The search was limited to five prominent journals and or conference proceedings portals, namely ScienceDirect (http://www.sciencedirect.com), Ebsco (http://www.ebscohost.com), IEEE XPlore (http://ieeexplore.ieee.org), ACM Digital Library (http://portal.acm.org), and SpringerLink (http://www.springerlink.com). In addition, I also included *The Electronic Journal of Information System in Developing Countries* (http://www.ejisdc.org), which is one of the prominent ICT4D journals[2] that is not indexed in those five portals, in the pool. In doing so, I hoped that the review would cover as much of the relevant literature as possible.

The initial search was conducted using three combinations of keywords: electronic government and developing country, eGovernment and developing country, and digital government and developing country; in the title, the abstract, the keywords, and the text. The paper search was conducted in October 2010. After exclusion of duplicates, 134 papers were finally included in the pool. Second, the contents of the paper in this pool were carefully examined. This mechanism reduced the number of papers from 134 to 108 (2005: seven papers; 2006: eight; 2007: 19; 2008: 23; 2009: 35; and 2010: 16). Twenty-five papers were excluded for several reasons; e.g., they were not written in English, the focus was not on developing countries. Editorial papers were also excluded from the pool. In the final pool, 39 were journal papers, whereas the rest (69) were conference papers in proceedings. The final pool consisted of 95 empirical and 13 theoretical papers. A paper was considered to be empirical if it reported a real case, whether it used primary or secondary data or both.

[2] See ICT4D Journal Ranking Table compiled by Richard Heeks (`http://ict4dblog.wordpress.com/2010/04/14/ict4d-journal-ranking-table`).

2.2 Method of Analysis

Content analysis was used in this study. Several areas of categorization were used to analyse the papers. Selection of the areas was influenced by earlier research both in eGovernment and in general information systems [1, 3-6]. The following categorization was used to classify the papers.

Research Paradigm. This was classified into three categories: (a) positivist; (b) interpretative; and (c) critical [4, 7]. A research is said to be positivist if it attempts to test theory to increase the predictive understanding of phenomena [7]. In this type of research, generally there is evidence of formal propositions, quantifiable measures of variables and hypothesis testing [8]. Interpretative studies generally attempt to understand phenomena through the meanings that people assign to them and interpretative methods are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" [9:4-5]. Critical research deals with social critique by assuming that social reality is historically constituted and that it is produced and reproduced by people. Hence, critical research focuses on the oppositions, conflicts and contradictions in contemporary society [7, 10].

Knowledge Framework. A set of categorized frameworks of knowledge used in eGovernment research proposed by Heeks and Bailur [1] was adopted. They grouped research as follows: (a) theory-based – when the paper made use of an explicit well-established theory such as structuration theory or institutional theory; (b) framework-based – when the paper used a framework from a body of theoretical work; (c) model-based – when the paper used a model presented without reference to any deeper knowledge framework, such as a stage model; (d) schema-based – when the paper made use of schemas of technique or a technical architecture of eGovernment; (e) concept-based – when the paper used a certain concept such as good governance or usability; and (f) category-based – when the paper presented a set of categories or list of factors. Papers that did not belong to any of these categories were categorized as non-framework-based research.

Methodology. The papers were also examined in accordance with the research method and data collection method used. The research methods were classified as: (a) survey; (2) case study; (c) experiment; and (d) action research [4]. The data collection methods were grouped as: (a) questionnaire; (b) interview; (c) reflection on project experience; (d) document analysis; (e) literature review; and (f) observation [1]. In addition, the papers were also examined in terms of the time dimension of the research undertaken, whether cross-sectional or longitudinal, and in terms of data type, i.e., qualitative or quantitative.

Application. Topics were also grouped: (a) eAdministration – initiatives dealing particularly with improving the internal workings of the public sector; (b) eService – initiatives dealing particularly with the relationship between government and citizens as voters/stakeholders or as customers of public services; (c) eSociety – initiatives dealing with the relationship between public agencies and other institutions and with the relationship between civil society institutions; and (d) general eGovernment [3].

Examples of the last topic include studies that aim to identify eGovernment challenges, barriers, and opportunities in a general context.

Focus of Research. This was divided into three categories: (a) techno-centric/online service delivery; (b) government-centric/organizational change; and (c) citizen-centric/better government. This categorization was based on a review of ten years of eGovernment development, which was conducted by Grönlund [5] and identified three main models of eGovernment development, namely (1) the service delivery model, (2) the organizational change model, and (3) the better government model. The first model focuses on online service delivery from provision of online information to full electronic case handling. eGovernment implementation in this model is seen from a techno-centric perspective [6]. On the other hand, the third model does not necessarily involve eService delivery. Introducing cyber laws protecting privacy and increasing accessibility of eGovernment services (i.e., eInclusion initiatives) to various societal groups, including the disadvantaged ones, are examples of the initiatives in the third model [5, 6]. The second model (i.e., the organizational change model of eGovernment) assumes that IT itself cannot offer significant benefits without organizational change.

3 Findings

3.1 Overview of the Papers

Forty-three countries were reported in the papers. When the countries were not clearly stated or the study covered a lot of countries (such as Arab countries, Africa, Asia), I classified the papers into 'other countries' (Table 1). India was found to be the most frequently (11 times) reported country in the papers under study, followed by South Africa, China, Kenya, and Nigeria.

3.2 Research Paradigm

I attempted to group the papers based on their research paradigms used in the studies, although any attempt at classifying the papers like this might raise a discussion. Hence, since many papers did not clearly state their epistemological stance, I used additional criteria to classify the papers as follows.

The papers on eGovernment architecture and other technical aspects of eGovernment infrastructure were classified as positivist research, since they focused on building information technology (IT) artefact [see e.g., 11]. More specifically, these papers reported design research whose epistemology was primarily positivistic [11]. Also in this group of positivist research were papers reported a research model with a set of dependent and independent variables and used a statistical analysis to test some hypothesis [see e.g., 8]. The studies that carried out website evaluation were also grouped as positivist research. Almost half (42.6%) of the papers belonged to this group (see Table 2).

Table 1. List of countries reported in the papers

No	Country	n	No	Country	n
1	India	11	23	Chile	1
2	South Africa	7	24	Ethiopia	1
3	China	6	25	Jamaica	1
4	Kenya	6	26	Kazakhstan	1
5	Nigeria	6	27	Kuwait	1
6	Bangladesh	5	28	Malaysia	1
7	Indonesia	5	29	Maldives	1
8	Jordan	5	30	Mauritius	1
9	Morocco	4	31	Mexico	1
10	Nepal	4	32	Mongolia	1
11	Pakistan	4	33	Mozambique	1
12	Sri Lanka	4	34	Philippines	1
13	Argentina	3	35	Rwanda	1
14	Brazil	3	36	Saudi Arabia	1
15	Egypt	3	37	Senegal	1
16	Iran	3	38	Serbia	1
17	Turkey	2	39	Taiwan	1
18	Colombia	2	40	Tanzania	1
19	Ghana	2	41	UAE	1
20	Thailand	2	42	Uzbekistan	1
21	Uganda	2	43	Zambia	1
22	Cape Verde	1	44	Other countries	11

Table 2. Research paradigm used in eGovernment research

Research paradigm	Frequency	Percentage
Positivist	46	42.6
Interpretative	26	24.1
Critical	3	2.8
Other	33	30.6

The papers whose purpose was to evaluate and criticize the reasons or values behind an eGovernment initiative in a specific context were considered as critical research. Out of the 108 papers under study, only three papers that used a critical realism research paradigm.

The definition of interpretive research developed by Walsham [9] was adopted to classify the papers. Around one-quarter (24.1%) of the papers adopted interpretive stance.

Other papers that did not belong to those three groups were put in the 'other' group. Examples were the papers that used secondary data to summarize or to present some ideas or concepts related to eGovernment, e.g., scope and challenges of eGovernment in a

specific context. Descriptive literature review papers were also put in this group. This group had 30.6% of the papers.

3.3 Methodology

Case study was the most frequent research method used, although the protocols for conducting a proper case study research, such as those suggested by Benbasat et al. [12] and Yin [13], were in many cases not adequately followed (Table 3). I found that in 22.2% of the papers, the research methods were not easy to identify; for instance, the papers that attempted to assess development of eGovernment in a specific context lacked sufficient information on how the data were to be collected and conclusions drawn.

Table 3. Research methods used in eGovernment research

Research method	Frequency	Percentage
Survey	20	18.5
Case study	60	55.6
Experiment	1	0.9
Action research	3	2.8
Other	24	22.2

Distributing questionnaire was the most popular data collection method, followed by interviews (see Table 4). Eight papers reported that more than one data collection (mixed) method was employed. No paper used only observation as its data collection method. Eighteen papers even did not report how the data has been collected explicitly, in a research method section, or implicitly, somewhere else in the paper.

Table 4. Data collection methods used in eGovernment research

Data collection method	Frequency	Percentage
Questionnaire	21	19.4
Interview	21	19.4
Reflection on project experience	16	14.8
Document analysis	11	10.2
Literature review	1	0.9
Web content analysis	6	5.6
Observation	0	0.0
Hunt and peck*	6	5.6
Mixed	8	7.4
No discernable method	18	16.7

Note: * “A review of some relevant sources but without the rigor that might allow the approach to be called a proper literature review” [1].

As many as 28.7% of the papers (31) adopted an individual/personal level of analysis, whereas 35 papers preferred the group/organization level, and the rest (42) focused on societal or country level. Qualitative research was found to be the approach preferred (62 papers) over quantitative (31) and mixed approaches (10). This study found that only six papers employed longitudinal studies.

3.4 Application

This study found that the most frequently researched area of application was eService (46 papers), whereas the eSociety domain received the least attention (see Table 5). Thirty-five papers focused on eGovernment issues in general such as identifying eGovernment challenges, barriers, and opportunities.

Table 5. Area of application in eGovernment research

Area of application	Frequency	Percentage
eAdministration	17	15.7
eServices	46	42.6
eSociety	10	9.3
eGovernment (in general)	35	32.4

According to Heeks [3], the focus of eService is to talk to citizens about details of public sector activities, to listen to citizens to gain input into public sector decisions and action, and to improve public services, whereas eSociety initiatives are intended to work better with business, to develop communities, and to strengthen partnership. Both of these applications deal with the demand side of eGovernment, whereas eAdministration, whose objectives are to cut process cost, manage process performance, and make strategic decisions in government, treats the supply side [14].

3.5 Knowledge Framework

Sixteen (14.8%) papers under study explicitly used theory (Table 6). Diffusion and adoption theories (such as Rogers's diffusion of innovation theory) were the most dominant theory used (in seven papers). Other theories used were stakeholder theory (two papers), actor network theory (two papers), and Giddens's structuration theory (two papers). The other three papers used institutional theory, theory of development, and intellectual capital theory. Some of these theories have been popular in information system research in the context of developing countries [15].

A large proportion of the papers (37.0%) used one or more concepts to inform the research process and analysis. The concepts included awareness, trustworthiness, usability, pushing versus pulling systems, good governance, hospitality and drifting, and interoperability.

Some (7.4%) studies were framework-based. Various frameworks explicitly derived from a body of theoretical work used to study, e.g., information system adoption and

Table 6. Frameworks of knowledge used in eGovernment research

Knowledge framework	Frequency	Percentage
Theory-based	16	14.8
Framework-based	8	7.4
Model-based	9	8.3
Schema-based	7	6.5
Concept-based	40	37.0
Category-based	15	13.9
Non-framework-based	13	12.0

success. Examples of scheme-based studies included the papers that used infrastructure scheme or architecture (6.5%). Model-based research (8.3%) mostly adopted stage model of eGovernment development. Fifteen (13.9%) papers fell into category-based studies. The categories used included gap-analysis, eGovernment barriers, and challenges.

In addition to the fact that only a limited number of the papers used theory explicitly, we should note here that 13 papers did not use any knowledge frameworks. One could ask whether the absence of theory in eGovernment research is a problem. If it is a problem, then it has been around for some years, as Heeks and Bailur [1] found a similar phenomenon. They found that the background of the researchers had influence in this regard. Researchers whose academic base was informatics or computer science generally made no use of theory or framework.

3.6 Focus of Research

This study revealed that the papers focused on various aspect of eGovernment, ranging from online service delivery, through organizational change, to better government (Table 7). The focus of research was reflected in the area of concern or in a more observable form, in the definition of eGovernment adopted by the researchers. For instance, one paper [16:124] that was dealing with online service delivery defined eGovernment as

> "a web-based project to enhance communication between the government and citizens, business partners, employees and other agencies, and information publication from the authority".

Table 7. Focus of eGovernment research

Focus of research	Frequency	Percentage
Techno-centric/online service delivery	57	52.8
Government-centric/organizational change	27	25.0
Citizen-centric/better government	24	22.2

As another example, a paper [17:37] that focused on organizational change defined eGovernment as

> "a way of organizing public management in order to increase efficiency, transparency, accessibility and responsiveness to citizens through the intensive and strategic use of information and communication technologies in the inner management of the public sector (intra and inter governmental relations) as well as in its daily relations with citizens and users of public services".

Other papers that used a more citizen-centric approach paid attention to eGovernment initiatives that were intended, for instance, to provide citizens with greater access to eGovernment services or to IT, especially the Internet, in general [e.g. 18, 19]. The main goal was to empower citizens and to realize the advantages of IT in development, where citizens are the main beneficiaries.

4 Discussion

Has something substantive happened in the field of eGovernment research since 2005? Findings from previous literature reviews made by Heeks and Bailur's [1] and Grönlund and Andersson [20] were used as bases for comparison. Although these studies dealt with the eGovernment research in a general context, and did not focus on the context of developing countries, the findings could provide useful insights. To put them into the context, another literature review made by Walsham and Sahay [15] on IS research in the context of developing countries were brought in.

This study revealed that research paradigms of 30.6% of the papers were not discernable. This finding indicates that many eGovernment researchers did not pay attention to research epistemology or philosophies. This finding is in line with the previous literature review conducted by Heeks and Bailur [1], who found that most eGovernment research contained no clear statement of research philosophy. It is possible that for many of the eGovernment researchers the relevance of the research was more important than rigour. As Heeks and Bailur [1:251] noted, this finding still left "an open question about the importance and role of research philosophy in eGovernment research".

In 2005, Heeks and Bailur [1] did not found any single papers that adopted interpretive paradigm. If we believe that interpretive research can provide more insights about a phenomenon under study, we may rejoice the recent development in our field since 24.1% of the studies adopted this paradigm. However, this study found that only few (2.8%) critical studies. This finding echoed the previous study made by Walsham and Sahay [15] that made a call for critical studies. They argued that this type of studies was important since it "can open up the 'black box' as an aid to deeper understanding, and a stimulus to appropriate action" [15:19]. It seemed that this call did not get a sufficient attention from the researchers of eGovernment in developing countries.

Walsham and Sahay [15] also recommended more action research and longitudinal studies. Similarly, Heeks and Bailur [1] also found that around 80.0% of the papers reported cross-sectional research. Again, not many papers in this current study addressed this recommendation. This study found that only six papers employed longitudinal studies and three that reported action research. According to Walsham and Sahay [15:19],

> "action research would appear to be particularly relevant in contexts where resources are scarce, when it can be argued that outside researchers should not only go away with data for their own papers and academic careers, but also aim to make a specific contribution in the research setting itself."

The action research may be also carried out in longitudinal studies, when interventions in field sites taking place on several occasions spaced out over time [15]. Often, action research is done in close collaboration with real stakeholders.

This study found that the proportion of theory-based studies increased. Heeks and Bailur's study [1] found only 1.2% theory-based studies out of 84, while this study revealed that 14.8% studies were theory-based. As presented above, there were a variety of theories brought in into the eGovernment research, such as institutional theory, theory of development, actor network theory, structuration theory, diffusion of innovation theory, and intellectual capital theory. This is promising since the quality of research can increase if the studies are theory-based. Theory is important in eGovernment research, because it serves as: (a) a means for researchers to communicate with practitioners; (b) a means for researchers to communicate with each other; (c) a means for accumulation of knowledge; and (d) a means for legitimacy and recognition of the field as an academic discipline [21]. During the research process, theory can be used to guide data collection and analysis [22].

It their study, Heeks and Bailur [1] revealed that 20 (23.8%) papers did not reported their data collection methods. They considered it as 'bad practice' in eGovernment research. Unfortunately, there was no substantive change in this regard. This current study found that research methodology of 22.2% of the papers was indiscernible. In addition, data collection methods of 18 (16.7%) papers were also difficult to identify.

In 2006, Grönlund and Andersson's study [20] found that the eGovernment studies was increasingly focusing on IT. A different picture was offered by this study, which found significant recognition of human and other contextual factors in addition to merely technical actor, use of a range of different research methods and broad use of primary data, and attention to various eGovernment applications (i.e., eAdministration, eService, and eSociety). This was considered as good practices in Heeks and Bailur's study [1]. Moreover, these practices were suggested by Grönlund and Andersson [20] in their study. Instead of focusing on IT itself, eGovernment studies should focus on the role of IT in the context of society and government organization [20].

To sum up, from the methodological perspective, some future research directions can be drawn from this discussion. These include

(a) paying more attention to research paradigm and methodology;
(b) preserving multiculturalism in eGovernment research, by adopting appropriate research paradigms;
(c) encouraging action research and longitudinal studies; and
(d) improving the research quality by bringing theories in.

5 Concluding Remarks

This paper has painted a current state of eGovernment research published between 2005 and 2010. The review was based on five areas of categorization, i.e., research paradigm, knowledge framework, methodology, application, and focus of research. Several future directions from the methodological perspective have been also presented. The main contributions of this paper are the answers to two research questions set at the outset. This study provided (a) a more recent picture of eGovernment research in the context of developing countries, and (b) a set of future research directions. This study was then expected to provide insights to eGovernment researchers.

Lastly, like any other studies, this study has some limitations. First, the paper focused on state of eGovernment research and not the research issue. I will present the latter in another future paper. Second, although I have tried to include most of the relevant papers in the review, it is certainly possible that some were omitted, especially those which were not indexed in the five portals and those which were not written in English. This might have caused some bias. Third, the validity of the study may be questionable and open for discussion, since I was the single coder for all the papers under study. Similar studies should if possible use more than one coder to improve validity.

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The Influence of External Institutional Pressures on Local E-Government Adoption and Implementation: A Coercive Perspective within an Indonesian Local E-Government Context

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Abstract. Adoption and implementation of e-government within local government organizations are influenced by many external factors. These factors are often perceived as forces or pressures that influence local government decisions to adopt and implement the initiatives. This study uses the concept of coercive force from institutional theory to explain those external pressures influencing e-government adoption and implementation within a local government in Bali province in Indonesia. An interpretive case study approach is adopted to empirically understand the external pressures on local government adoption and implementation of e-government. Our findings show that four institutional external forces, central government, regulations, local citizens and limitation in financial resources, have strongly influenced the regency to adopt and implement e-government systems to improve their administration and services performance.

Keywords: institutional theory, coercive, local government, e-government, Indonesia.

1 Introduction

Previous studies on e-government adoption and implementation have mostly concentrated on economic or technical factors rather than institutional factors. In fact the majority of challenges surrounding e-government adoption and implementation are related to institutional factors [1, 2] including external factors that are often associated with pressures or forces which may lead to success or failure of e-government adoption and implementation.

Studies in Information systems (IS) literature [e.g: 3] argue that the real constraints on IS implementation are mostly related to institutional factors rather than technical factors. However, there is a lack understanding of IS adoption and implementation within the public sectors from an institutional perspective particularly in understanding public organizations as the focus of institutional pressure [4]. While

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H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 13–26, 2012.

there are some e-government studies [e.g: 5, 6] that address institutional theories to understand such phenomenon, but these studies mainly focus on central government levels and broadly focus on many aspects of institutional factors rather than on a specific aspect of institutional pressure.

This paper specifically focuses on the external institutional pressures that influence e-government systems adoption and implementation at local government level. This type of pressure is considered coercive pressure [e.g: 7, 8, 9] on organizations. Previous studies in IS [e.g: 7, 8] have acknowledged that coercive pressures influence the adoption and implementation of IS within organizations. Coercive pressure is "the formal pressure and external pressure exerted upon them by other organizations upon which they are dependent, and the cultural expectations in the society within which the organizations function"[10]. Other studies have also found that organizations' external pressures are exerted by organizations or parent organizations, constituents [8] and regulations [9].

This study, therefore, provides in-depth practical and theoretical insights into the nature of external institutional pressures on e-government adoption and implementation within a local government in an Indonesian setting. In understanding the phenomenon this study applies institutional theory, which previous studies [e.g: 11] have argued, can strongly provide explanation at organizational level. This paper attempts to answer the following research questions: ***What external institutional factors exert pressure and how do these external factors influence the local government adoption and implementation of e-government?***

This paper is structured as follows. Section 2 presents a theoretical review which includes institutional theory, a coercive perspective, and external pressures on e-government adoption and implementation, and then concludes with a theoretical construct for this study. Section 3 discusses the research methodology, while section 4 presents the case description, followed by findings in section 5. Section 6 and 7 present the discussion and conclusion respectively. Future research and limitation are addressed in the final section.

2 Literature Review

Institutional theory has been widely applied in understanding adoption and implementation of information technology whether in private sectors [e.g:7, 8] or in public sectors [e.g: 5, 6]. The benefits of applying institutional theory in understanding IT implementation within organizations are twofold; it enables researchers to understand the impacts of various organizational factors that are difficult to quantify such as government regulations and organizational contexts [12] and to conceptualize the dynamic interplay between actors and structure in organizational settings [13] during technology adoption and implementation. In the next sections, we construct our framework to understand those phenomenon.

2.1 Coercive Forces

Institutional theory postulates that organizations are influenced by external or internal pressures in forming their structure[14]. These external or internal pressures are

acknowledged by DiMaggio and Powell[15] as coercive pressures or forces that impose upon organizations to adopt certain policies or to change their structure. Coercive forces have been found to significantly influence an innovation's adoption and implementation in private [e.g: 7, 8] and public organizations [e.g: 16, 17]. However, our study only focuses on external coercive forces on organizations. These coercive forces might be triggered by three factors; such as a parent corporations that an organization relies on, pressure from their constituents [8, 18], regulations [14] that are associated with sanctions [14] (such as sanctions that are the result of parent organizations or legislations pressures), and society expectation [15, 18].

2.2 External Pressure on E-Government Adoption and Implementation

External pressures are forces that come from external government organizations which may influence their policy to adopt and implement e-government. The IS literature [e.g: 7, 8] view these external forces as coercive forces which come from many factors such as parent organizations and constituents. Studies in e-government associate these external forces with factors such as legislation [5, 19], citizens and businesses [2, 5], and central government [20, 21]. However, we acknowledge that the distinction between central government and regulation pressures may be blurring because regulations are also enacted by central government. However, in this study we separate both pressures in an attempt to show that they play a different role in e-government adoption and implementation.

a. Central Government Pressure

A central government may launch a policy to deliver better services, such as online services, to their citizens across the country. This policy might be mandatorily adopted and implemented within local authorities because central governments have the power and resources to do so. Central government power may be exerted due to a dependency of lower government agencies to central government in term of resources. For example central government has the power to control financial resources at local levels due to hierarchical systems such as centralization [22] or in another case central government may view local government as an instrument to achieve their policies rather than an autonomous institution representing its local citizens [23]. In this context, local government authorities may be constrained in making decisions to adopt and implement their own policies and programs. As a result, local governments might also be strongly influenced by central government in delivering their services or policies [24] because central government might dictate or mandate the adoption and implementation of the policies according their interests.

b. Regulation Pressure

Regulation is an institutional element that constraints behaviour and regulates interaction [13]. Scott[25] refers to regulation as explicit and formal rules. In the context of government organizations, rules or regulation are explicitly and formally enacted to structure government institutions to behave in certain ways. Geels [13] stresses that rules or regulations are all about rewards and punishment backed up by sanctions.

Similarly, government institutions are impelled by the rules to implement certain initiatives or policies such as e-government systems. Failure to abide to the regulation might lead to sanctions. This includes sanctions when the e-government systems do not meet criteria or targets [26] determined by regulations.

A regulation on freedom of information and transparency is one vivid example that imposes the requirement for government organizations, including local governments, to adopt and implement e-government systems. These regulation have been enforced in many countries such as in USA [27] and Spain [28]. Agusti (2011) argues that the diffusion of information through electronic means within the public sector in Spain was caused by the formulation of new regulations. The regulations cover the general principle of electronic means in providing information to citizens and citizens' right to access the information. All public organizations should abide by this regulation. Regulations may constrain government organizations in that they influence the adoption and implement of e-government within their organizations[29].This may imply that regulations can be a source of institutional pressure that has the ability to force government organizations to adopt certain policies.

c. Local Citizens and Business Pressure

As argued by Markus & Robey [30], organizations try to find solutions as demanded by their external clients. In the context of e-government, citizens' and local businesses' demand for online services have become a pressure for local government to adopt and implement e-government [2]. For example, when local firms implement online commerce to ease their businesses to citizens relationship, the local citizens experience new convenient ways of doing businesses. These new experiences result in an expectation of similar services from their local government. Then the local government comes under pressure to adopt and implement new technology such as e-government systems.

Citizens demand transparency from government bodies that allows citizens to obtain online information and make transactions at any time; another example of external institutional pressure. In response to this demand, local governments implement technology that promotes openness[31, 32]. Government organizations' efforts to be transparent might also lead to changes their daily practices. For example, they have to reveal their work procedures to citizens and other stakeholders in order to be transparent [32]. This pressure may be viewed as a driver for e-government adoption and implementation within local government organizations.

2.3 Theoretical Constructs

The theoretical concepts discussed above are summarized to establish our theoretical construct as depicted in Figure 1 below. In this study, coercive forces are considered as external forces that influence local government decision to adopt and implement e-government systems within organizations. We argue that the coercive forces are derived from three external factors; central government, regulations, and local citizens and businesses. The three external factors exert their influences throughout the process e-government systems adoption and implementation.

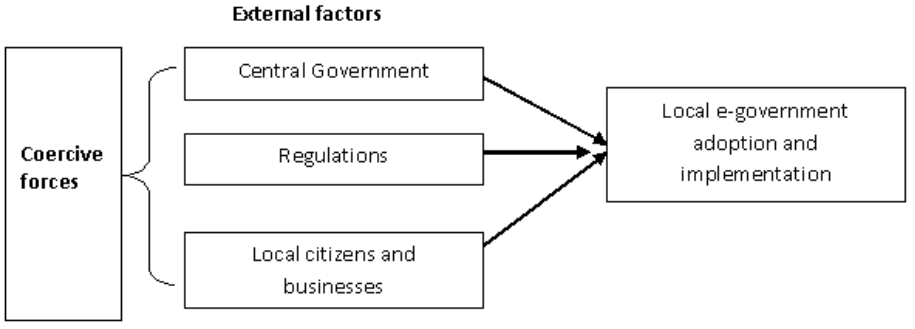

Fig. 1. Theoretical Constructs

3 Research Methodology

This research uses a single case study of local e-government adoption and implementation in Jembrana regency in the Bali province in Indonesia. The case study is better applied to understand phenomenon when the boundary between the phenomenon and context are not clearly defined and requires an in-depth study of a case or cases [33]. For example, e-government adoption and implementation involves the complexity of government institutions' relationships [1] which requires close examination. This complexity emerges as the result of institutions' interaction, such as social, political, and cultural, during the adoption and implementation, and this complexity can be understood through interpretive case study research [34-36]. This approach provides the researcher with the opportunity to reflect on the complexity of local government organizations and employees' sense making during the emergent situation in e-government implementation. As a result, this approach could assist the current poor understanding and limited theoretical development in addressing the above research question.

Table 1. Participants characteristics and roles

Participants' Role	Number of participants	Participants code
Management level	4	A, B, C, and D
IT/ IS Team Members	5	E, F, G, H, and I
Operational IT/IS staff	3	J, K, and L

The primary data were gathered through semi-structured interviews which involved 12 participants from management level to technical employees (table 1). Data collection from different levels will contribute to drawing more informed conclusion of this study [37]. During field visits, field notes were made and written materials that support the main data were also collected. The interviews were carried out in Indonesian. The interviews were transcribed and translated into English. This allows the

other two researchers, who do not understand Indonesian, to assist in the coding process as well as to establish research transparency. The interviews along with field data, such as field notes and other written material which have been collected, were coded in Indonesian language to maintain the original meaning and sense. All codes were translated into English when they were transferred into this paper. Meanwhile, coding broadly followed Strauss and Corbin [38] in which the data analysis was carried out with three iterations; open coding, axial coding and selective coding.

4 Case Description

Indonesia has a unique local government power structure where the greatest autonomy is transferred to the second level of local government (regencies and cities) and not to provincial levels [39]. According to Regional Autonomy Law No. 32/2004, central government has granted full autonomy to the regencies and cities to manage their development (except law, monetary, defence, and foreign affairs). Based on this regulation, governments at provincial level do not have the power to impose or mandate regencies or cities to adopt certain policies and regulations. Provincial level governments function as coordinators and supervisors of the lower levels (regencies and cities). Regencies and cities have a direct relationship to central government and can adopt new policies from central government directly without involving the provincial level.

Jembrana regency is one of five regencies in Bali province Indonesia. Despite Bali's popularity in the tourism industry and the generation of more income for the province, Jembrana regency is not a main destination for tourists. The tourism development in this regency is slower than other regencies. Consequently, unlike other regencies in Bali the main source of this regency's income is not from tourism but from farming. However, farming does not produce sufficient income to support the regency development since farming relies on traditional methods. This regency also does not have mining and big industries that support local government income. Most of the industries are home industries and small medium industries such as handicraft and religious related arts. Their income is low and unable to support its development if they only relied on local revenue. Therefore, the local government budget is mostly supported by central government annual transfer.

5 Findings

This section describes the findings from the interview, field notes, and other written documents. Based on the analysis, it was found that a number of external institutional factors have influenced the adoption and implementation of local e-government in Jembrana regency.

a. Central Government Pressure

Our findings show that Indonesian central government, through a number of central government departments, has contributed to e-government adoption and implementation within Jembrana regency. Participants indicated that early initiative of information

technology (IT) adoption and implementation within their regency was influenced directly and indirectly by central government pressure. The initial IT adoption and implementation within the regency central office, for example, was started when the BPPT introduced the use of computers in the regency to improve the local government work performance. One of the participant states:

> *Regarding e-government we started working with BPPT. It happened in 2001,right after the regent serve done year of his leadership…. After that, we were introduced to computers to support local government performance* (Participant I)

The early IT introduction within central regency office has led to the introduction of computers to district levels in the following year (2002). Each district office was provided a computer to perform their work and provide service to their citizens.

An early e-government application, which supports online job accomplishment and data sharing was initiated by the BPPT by implementing a virtual office system which is called KANTAYA in 2004. The importance of this initiation is highlighted by participant C.

> *Then an application which is called KANTAYA (virtual office) was implemented in 2004. This was an embryo for the development of e-government in the regency of Jembrana.*

The presence of the KANTAYA system enabled the implementation of other central government based systems such as SIADINDA (regional department accountancy information system). SIADENDA is a compulsory system to manage finance within all departments in the regency. One participant addresses this issue as follows:

> *The system is mandated by the financial department in Jakarta and in this office. All departments must use SIADINDA because all financial data must be put into the system with similar format, otherwise our financial reports will be rejected by central government* (Participant J)

SIAK (demographic information systems) is also a system transferred from Ministry of State Affair in Jakarta. The system was mandatory adopted and implemented by central government to improve local population administration since 2007. Despite demanding the regency to adopt and implement the system, the ministry of internal affairs did not fully transfer the system. The impact of this systems transfer policy has resulted in a lack of skills by the staff to deal with the system as addressed by the following participant:

> *The SIAK system was transferred from Ministry of state affairs office in Jakarta..... Actually, the system is a bundled system which is ready to use. We do not know what is behind the system, we just operate it. If we encounter system malfunction, we have to contact them* (Participant K)

The mandatory use of SIAK system within all regency levels is due to the central government policy to implement e-ID (electronic identification) in 2011. All databases for e-ID implementation come from the SIAK system. e-ID has become a mandatory system from central government to be adopted and implemented at regencies level in Indonesia from early 2011 and must be adopted and implemented completely in all regencies by 2013.

b. Regulation Pressure

E-government adoption and implementation in Indonesia context is regulated with presidential instruction no. 3 year 2003. The presidential instruction states that all government institutions from central to local levels must adopt and implement e-government. During the interviews, participants explicitly referred to the regulation regarding e-government adoption and implementation within the regency. The presidential instruction must be used as a legal basis for e-government adoption and implementation and also for annual budget proposal negotiation with local parliament and central government. For example, one participant indicates:

> *Allocation of annual budget for IT implementation is not easy because we have so many development priorities in this regency. We have to convince local parliament members and central government. However, since e-government implementation has been regulated by the presidential instruction, we just refer to the regulation so they can not reject it (Participant A)*

In addition, the presidential instruction has contributed to the enactment of other government regulations at ministry levels that mandate all local governments to adopt and implement certain e-government systems. The findings show that even though some of e-government systems were implemented based on the regency initiative, most important e-government systems that improve the local government bureaucracy, administration and citizens services were strongly mandated by the regulations. SIMAKDA (Local government budgeting and financial information system management), for example, have been implemented based on Central government regulation No. 58 year 2005 and Ministry of Internal State Affairs No. 55 year 2008. Meanwhile, e-ID (electronic identification) was mandated with presidential decree number 26 year 2009.

Central government regulation number 14 year 2008 imposes all government institutions to provide information to citizens. This regulation is a well-known regulation regarding government information disclosure which is published through the local government web sites. A participant refers to that regulation as follows:

> *There's a regulation of public disclosure; so, government should be transparent and IT will help government to be transparent …..the information associated with the budget or local government regulations must be published* (Participant B)

Regulation at local level has also been enacted to impose all departments to adopt and implement e-government within their organization to improve regency services performance. The influence of regulation has caused the local government to adopt and implement the e-government systems. In the context regulations pressure, resistance might not possible because resistance to the policy may result in a punishment such as their financial reports may be rejected.

c. Local Citizens and Businesses Pressure

Citizens and local business influences have played a significant role in e-government adoption and implementation in Jembrana regency. Their influences relate to better government services provision performance. One participant indicates this issue as follows:

Today citizens become more and more smart, and they expect a responsive and efficient government that is able to provide better services for them. In response to their expectation we have an ambition that we must use technology in our daily work; it is e-government (Participant B)

In response to the citizens' and to business demands, the regency implemented a SMS centre system that is able to accommodate and absorb their enquiries. The SMS centre has been considered an important e-government system that helps local government respond quickly to citizens' complaints related to local development as well as accommodate their participation in local development planning. One participant says:

This application (SMS centre) is really important to be implemented and used by responsible employees every day because it consists of complaints and suggestions from citizens that need to be followed up quickly (Participant B)

All the messages from citizens come to the system and then each relevant department (SKPD) must respond to the citizens' inquiries.

Similarly, another participant from licensing department indicates citizens and businesses pressure to implement a system which able to improve efficiency in licensing process.

The system was implemented as increase demand in licensing process from citizens and business. Previously, it took a long time to process a license and the processes were not in order. Sometimes people who apply earlier did not get their licenses first and it caused tension between us and the applicants because they think we had done something negative (Participant L)

Adoption and the implementation of e-library system that allows citizens to find library collections quicker and easier was also as a result of citizens pressure. Participant from the library says:

The visitors want to find books quickly, while the existing system does not allow visitors to use the system because it is only for staff log in (Participant J)

Previous system was integrated with the KANTAYA system which allows only government employees to use the system and search a library collection based on a citizens (visitors) demand. However, when more and more citizens visit library and want to find library collections in a fast way, the government library staff were unable to response to the increasing demand. Library IT staff, then, developed the e-library system that allows visitors to do self-retrieve.

d. Regency Limitation Pressure

Jembrana regency is a relatively poor regency compared to other regencies within Bali province. Their revenue relies on farming, small and medium enterprise, central government annual budget transfer. In 2010, the regency annual budget comprised of 84.5 % central government transfer, 10. 4 % from provincial tax sharing and grant, and only 5.1 % of the budget come from the local government revenue. The regency limitation in budget is realized by all citizens in the regency as stated by the following participant:

> *The main problem is lack of funds. We got small budget allocation because our regional budget is relatively small compared to other regions. Everyone knows about it* (Participant D)

This situation has encouraged local leaders and employees to think innovatively by implementing e-government as a tool to cope with local budged hardship. One participant said:

> *Since we don't have money, so we think of innovation. If we are continuously poor, we'll be rejected by people. Then we think what we can do with IT to improve our region* (Participant B)

As the regency does not have reliable industries, tourism, and natural resources that can support their annual budget, the regency uses IT as a solution to minimize their operational cost in serving citizens and promote their regency through their website. A participant from management level expresses his comment as follows:

> *You know we have limited budget because we do not have many industries, tourism or natural resources like other regencies in Bali. We only rely on farming and some small natural resources. I think implementation IT within our office is one way to save our operational cost and time* (Participant C)

Another participant expressed similar concern as follows:

> *Our basic principle is that "we are not rich but we are creative and innovative". You know this regency is not as rich as other regencies. By implementing IT we also expect that citizens get benefits from it* (Participant A)

The importance of e-government implementation to reduce the regency budget expenditure and to cope with the regency budget limitation has caused Jembrana regency leaders and IT team to think creatively. The IT team designed a variety of e-government systems to support the development of the regency and to improve service delivery to citizens. For example, they created cheaper communication application systems that allow citizens and local government to communicate free of charge, such as J-Net (Jimbarwana network), VOIP (voice over internet protocol), and SMS centre.

6 Discussion

Delmas &Toffel [40] argue that the sources of pressure that impose on an institution to adopt certain policies mostly come from external institutions such as government, regulation, and constituents as found above. Our findings, however, in the context of e-government adoption and implementation within local government institutions in Indonesia, found that regency limitations of economic or poverty also force a local government institution to adopt and implement technology. The regency limitation in generating revenue from their local resources and citizens has forced the regency leaders and staff to be innovative. In this study context, poverty is viewed as a source of innovation. Poverty as a source of inspiration to innovate is not well addressed in information technology and e-government adoption and implementation but a study conducted by Reij& Waters-Bayer [41] on farmers' poverty in Africa found that the

adoption of new innovation by farmers were encouraged by their poverty. This means that poverty or peoples' economic limitation has inspired them to adopt an innovation to improve their well-being.

Similarly, Jembrana regency has adopted and implemented e-government as the result of the regency limitation in economic resources. The regency was forced to innovate in improving government institutions performance to provide better services for their citizens. This resulted in improving the local government performance through cost reductions and promotes local tourism and businesses to external agencies. As a result the regency and citizens can improve their well-being and is able to generate more revenue.

There is a limited amount of literature that addresses poverty in e-government adoption and implementation [e.g: 42, 43, 44]. Study findings do not explain how poverty triggers the local authorities to adopt e-government but rather, they focus on benefits provided by e-government for local citizens and the use of e-government to alleviate poverty. Our findings may inspire other government institutions to adopt and implement similar initiatives, particularly government institutions with a similar context with Jembrana regency in Bali province Indonesia.

There might be a question from readers regarding how a poor budget regency adopts and implements technology within their organizations because it consumes a lot of their budget which should be used for their regional development. However, institutional theories argue that "an institution will be innovated if the expected net gains exceed the expected costs"[45]. Jembrana regency has been able to generate direct and indirect benefits from the e-government more than the costs they invested because the regency institutions are able to reduce operational costs and improve service deliveries, while citizens able to access government service effectively.

7 Conclusion

The findings show that three external pressures proposed in our theoretical framework have influenced e-government adoption and implementation within Jembrana regency. Interviews, document and field notes analysis also reveals that the regency limitation in financial resources also contribute to the adoption and implementation of e-government. The limitation forces the regency leaders to innovate by adopting and implementing e-government to cope with the limitation. As a result our prior theoretical construct to conduct this study is resumed and revised as shown in the following figure 2. External institutional pressures that influence local e-government adoption and implementation are not limited to the three previously found in IS and e-government adoption and implementation, but in this case study the adoption and implementation of e-government is also influenced by the regency limitation in economic resources.

8 Limitation and Future Research

This study was carried out within a local government in Indonesia and the findings may provide a new perspective on external institutional pressure on e-government

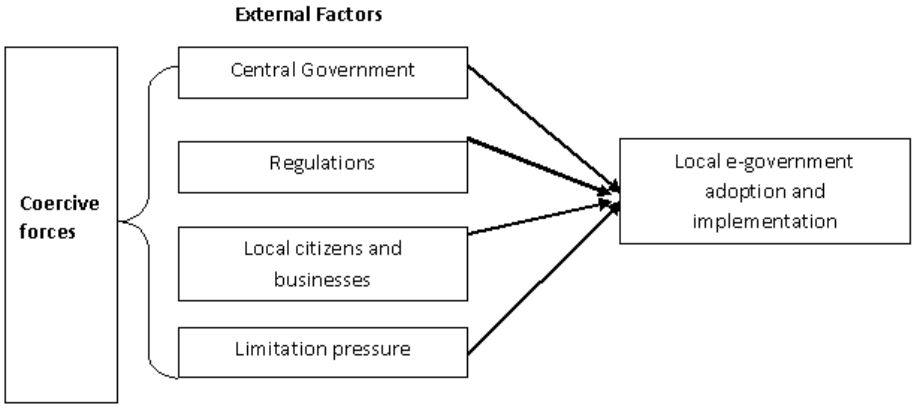

Fig. 2. Concluded external pressure on Local e-government

adoption and implementation within local government levels. Since this study was carried out at one local government and only focuses on external institutional pressures, the findings may lack generalizability. However, our in-depth study of the case phenomenon and the results can potentially contribute valuable theoretical and practical knowledge to the community [46]

Therefore, future research needs to explore internal institutional to provide a broader perspective of institutional pressures on e-government adoption and implementation within local government organizations. Future research also need to be carried out within multi-site studies to increase generalizability as suggested by Schofiell [47]. This strategy might produce a more rigorous result as a basis for generalization to other e-government adoption and implementation cases.

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On the Interaction of Source and Channel Choice in the Government-to-Business Context

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Abstract. Communication processes between governments and businesses are increasingly networked. This paper increases our understanding of the information seeking behavior of businesses in the Government-to-Business domain. We conducted a quantitative study among Small and Medium-sized Enterprises in the Netherlands to discover source-channel interaction. The results provided several interactions regarding nature of relationships with sources, channel and source choice. This proves that it is important to consider source and channel choice together to gain an important insight regarding information seeking behavior of businesses. Today's networked environment implies that besides having direct contact with governments, businesses make use of other sources to get governmental information. In addition, they use various channels to contact these sources, suitable to the type of relationships. This is vital information for governments, because it helps to optimize their service delivery strategy towards businesses.

Keywords: channel and source choice, interactions, information seeking, government-to-business.

1 Introduction

Governments frequently interact with citizens and businesses. Citizens and businesses seek government information and use public services while governments send information to these groups. One first major call to improve these processes was made in the early 1990s when advocates of the New Public Management argued for a more 'customer' centric approach under the assumption that governments were too bureaucratic and inefficient in their process [1]. A second call came with the arrival of new electronic communication channels in the 1990s. This not only led to new ways of communication, but also to questions about how to manage the increasing number of channels to make service and communication processes more efficient without suffering in quality [2]. Moreover, the Internet has also changed the patterns of communication in society. Groups in society are increasingly networked and pluriform in their media

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 27–39, 2012.

consumption [3]. This for example implies that communication no longer solely directly flows from governments to businesses and citizens and vice versa, but may take multiple steps. This applies even more to businesses. Reason is the high complexity in Government-to-Business (G2B) interaction [4] that leads to a networked character both within the organization as externally [5]. These developments challenge the effectiveness of communication between governments and their client groups and call for an increase in the level of knowledge on government-client interactions.

However, knowledge in this domain is lacking in a number of ways. First of all, research in this area almost exclusively focuses on the Government-to-Citizens (G2C) context. Whereas many studies have focused on the use of channels and communication effectiveness in the G2C-setting [e.g. 6], there are very few studies in the G2B-setting. This leads to a lack of knowledge about this target group in general [7]. This is complicated even further by the increasing expectations of businesses regarding the quality of government service provision [8]. Second, research in this domain is primarily aimed at finding drivers behind the choice and use of certain communication channels and not behind the source of information. However, the increased networked character of communication processes calls for an understanding of the specific information sources used to receive information from.

The aim of this paper is to provide the first exploratory insights to address these two voids in the available knowledge. The focus of this paper is on which channels and sources businesses use during their search for government information. By doing this, we provide a first insight in the world of the Small and Medium Sized Enterprises (SMEs) concerning their information gathering process in the G2B-context. Furthermore, a network perspective seems valuable to increase our understanding of G2B-interactions and specifically the information source and channel choice of businesses [5]. In addition, we focus on interactions with nature of relationships, channel choice, and source choice.

The second section of this paper provides some theoretical background. The third section discusses the method and next the results will be presented. The final section will provide conclusions and discusses implications for future research.

2 Theoretical Background

This section provides some theoretical background, and thereby propositions, regarding the G2B-context and is built on three elements: (1) changes in the external environment, (2) source and channel choice and (3) nature of the relationship, which partly explains the interaction between channel and source choice.

2.1 Building Blocks for Interactions: Sources, Channels and Relationships

Sources. During the last decades organizations underwent rapid and revolutionary changes [9]. Major developments in the organizational landscape are the changing connection between firms [9] and the emergence of (global) network forms of organizations [10]. Information exchange is now fundamental to relationships [11].

Monge and Contractor [12] argue that network organizations are organized around complex webs of exchange and dependency relations among multiple organizations. This implies that the organization turns into a superorganization with strong links to other organizations and whose main function is to link organizations and coordinate their activities. Some [e.g. 13] even argue that network organizations create so-called boundary-less organizations whereby the boundaries of the internal organizational network and the external network become increasingly blurry. One of the main components of a (global) network organization is that external (communication) relationships are flexible, according to organizational needs and are not bounded by horizontal or vertical structures [10].

Other major developments that turned the organizational landscape into a network society are changes in technology [14]. The rise of the Internet has facilitated media such as websites, and now social media (e.g. Twitter and Facebook), that are often labeled web2.0 [15]. However, these new media are not replacing the old media, but are an addition to the existing channels [16]. For example, young people often use multiple sources at the same time [17] and many people often use sequences of media rather than isolated choices [18]. Finally, people often switch between receiving information passively and seeking it actively in one search process [19]. Hence, multi-directional flows via electronic and interpersonal media (partly) replace uni-directional flows via the mass media. This phenomenon is labeled "mass self-communication" [20]. Hence, organizations increasingly use sophisticated communication technology to coordinate and communicate in these structures [10]. The growing importance of information exchange and relationship building is likely to impact the media chosen to communicate within and between organizations. Structural changes in the organization, due to network effects, will for example impact the physical proximity of employees; an increase in distance leads to decreased probability of communication [e.g. 20].

This implies that the position of government in relation to businesses is changing and thereby affects the distance between the two. Research shows that intermediaries become increasingly important in the G2B-context [22]. They fulfill different roles in G2B-interaction and can be seen as important partners in optimizing services towards businesses [23]. Reasons to bring in intermediaries from the business point of view are complexity in the issuing of laws, rules and technology [24], but also an increasing focus on primary products and processes and increasing efficiency [25; 23]. For governments, the reasons to use intermediaries are reducing the amount of contact and data collecting points [26]. In these cases, intermediary organizations act as formal intermediaries (e.g. accountants who mediate the G2B-interaction). However, not only formal intermediaries, but also social intermediaries (e.g. friends, colleagues) seem to fulfill an important role in G2B-interaction [4].

The information source in the organizational context refers to human or organizational sources and can be divided into two major categories [27]: external and internal. An internal source is located within the organizational boundaries (however blurry) either at levels above, below, or equal to the actor. External sources are those outside the organization. External sources in our context of research can be governmental agencies, expert organizations and personal network of employees [4].

So as a consequence the business context is getting more complex and networked and technology facilitating closer links between organizations, we can infer that businesses search for information in their external network instead of contacting the government directly. Moreover, other parties in the external network have an increasing important role to fulfill in G2B-interaction. This leads to the following proposition:

#1 Besides having direct contact with governments, businesses make use of intermediaries to get governmental information.

Keeping in mind that (1) businesses make use of both governmental agencies and intermediaries to get governmental information and that (2) the growing importance of information exchange in a relationship is likely to impact the media chosen, we can infer that the choice of a channel relates to the chosen source to have contact with. The next paragraph provides some existing theoretical findings.

Channels. The channel refers to: "the means by which a message is sent by a source or obtained by a receiver" [30, p.13]. In this case channels are equal to media. Examples of channels are face-to-face, e-mail, website and mail. There are different perspectives on channels and channel choice in the existing literature. According to the Media Richness Theory (MRT) [31] employees make rational channel choices during information processing. They make channel choices by taking their tasks in consideration, because channels vary in capacities and some channels are more suitable for certain tasks than other channels (e.g. task/medium fit). Other theories (e.g. Social Influence Model, Symbolic Interactionist Perspective) argue that channel and task characteristics are socially and subjectively constructed and less rational, but influenced by factors such as context (e.g. distance, time) and the symbolic meaning conveyed by the channel [32; 33], and finally communication capability constraints (e.g. communicator, recipient and organizational characteristics) and normative contingencies (e.g. cultural norms and role and institutional expectations) [34]. Moreover, we can infer that businesses use different channels for contacting different sources. This leads to the following proposition:

#2. Businesses use different channels to contact sources.

Characteristics of Relations with Sources. Given that organizations are operating in an increasingly relational context of interconnectedness, one can imagine that organizations establish connections and exchanges with other organizations in order to survive [35]. Oliver [35] pointed out that there are several different contingencies for relationship formation between organizations: necessity, asymmetry, reciprocity, efficiency, stability and legitimacy. Applying this to the G2B-context it is likely that businesses establish relations with governmental agencies because of necessity; the relationships are required. For example, businesses must pay taxes in order to meet regulatory requirements; the relationship with the Tax Office is non-voluntary. In contrast, it is likely that the relation with a personal source is perceived as voluntary; it is not a required relation. This leads to the following proposition:

#3. Businesses have different types of relations with different sources.

Summarizing, we can infer that businesses contact different sources, through different channels and have varied types of relations with the contacted sources. The next section focuses on possible interactions between these three building blocks.

2.2 Interactions between Sources, Channels and Relations

So far, we pointed out that: (1) businesses use different sources while searching for governmental information, (2) businesses use different channels to contact varied sources, and (3) businesses have different types of relations with these sources. In this section we look for interactions between these three building blocks.

First, not only characteristics of the employee and its environment are vital factors of channel choice, but also characteristics of the other party (in our context is the other party an information source) are important influencers regarding channel choice [34]. This implies that the channel choice of an employee partly depends on the (perceived) characteristics of the chosen source. Hence, we propose that channel choice interplays with source choice. This leads to the following proposition:

#4. Businesses use different channels to contact different sources.

Keeping in mind that environmental factors (e.g. social influence, recipient and organization characteristics, and expectations) influence channel choice [e.g. 32 - 34], we can infer that also nature of a relationship could influence channel choice. For instance, the relationship between a business and the Tax office is a required one (the business has to pay taxes) whereas the relation between a business and a (financial) advisor is likely to be of a more strategic nature. Subsequently, we postulate the following proposition:

#5. Different sources are characterized by different types of relationships.

Third, regarding the MRT [31] people choose a channel suitable to their task. In our context, the task can be considered as type of a relation with a source. For instance, an employee wants to contact an external colleague. They have an informal, voluntary type of relation. It is likely that an employee who is contacting a personal source chooses a suitable channel, for instance the telephone. It seems very unlikely that this employee chooses a more formal channel (e.g. a letter). Therefore, we propose that type of relation relates to channel choice:

#6. Businesses use different channels to contact different sources with different relationships.

3 Research Method

In order to examine the propositions we conducted a survey among Dutch SMEs (from self-employed up to businesses with a maximum of 249 employees). We gathered data in February 2011 by using an electronic questionnaire. The respondents for this study needed to be involved in the strategic issues of their business, because

external sources tend to become more important at higher levels in the organization [e.g. 28]. We invited 6850 respondents from a commercial online panel to fill out the questionnaire and 1284 respondents started the survey, some respondents (N=263) were filtered out based on the fact that they were not involved in the strategic issues of their business, others (N=348) didn't complete the questionnaire and finally 10% of all invited respondents completed the survey (N=673). 39% of the respondents were women and 61% men. 28% were self-employed, and 47% of the sample were small businesses and 25% medium sized businesses. Compared to information from the Dutch Statistical Office, there is a slight overrepresentation of the medium sized businesses. Results should be interpreted accordingly. The thirteen sources that were mentioned most often were included in the analysis. Furthermore, we used the following channels: face-to-face, telephone, e-mail, mail and Internet (WWW). Regarding nature of the relationship we formulated four different natures: (1) required, (2) voluntary, (3) practical and (4) strategic. For each source we asked the respondents for their channel use and their perception of the nature of the relationship.

4 Results

4.1 General Overview

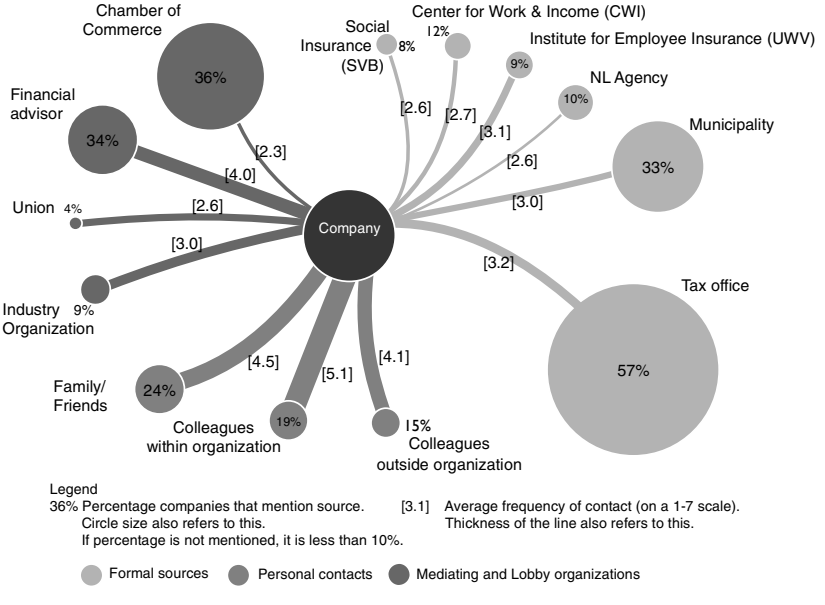

Fig. 1. The most important sources for businesses to gain governmental information

Figure 1 above shows the thirteen most mentioned sources in our research. Regarding formal government sources the Tax Office (57%) and the Municipality (33%) were most mentioned by businesses to have contact with. Both were contacted a few times in the last several years, respectively with an average frequency of 3.2 and 3.0. The Chamber of Commerce (36%) with an average frequency of 2.3, which is sporadic, is the most mentioned source concerning Lobby sources. Besides, the Advisor (22%) also is a relevant source for businesses and is contacted a number of times. Last, regarding the personal network 22% of the businesses mentioned family/friends, 15% external colleagues and 12% mentioned internal colleagues. All personal sources have a high average frequency compared to other sources (respectively 4.5. 4.1 and 5.1).

We can deduce from these results that besides having direct contact with governments, businesses also make use of other kinds of sources (e.g. lobby. intermediary and personal sources). This supports our first proposition. In addition, some sources (e.g. Tax Office) are often mentioned by businesses; a lot of businesses contact these sources for information. On the other hand there are sources (e.g. internal colleagues), which are frequently used; few businesses contact these sources but when they use these sources they make extensive use of them. Hence, businesses use different sources in varied ways. This implies that sources have different functions or roles.

Next, which channels do businesses use while searching for governmental information? Table 1 presents the channels businesses use when they contact sources. Most businesses use e-mail (31%) to contact their sources. Another channel that is often used is the telephone (28%). Face-to-face (16%) and the Internet (18%) are in the middle and the mail (4%) is the least often used channel.

Table 1. The channels businesses use while searching for governmental information

	Channels (%)				
	Face-to-face	Telephone	WWW	E-mail	Mail
General channel use	16%	28%	18%	31%	4%

Table 2 below shows how businesses describe their relationships with sources in terms of nature. Most relationships can be described as practical (43%) or required (34%). Very few relationships in the G2B-context can be described as strategic (6%) and some relationships are voluntary (17%).

Table 2. Perceived nature of relationships with sources

	Natures (%)			
	Practical	Strategic	Voluntary	Required
Described natures	43%	6 %	17%	34%

So, the results show that businesses use different channels and have different types of relations with sources. These findings support both the second and third propositions. The next section focuses on interactions between channels, sources and relations.

4.2 Interactions between Channels, Sources and Relationships

Channels and Sources. Table 3 shows which channels businesses choose regarding to their source choice. Concerning the formal governmental sources the telephone is often used to have contact with these sources; for instance, 36% uses the telephone to contact the Tax Office and 28% for contacting the Municipality. Besides, 27% have contacted the Municipality by face-to-face. In contrast, 25% use WWW when they choose the Tax Office as a source. Remarkably, both intermediaries and personal sources (e.g. family) are relatively often contacted by F2F (respectively 33% and 49%) and telephone (respectively 28% and 29%). The same channels are used to contact the Union: face-to-face (30%) and telephone (26%).

To summarize, we found that businesses use different channels to contact sources in their information seeking process in the G2B-context. This supports the fourth proposition. In general we observe that, for instance, face-to-face is more used during interaction with personal sources compared to the more formal sources.

Table 3. Source-Channel Selection

Source	Channels (%)				
	Face-to-face	Telephone	WWW	E-mail	Mail
Formal government					
Tax office	7%	36%	25%	15%	18%
Municipality	27%	28%	15%	20%	10%
CWI	13%	30%	24%	23%	11%
UWV	7%	41%	23%	16%	14%
SVB	8%	39%	20%	18%	16%
NL Agency	10%	22%	21%	26%	21%
Intermediaries					
Advisor/Accountant	33%	28%	2%	28%	9%
Personal network					
Internal colleagues	52%	23%	1%	23%	1%
External colleagues	38%	27%	6%	27%	2%
Family/Friends	49%	29%	2%	18%	3%
Lobby					
Chamber of Commerce	25%	25%	21%	17%	12%
Union	30%	26%	12%	19%	14%
Industry Organization	13%	25%	21%	29%	12%

This observation implies interplay between channel and source choice. Hence, the next paragraph focuses on this interplay by looking at interactions between nature of the relationship and channel and source choice.

Type of Relationships and Sources. Table 4 shows how businesses describe their relationships with different sources in terms of nature. It is obvious that the relationship with the Tax Office, as well as with the Municipality is described as practical (43% and 42%) and required (46% and 38%). The relationship with

per-sonal sources, for instance with external colleagues, is described as practical (45%) and voluntary (39%). Contact with the Chamber of Commerce (Lobby) and the Intermediaries are described as practical (44%, 46%) and required (40% and 33%).

Table 4. Nature of a relationship regarding source choice

	Natures (%)			
	Practical	Strategic	Voluntary	Required
Formal government				
Tax office	43%	7%	5%	46%
Municipality	42%	7%	13%	38%
CWI	43%	7%	21%	29%
UWV	42%	8%	10%	41%
SVB	42%	5%	11%	42%
NL Agency	35%	15%	24%	26%
Intermediaries				
Advisor/Accountant	46%	4%	17%	33%
Personal network				
Internal colleagues	46%	4%	31%	19%
External colleagues	45%	6%	39%	11%
Family/Friends	44%	6%	45%	5%
Lobby				
Chamber of Commerce	44%	5%	10%	40%
Union	26%	3%	14%	57%
Industry Organization	45%	4%	25%	25%

We can deduce from the results above that businesses have varied perceptions of nature regarding their relationships with different sources. Especially relationships with personal sources are perceived as practical and voluntary. In contrast, relationships with other kinds of sources are perceived as practical and required. Alltogether, we found support for the fifth proposition that businesses choose sources because of the nature of their relationship with a source.

Channels, Sources and Type of Relationship. In order to gain insight into how the nature of the relationship and channel choice are related to each other, we looked at similarities between relationship characterization and channel preferences for each source. In order to establish the degree of similarity we used Dice (also known as Czekanowski or Sorenson) as a proximity measure. This measure compares the number matches to the number of non-matches while joint absences are excluded from consideration. The measure varies between 0 and 1, where 0 signifies no similarity at all and 1 signifies perfect similarity. When many respondents combine e.g. face-to-face with a practical relationship for the sources they use, the proximity level is high. As such we abstract from the specific sources that respondents use. By comparing the proximity measures between each channel and type of relationship we are able to identify interactions with regard to the information seeking process.

The results of the analysis are presented in Table 5. The results show when a relationship with a source is described as practical or required, face-to-face is the channel which businesses use, with a value of respectively 0.55 and 0.49. E-mail (0.49 and 0.41) and WWW (0.38 and 0.40) also are used to some extent in practical and required relationships. In addition, businesses use the telephone when a relationship with a source is described as practical (0.63) or voluntary (0.55). Mail is sometimes used in a required relation (0.37).

Table 5. Proximity matrix regarding nature of a relationship and channels

	Channels				
	Face-to-face	Telephone	WWW	E-mail	Mail
Nature of relationship					
Practical	.55	.63	.38	.49	.30
Strategic	.14	.17	.14	.15	.12
Required	.39	.55	.40	.41	.37
Voluntary	.49	.40	.22	.38	.11

Interactions were found regarding nature of the relationship and source and channel choice. This supports our last proposition (#6). In summary, practical and required relationships with sources (e.g. formal government and intermediaries) interact with the telephone and to some extent also with e-mail and WWW. Practical and voluntary relationships with sources (e.g. personal network) show proximity with face-to-face as a channel. In general, as expected the interaction concerning mail is relatively low. However, it is remarkable that the interaction for WWW is relatively low and, in contrast, the interaction regarding the telephone is relatively high.

5 Discussion and Conclusions

This paper examined the information seeking behaviour of businesses in the G2B-domain. Instead of focusing on the interplay between task and technology characteristics we focused on the interrelation between sources, the nature of the relationship with the source and the channel that is used to communicate. By doing that, this paper takes a new approach towards the understanding of information seeking behavior of SME's in a G2B-context.

Limitations. Before we will present our final conclusions we would like to mention some of the limitations of this study. Because we asked one person per organization we get information from that specific person within the organization. Another person in the same business, even in the same management, could have other contacts regarding the G2B-context. So even though we asked managers responsible for the strategic management issues, we should be careful when interpreting results. A second limitation is that we looked at differences between sources, channels and relations only. More factors may be at play. Although channel choices may be more

complex than what we studied here, we do feel that our approach towards contingent choices does shed a new light towards understanding the information seeking behavior of businesses in a G2B-context. A final limitation is that we studied the situation in one country. Hence, differences between countries remain unsearched.

Discussion and Conclusions. The first three propositions focused on the variation in the choice of channels (#1), the use of channels (#2) and the nature of the relationship between a business and a source (#3). We conclude that besides having direct contact with governments, businesses make use of intermediaries to get governmental information. We found, in accordance with previous studies [22; 23], that the intermediary (e.g. advisor) is a very versatile and therefore notable source in the network of businesses in the G2B-context. Thus, for governments the intermediary is the party in the network of G2B-interaction to focus on and to work with. Others already argued that intermediaries can be seen as a new kind of service delivery channel and are of great value in optimizing G2B-interaction [36]. However, not only formal parties seem to fulfill an important role here, but also informal parties (e.g. personal sources) are vital information sources for businesses. This implicates that governments should also focus on and work with informal intermediaries. We also found support regarding the second and third proposition. The results in this study show that businesses use various channels to contact sources. Besides, we found that businesses have different relationships with sources, which is in line with Oliver [35].

The second set of three propositions focused on the interaction between the building blocks. Results of the empirical study show that business choose different channels for different sources (#4), have different types of relations with different sources (#5) and use different channels to communicate with sources they have a different type of relation with (#6). Thus, we can conclude that there is interplay between source, channel and type of relationship in the information seeking process of businesses in the G2B-context. These interactions are important because together they provide an important insight in the information seeking behavior of businesses nowadays. Moreover, the findings imply that the choice of channels not only depend on the factors found in earlier research, but that the choice of sources is a crucial factor that interacts with channel choice. From a theoretical standpoint the results of this research offer the possibility for further exploration. The mechanism of interaction turns out to be more complex than a simple task-technology fit. Further research can provide insight into the factors that make the relation between a business and their sources contingent.

We made a first step towards the understanding information seeking behaviour of businesses in the G2B-context by looking at the interaction between channels, sources and nature of a relationship with a source. The finding that source and channel choice interact is vital information for governments to improve their service provision towards this complex target group. More specifically, taking into account that the context of G2B-interaction is very complex and networked, and that businesses use various sources to gather governmental information, it sounds wise for governments to integrate both channel and source choice in their service provision strategies towards SMEs. However, more research on this topic is needed before a

well-balanced and effective strategy can be implemented. Our study is among the first researches in the context of businesses itself and that elucidates the importance of the interplay between channel and source choice in the G2B-context.

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Building Understanding of Smart City Initiatives

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Abstract. This study presents the first results of an analysis primarily based on semi-structured interviews with government officials and managers who are responsible for smart city initiatives in four North American cities—Philadelphia and Seattle in the United States, Quebec City in Canada, and Mexico City in Mexico. With the reference to the Smart City Initiatives Framework that we suggested in our previous research, this study aims to build a new understanding of smart city initiatives. Main findings are categorized into eight aspects including technology, management and organization, policy context, governance, people and communities, economy, built infrastructure, and natural environment.

Keywords: Smart city, City management, City government, Smart Government, Technology, E-government, Governance, Citizen engagement, Policy.

1 Introduction

Over half of the world's population lived in urban areas in 2010, and this figure is expected to increase to three quarters by 2050 [2]. With the rise in urban populations, city governments are required to manage an escalating number of technical, social, physical, and organizational issues arising from complex congregations of people in spatially limited areas. Rapid urbanization creates an urgency and imperative for cities to find smarter ways to manage the accompanying challenges—e.g., traffic congestion, air pollution, high crime rate, difficulty in waste management, wasteful energy consumption, and so on [23-24].

The concept of "smart city" is evolving as a new approach to mitigate and remedy current urban problems and make urban development more sustainable. Recent studies have conceptualized and defined a smart city in various contexts and meanings [3], [6], [18]. Some working definitions merit attention, and they share some commonalities in definitional elements. Washburn et al. [27] emphasized technology by

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 40–53, 2012.

defining a smart city as "the use of smart computing technologies to make the critical infrastructure components and services of a city—which include city administration, education, healthcare, public safety, real estate, transportation, and utilities—more intelligent, interconnected, and efficient" (p. 2). The definition made by Anavitarte and Tratz-Ryan [1] also underscores the role of information and communication technologies (ICTs) by defining it as "an urban area functioning and articulated by modern information and communication technologies in its various verticals, providing ongoing efficient services to its population." The definition from the Natural Resources Defense Council (smartercities.nrdc.org)—"a city striving to make itself smarter (more efficient, sustainable, equitable, and livable)"—includes the meanings of smartness in urban context. There is a definition that indicates domains of urban smartness. According to Giffinger et al. [12], a smart city denotes "a city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens." In sum, the comprehensive definitional elements include the role of technologies, the meanings underlying a city's smartness, and a set of components representing the smartness of a city.

Another definition views a smart city from a different angle. Caragliu et al. [5] claim that a city is smart "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" (p. 70). Their claim highlights the role of smart city initiatives by stressing where a city should invest (human and social capital, traditional and modern communication infrastructure) and how it becomes smarter (wise management of natural resources, participatory governance).

This view allows us to recognize a gap in the current discussions of smart cities. While an increasing number of studies and practical reports explore desirable properties of a smart city [3], [7-9], [12-13], [16-18], [27] and cases of self-labeled "smart" (or dubbed with other equivalent progressive terms such as intelligent and innovative) cities [2], [4], [19], [25], little research purports to develop a systematic understanding of smart city initiatives that make a city smarter. We have identified this research gap and developed a preliminary framework for helping understand smart city initiatives. The Smart City Initiatives Framework included in Chourabi et al.'s [6] paper is a product of the authors' joint efforts to understand city government-driven initiatives to make a city more efficient, effective, attractive, competitive, sustainable, equitable, and livable. In that paper, we derived eight core pillars of smart city initiatives from a wide array of conceptual and empirical studies in the disciplinary background of e-government, public administration, and information science. The eight categories the preliminary framework suggests include technology, management and organization, policy, governance, people and communities, economy, built infrastructure, and natural environment.

With the reference to the Smart City Initiatives Framework [6], this paper aims to build an understanding of smart city initiatives through a case study of four cities in North America—Philadelphia and Seattle in the United States, Quebec City in Canada, and Mexico City in Mexico. We also try filling the gap between growing attention

to a smart city itself and relatively little research of smart city initiatives. We expect this empirical research to make a first-of-a-kind contribution to systematic understanding of smart city initiatives. In this paper, we do not compare smart city initiatives between our cases, instead we suggest a comprehensive understanding of smart city initiatives. To build this understanding we conducted semi-structured interviews with government officials and managers with responsibilities for smart city initiatives in the four cities selected. We analyzed documents and the qualitative data from the interviews with respect to the eight components of the Smart City Initiatives Framework. In this paper we present new understanding of smart city initiatives in terms of insights and lessons learned to-date from this multi-case study.

The remainder of this paper is organized as follows. The next section provides an overview of the Smart City Initiative Framework as a lens to see smart city initiatives. The subsequent section describes the method of data collection and the multiple cases we focus on. Then the following section reports the findings from the first-round analysis of the data. The final section addresses future research and presents concluding remarks.

2 Understanding Smart City Initiatives

We suggested an integrative framework to understand smart city initiatives in our previous paper [6]. The eight components included in the framework are derived from the exploration of a wide and extensive array of literature from various research fields such as e-government, local government administration and management, and information systems. Figure 1 illustrates the framework.

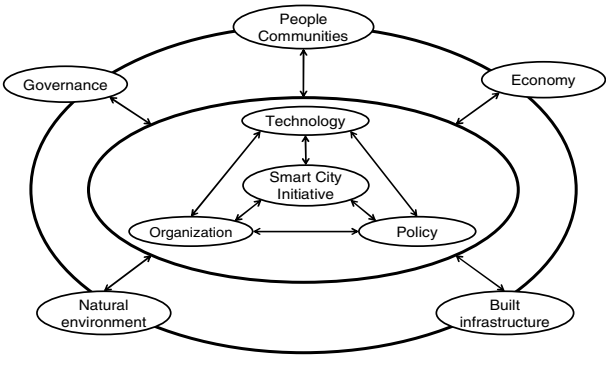

Fig. 1. Smart City Initiatives Framework (Source: Chourabi et al., 2012)

This set of factors can help understand differences in smart city initiatives implemented in different contexts and for different purposes. The framework also helps explain the relationships and influences between these factors and smart city initiatives. As illustrated in the framework, all factors have a two-way impact on smart city initiatives. The framework also reflects the differentiated levels of the impact. Three

core factors (technology, management and organization, and policy) shape and form smart city initiatives. As well, smart city initiatives may lead to some change in the three factors. Smart city initiatives have a significant impact on various sides of a smart city (governance, people and communities, economy, natural environment, and built infrastructure). These are not only the aspects of outcomes made by smart city initiatives, but the components as contexts and conditions of localities also shape the characteristics of smart city initiatives.

Technology is considered one of core components of a smart city in practical research [7-9], [12-13], [27]. ICTs are a key driver of smart city initiatives [18]. E-government research offers knowledge of technology-related challenges government projects usually face. For example, Ebrahim and Irani's [10] study of e-government adoption highlighted the challenges in using technologies for e-government projects. Notably, the lack of IT skills and (cross-) organizational (cultural and political) challenges are identified as main technological challenges instead of technical concerns.

Managerial and organizational factors do not draw much from smart city research, but instead the factors have been discussed in the extensive literature on e-government and IT projects. Smart city initiatives may differ from general e-government initiatives in the light of their specific focus on localities and strategic goals for making cities smarter. However, our previous paper [6] suggested many commonalities between e-government or public sector IT projects and smart city initiatives. Gil-Garcia and Pardo's [14] research is worthy of attention. Managerial and organizational factors that influence e-government projects broadly comprise project size, managers' attitudes and behavior, organizational diversity, alignment of organizational goals, multiple goals, compliance to change, and perceived turf.

Policy context is important to understanding smart city initiatives. Nam and Pardo [24] consider a smart city as innovation in policy and management as much as in technology. In the Smart City Initiatives Framework, the policy context comprises political components (the form of a city government, mayor-council and council-manager type, and the relationships among key players such as mayor or city manager, council, and related agencies) and institutional components (law, regulation, code, and intergovernmental agreement). According to Mauher and Smokvina [21], transformation from an ordinary (non-smart) to a smart city entails the interaction of technological components with political and institutional components.

There is an increasing need for better governance to manage initiatives or projects to make a city smart [15]. Some studies identify the importance of governance for a smart city in various contexts. According to Johnston and Hansen [20], smart governance involves the implementation of processes with constituents who exchange information in accordance with rules and standards. Mooij [22] emphasized a smart governance infrastructure that should be accountable, responsive, and transparent. Odendaal's [25] case study found smart governance promotes collaboration, data exchange, service integration and communication. Giffinger et al.'s [12] model to assess European mid-sized smart cities views smart governance as a core of smart cities. In their model, smart governance represents citizen participation and transparent processes. Scholl et al. [26] identified stakeholder relations as one of critical governance factors to determine success and failure of e-government projects. The

"stakeholder relations" factor includes the ability to cooperate among stakeholders, support of leadership, structure of alliances and working under different jurisdictions.

The Smart City Initiatives Framework includes four other components. The framework emphasizes both people and communities, because it is critical to refer to the members of a city, not only as individuals but also as communities, groups, and segments of the whole population that have their own wants and needs [6]. Regarding the importance of people and communities, social and human capital is considered a core component of a smart city [12]. Smart city initiatives welcome residents to participate in the governance and management of a city. Urban economy is a major driver of smart city initiatives, and economic competitiveness is one of important properties of a smart city [7-9], [12]. In turn, economic outcomes of smart city initiatives include business creation, job creation, talent attraction, workforce development, and retention, and improvement in productivity. In addition, smart city initiatives are forward-looking in terms of preserving and protecting the natural environment and improving and leveraging the built infrastructure [16]. Thus, smart city initiatives have an impact on environment-friendly development, sustainability, and livability of a city.

3 Method

This paper focuses on four cities in North America: Philadelphia and Seattle in the United States, Quebec City in Canada, and Mexico City in Mexico. These cities are making critical efforts—through a variety of initiatives—to become smarter and more innovative. The cities range widely in terms of many conditions such as population, demographics, economy, and location, and thus smart city initiatives reflect differences in contexts and conditions around the cities' efforts toward becoming smarter. This study selects the four cities as research cases, but the unit of observation is a smart city initiative. The selection of cities and initiatives as cases for empirical research follows an information-oriented (not random but rather purposive) approach. Flyvbjerg [11] suggests four information-oriented strategies for case selection in qualitative case research: extreme/deviant case selection, maximum variation case selection, critical case selection, and paradigmatic case selection. This study is characterized as critical case selection, of which the logic is "if this is (not) valid for the case, then it applies to all (no) cases" [11, p.230]. The critical case selection approach allows for the collection of information that permits logical deductions. For this research, the four cities are used as selected cases for logical deduction.

Interviews, based on the Smart City Initiatives Framework, were used to qualitatively understand concepts and factors that characterize smart city initiatives. We conducted semi-structured interviews with individuals who are responsible for projects and initiatives underway in each of the four cities. Table 1 briefly describes those initiatives. Interviewees were selected from various levels and functions, including executives (elected officials, chief executive officers, and chief information officers), heads of departments or agencies that lead smart city projects or initiatives, project managers, team leaders, and technical experts.

Table 1. Selected Cities and Smart City Initiatives

Cities	Smart city initiatives
Philadelphia	• Philly311: receiving non-emergency service and information requests • PhillyRising: revitalizing distressed neighborhoods • PhillyStat: meetings to review operation and strategic performance
Seattle	• Seattle.gov portal with 20+ language support • data.seatle.gov (open data, open government) • Community Technology Planner • Equitable Justice Delivery System • Communities Online • Puget Sound-Off • Smart Grid • Automated Metering Infrastructure • Pacific Northwest Regional Demonstration Project • Fiber to the premise • GigU • Customer Relationship Model • Supervisory Control and Data Acquisition (SCADA) • Drainage and Waste Water System • Rain Watch Program • Field Operations Management System (FOMS) • Common Operating Picture • IT Cloud • Electronic Plan Review System • Digital Evidence Management System (DEMS)
Quebec City	• Zap Quebec: providing Wi-Fi internet access • Text messaging service of snow cleaning information • Snow cleaning management project: providing sensors at each snow cleaning machine • Inter-cities network: connecting with major cities (100,000 population and more) of the province of Quebec • Mobile homepage: developing a mobile version of the city's website • Infrastructure management system: integrating different information systems to coordinate activities related to infrastructure management • Open data initiative: making city data open • Developing a new transportation plan
Mexico City	• AngelNet

Through 39 individual and group interviews across the four cities in the second half of 2011 and the first quarter of 2012, we met and interviewed a total of 87 people. Interviews took place at their work site, and each session lasted approximately an hour. We used the interview protocol that we have jointly developed for the multinational research project, titled "Smart Cities and Service Integration." To ensure accuracy of data and minimize recall biases, all interviews were recorded and transcribed. Interview transcripts in Quebec City (French) and Mexico City (Spanish) were

translated in English. We analyzed the interview data following an inductive logic approach and using grounded theory techniques. Using text coding and analysis tools (Atlas-ti, Dedoose), we systematically coded and analyzed the transcripts in an iterative process. The results of the analysis are presented without any identifiable personal information of individual interviewees and also without any identifiable information related to cities and initiatives. Table 2 lists the high-level interview questions while the actual interview protocol included a sizable number of sub-questions and items for probing. The interview questions are categorized into the components included in the Smart City Initiatives Framework.

Table 2. Interview Questions

Categories	Interview questions
Description of initiatives	• How did the initiative start? • What are the main goals of the initiative? • What organizations are involved and how?
Technology	• How are technologies being used for the initiative? • What are the barriers or challenges to using technologies for the initiative?
Management and organization	• How is the initiative organized and managed? • What organizational challenges is the initiative facing in achieving its objectives? • How are those challenges being overcome?
Policy	• What is the relationship between the initiative and the policy environment?
Governance	• How is the initiative governed? • What's the authority and role of staff, partners, and stakeholders? • How are citizens and other organizations involved in the initiative?
People and communities	• How does the initiative affect the population and communities of the city?
Economy	• What is the relationship between the initiative and the economy of the city?
Built infrastructure	• What is the relationship between the initiative and the built infrastructure such as roads, bridges, power grid, water systems, etc?
Natural environment	• What is the relationship between the initiative and the city's natural environment?

4 Findings from the First-round Analysis

This section presents findings from our first-round of analysis of documents and interviews in terms of the eight areas of the Smart Cities Initiatives Framework. The data provide insights into each of those areas. Interviewees talked more about technology, management and organization, policy context, and governance, than the other areas. Those other areas are at times not directly related to the smart city initiatives that we focused on, but those initiatives have some also an impact on people and communities, economy, built infrastructure, and natural environment, and vice versa.

The interviews provided evidence that smart city initiatives are influenced and shaped by technology-related factors, managerial and organizational factors, the policy context, and the governance structure.

4.1 Technology

Across the cities a range of technologies are being used to implement smart city initiatives. Interviews revealed various opportunities and challenges of using technologies. Smart city initiatives involve adopting new systems. For example, a new enterprise project management system allows a city to track the scope, schedule, budget, and the overall situations from a portfolio standpoint. Some interviewees considered a single database system for a number of different government programs as crucial to integrating and sharing information. While these technological tools are emerging as essential back office systems, social media and smart phones are drawing attention from city managers of smart city initiatives that seek to improve front lines of municipal services. For instance, social media is broadly used to engage citizens and give them an opportunity to get feedback from them. City governments' attention to smart phones as a possible way to bridge a digital divide is growing, because an increasing number of people are using the Internet via smart phones. Various mobile services through short text messaging and smart phone applications include collecting requests for municipal services and sending residents alerts of city information.

While city governments have such new opportunities from emerging technologies, traditional challenges around technologies in government still exist. All four different cities have recently experienced financially insufficient support stemming from budget constraints, which ultimately arise from the economy downturn. Some city governments lose human resource, particularly technology staff, and others miss an opportunity to update and upgrade technical systems that are pivotal to smart city initiatives. One interviewee emphasized the impact of "the right technology in the right time." Our findings bolster Ebrahim and Irani's [10] claim that technological challenges of government IT projects are mostly organizational rather than technical in nature.

4.2 Management and Organization

Interviews suggest various managerial and organizational insights. Despite different organizational and interdepartmental settings across the four cities, the existence of a leading organization is common in quite a number of smart-city initiatives in our study. There are diverse organizational forms that lead a smart city initiative. One type is a committee, which has a strong authority to command and manage the initiative. In other cases, one particular city agency or department takes the lead to organize a smart city initiative. The agency or department plays an important role in linking with other related internal and external organizations and stakeholders. Another type appears as a collaborative structure, where any particular organization does not have a strong authority in decision making and project management.

There are some common characteristics across the various forms. The role of communication and interaction is central to managing and organizing smart city initiatives. The initiatives require interdepartmental collaboration and cooperation through sharing information, resources, and sometimes authorities. Interviewees recognize interdepartmental and interorganizational meetings as essential to proceeding smart city initiatives.

Smart city initiatives may result in change in organizational culture, and in turn cultural change in city government also may influence smart city initiatives. Many interviewees reported changes towards a more service-friendly and participative orientation in the organizational culture. The initiatives can change the way city departments do their businesses. Data and information is key to the cultural change. Public management is increasingly being driven by data and information. Public managers' decision making is informed by more accurate data that smart city initiatives provide. In addition, more data and information can open governmental internal processes to the public. For example, smart city initiatives in one city are considered an effective way to blocking corruption and favoritism. Interviewees viewed these changes consistently increase transparency, integrity, and accountability to a substantial extent.

Managers interviewed commonly stressed the role of the top management in envisioning a smart city and championing smart city initiatives. The executive support facilitates citywide and organizational commitment to the initiatives. Many interviewees also emphasized political support from elected officials.

An obvious managerial challenge indicated budgetary constraints because some initiatives have not been full-blown due to limited funding. However, interviewees viewed smart city initiatives as maintaining and even improving the quality of city services given insufficient financial support. In this sense, the practical meaning of a city's smartness refers to successfully achieving the city government's goals and objectives despite some unfavorable conditions.

4.3 Policy Context

Each city has different policy contexts, but there are some shareable findings across the four cities though the findings are not necessarily representative of common characteristics of all cities studied. In one city, interdepartmental agreements are considered as policy requirements for interdepartmental workings for smart city initiatives. The mutual agreements stipulate measurable service standards.

Quite a few interviewees talked about policy directions made by the mayor or the city manager, respectively. Along with his or her strong support and championing of smart city initiatives, the mayor's policy directions shape the city's overall strategies to make it smarter. Various initiatives are formed in line with the mayor's and the incumbent administration's directions.

The mayor's political position also impacts policy directions that outline smart city initiatives. In one city, the mayor's administrative leadership does not belong to any political affiliation (independent). In other cities, the mayor's political affiliation may be one of the reasons for strong support for government-driven smart city initiatives from the public and groups.

4.4 Governance

There are diverse models for governance and thus different types of a governance body. The cases of the four cities showed there is no uniform governance model for smart city initiatives. Governance structures are embedded in all stages of any project: starting from conception of a smart city initiative, through initiation, through design, construction, and closeout (or maintenance in permanent projects).

Participatory, hierarchical, and/or hybrid models are found in various initiatives. In one city, a steering committee has been formed by high authorities of multiple departments involving in a smart city project. The committee may support existing decisions or make a decision when the participatory structure of governance cannot reach consensus. Interviewees identified the committee system as hierarchical and effective for relatively swift decision making. In another city, there is no formal governance body for a smart city initiative, but regular interdepartmental meetings play as informal governance structure. In this case, the relationship among city departments is important to interdepartmental partnership for collaboration on their smart city initiative.

While these models represent internal (within government) governance, governance also means the interaction with external actors. Smart city initiatives often entail intersectoral as well as interagency collaboration. In addition, governments increasingly pay attention to citizen participation in decision making, monitoring city services, and providing feedback. An individual citizen and civic groups are important players in governance of smart city initiatives. Interviewees also see governance as stakeholder engagement. Since smart city initiatives are citywide movements, stakeholders of the initiatives include various actors such as governments in other jurisdictions, nonprofits, companies, schools, universities, and individual citizens.

4.5 People and Communities

Smart city initiatives in the four cities promote citizen and community engagement. One meaning of a city's smartness may be to better know citizens' wants and needs and their opinions. Many initiatives solicit their ideas and feedback on governmental efforts to make a city smart. One interviewee's comment is noteworthy: "We want to be able to use constituents as eyes and ears to tell us what's going on." Smart city initiatives are using mobile technology, social media, and other technology-enabled innovative solutions to enhance citizen participation in city governance. Community engagement changes the relationship between citizens and government. People are getting more involved in smart city initiatives because they know those initiatives have a great impact on the quality of their life.

4.6 Economy

Interviewees considered a smart city as a city that intelligently combines its resources to provide the best economic and social conditions. Some smart city initiatives aim at fostering economic growth and enhancing a city's competitiveness in local and global

markets alike, by creating jobs and attracting skilled workforce. Smartness indicates using limited resources effectively because smart city initiatives should find more innovative ways and solutions in order to overcome economic challenges such as budget cuts and financial recession across countries. It was interesting to find that one city had looked beyond its boundaries and had actively teamed up with neighboring municipalities in order to make the entire region more competitive and attractive within the global context.

4.7 Built Infrastructure

We heard more about information and communication infrastructures than other physical infrastructures. Interviewees said IT infrastructures enable and facilitate various smart city initiatives. These information and communication infrastructures create capacity to deliver city services seamlessly to residents and businesses. In turn, some smart city initiatives aim to develop and further improve those infrastructures. As a case in point, in one city multi-agency efforts were underway to help build a smart power grid, which is capable of dramatically reducing the loss of energy and making the smart management of the entire power grid and its various sub-grids as well as individual buildings and households a reality.

4.8 Natural Environment

Interviewees had some opinions about conservation and sustainable development of the natural environment to ultimately improve the quality of life and create conditions as a livable city. The smart city initiatives that interviewees involve do not directly address issues of the natural environment, but some interviewees mentioned the impact of those initiatives on the natural environment as a larger context of a space for living. Cities are being socially responsible and striving to make various options available in order to be able to remain green and environmentally sustainable. Energy saving and environment protection are a tag for smartness in one city. A greener city or go green is included in the cities' strategic goals. Table 3 summarizes the findings discussed up to this point.

Table 3. Main Findings from the Interviews

Categories	Main findings
Technology	• New technologies for back office functions are used for the initiatives. • Social media and smart phone are increasingly used for the initiatives. • The lack of staff and budgetary constraints are main challenges.
Management and organization	• The role of a leading organization is essential to the initiatives. • Managing the initiatives involves interdepartmental collaboration. • The initiatives change organizational culture, and vice versa. • The role of the top management and leadership is critically important. • Limited funding continues as a major challenge.
Policy context	• Interdepartmental agreements shape the policy context of the initiatives. • The executives' policy directions shape policy context.

Table 3. *(continued)*

Governance	• Various types of governance models and governance bodies exist. • Governance encompasses programmatic directions, budgetary and resource allocations, the interactions with external actors as well as internal partnerships with other departments and agencies.
People and communities	• Smart city initiatives aim to better know people's wants and needs, involve citizens, businesses, and other stakeholders, and also improve the citizen-government relationship.
Economy	• Smartness in the context of urban economy indicates overcoming economic challenges, creating new jobs and businesses, and increasing regional attractiveness and competitiveness.
Built infrastructure	• Smart city initiatives develop information and communication infrastructures, and in turn those infrastructures promote smart city initiatives. Smart power grids and smart traffic control and steering are among such initiatives.
Natural environment	• Smart city initiatives help create desirable conditions for a livable and sustainable city by preserving and protecting the natural environment, which in turn increases the city's attractiveness and livability.

5 Future Research and Concluding Remarks

This study presented the findings from the first-round analysis of semi-structured interviews with government officials and managers in the four North American cities, with the reference to the Smart Cities Initiative Framework that the authors' previous paper [6] created. The study does not compare among smart city initiatives and the four cities focused, but it builds a new understanding of smart city initiatives and suggests insights and lessons that cities can share with each other.

The first-round findings reveal characteristics and challenges of smart city initiatives. Given budgetary pressures, financial constraints are main challenges in proceeding the initiatives. However, emerging technologies such as social media and mobile communication offer new opportunities to engage people in smart city initiatives. Smart city initiatives are changing organizational culture in some way. Data-driven and information-centric management enhances the level of transparency and accountability. Internal and external governance influences participatory and collaborative decision making related to smart city initiatives.

This study presents a first-round analysis of smart city initiatives and as such represents reconnaissance research. Future publications will focus on and discuss the investigated cases in fine detail. We will also add more smart city cases and practices around the world. At a later stage of our research we plan to perform a comparative study of smart city cases based on the data collected.

Acknowledgement. This study is partially supported by a grant from the Canadian Social Sciences and Humanities Research Council (SSHRC) of Canada and the home institutions of researchers in Canada, Mexico, and the United States: Université Laval, Centro de Investigación y Docencia Económicas, University of Washington, and

the Center for Technology in Government, University at Albany. The authors want to thank the valuable help and support from all the members of the "*Smart Cities and Service Integration Project*" research team. The views and conclusions expressed in this paper are those of the authors and do not necessarily reflect the views of the SSHRC or their home institutions.

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The Need to Adjust Lean to the Public Sector

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Abstract. Over the last decade all kinds of e-government processes have been developed. Governments are seeking rationalization of these processes in order to save money while maintaining or improving service levels. In the private sector Lean methods have been used to achieve these goals, whereas these are hardly explored for e-government. The goal of this paper is to translate the concept of Lean to the field of government. An in-depth case study was conducted in which Lean was applied. Lean concepts like value stream and removing of waste proved to be useful. Some public sector characteristics impede the direct use of Lean concepts. We recommend to adjust Lean to the nature of e-government. Attention should be given to public values, fragmentation, financial aspects and culture when applying the concept of Lean in the public sector and e-government.

Keywords: E-government, organizational change, organization theory, structuration theory, multidisciplinary approach.

1 Introduction

After having developed all kinds of processes driven by technology development, governments are seeking rationalization of their processes in order to save money while maintaining or improving service levels. Many of those processes have been developed and evolved over the years without specific attention given to the improvement. A concept that is currently embraced for improving business processes is Lean. Originally Lean was developed in and for manufacturing environments [1] and during the last decade Lean has been adopted by the services industry [2]. Lean inherently possesses viewpoints and terms that do not immediately ring bells in or are applicable to governmental environments, such as measuring of lead times/takt-time, upstream - downstream or a constant awareness of operational costs. The management concept of Lean is ill-defined [3]. Depending on perspective, Lean can both be described as a set of tools, an approach, a system, and a philosophy [4]. The absence of a clear view on Lean makes it difficult to translate the concept, but gives leeway to modify the concept to other domains, such as e-government. The challenge will be to find analogies that allow us to use the Lean methodology and tools in governments settings and ultimately identify areas and ways for improvement. The most direct transfer of Lean from manufacturing environments supposedly are voluminous production processes of tangible products in the public sector (e.g. army

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 54–65, 2012.

trucks). More generally, Lean is said to work best on repeatable tasks of a certain volume [3, 5, 6], tasks found in administrative and e-government spheres.

Lean is not without criticism and the impacts remain much debated [see for example 7, 8, 9]. Lean is also associated with high levels of failure [5]. The translation of the Lean principles to practice is often complicated [10]. Lean models need to be adapted to the public sector [11]. Current literature about Lean in the public sector does not focus on translating the concept and capturing the nature of government and often remains generic [5]. Our goal is to translate the concept of Lean to e-government and understand the idiosyncratic nature of this field. We will conclude that public value fragmentation, financial aspects and culture influence the core concepts of value creation and waste.

2 Background

2.1 Principles of Lean

The concept of Lean was spread by Womack, Roos and Jones [12]. They visited and studied several Japanese businesses to find out why they did so well on the global market.. They concluded that the Toyota Production System was successful because the core processes were organized in such a way, that all activities where done in the exact right way, in de right order and at the right time, to create ultimate value for the customer. Lean production was at that time in sharp contrast with traditional mass production systems, typically characterized by batches of identical products and queues. The Lean methodology identifies five core principles or phases; Value, Value Stream, Flow, Pull and Perfection. We will use these core concept as a starting point for our research.

1. Specify **value** from the standpoint of the end customer, define value in terms of a specific product with specific capabilities offered at a specific time.
2. Identify all the steps in the **value stream**, eliminating whenever possible those steps that do not create value.
3. Make the value-creating steps occur in tight sequence so the product will **flow** smoothly toward the customer. 'Flow' enables the organization to deliver more "customer value for resources". A flow is perfect when there are no stops between the order and the delivery to the customer, unless the customer might want it differently.
4. As flow is introduced, let customers **pull** value from the next upstream activity; design and provide what the customer wants, only when the customer wants it. 'In a pull system, the allocation of resources (humans, materials, finance) follows the customer demand' ([13], p. 16).
5. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, begin the process again and continue it until a state of **perfection** is reached in which perfect value is created with no waste.

Taiichi Ohno, one of the creators of the Toyota Production system, stated that it was extremely important to differentiate value for the customer, from muda – the Japanese term for waste. Within the context of manufacturing systems he identified seven types

of waste [14]. Womack and Jones [15] added an eighth. For the services sector ten forms of similar waste are identified [16]. We will use these ten waste categories to analyze our case study.

1. Overproduction – Results in an excess of products, products being made too early and increased inventory.
2. Waiting – Any idle time or period of inactivity (because an upstream activity has not delivered on time).
3. Extra processing or duplication – Any activity that does not add value to the product or service, e.g. rework, reprocessing, handling or storage that occur because of defects, overproduction or excess inventory.
4. Transport and motion – Any movement of materials, people, employees and equipment. Motion takes time and adds no value to the product or service.
5. Inventory (incorrect) – Any product or work (whether finished or not) that is not immediately used or required by the customer. Such inventory or 'storage' can result in extra processing and requires space.
6. Defects – Any product or service that is not according to the needs or specifications of the customer, resulting in rectification or rework and/or customer dissatisfaction.
7. Underutilization of people – Also referred to as 'a waste of talent', this happens when people are not 'used' to their full talent, skills or knowledge..
8. Lack of customer focus – Poor attention to the customer resulting in dissatisfaction because of defects or treatment.
9. Unclear communication – Use of incorrect information or an unclear workflow, which can result in defects.
10. Variation – Lack of procedures or standard formats

Hines et al. [3] discuss the four main criticisms of Lean; the lack of contingency and ability to cope with variability, the lack of consideration of human aspects (see also [17]), the narrow operational focus on the shop-floor and not considering the strategic level. They conclude that Lean has evolved and different applications and contingencies have been explored, while maintaining the Lean principles developed by Womack and Jones [15]. On that account the mentioned criticisms are less relevant these days. They state that a contemporary version of Lean consists of two levels; operational and strategic, whereby the operational level is about eliminating waste and the strategic level is about understanding value. Their comparison of Lean thinking to the stages of organizational learning emphasizes 1) that Lean has evolved and 2) that Lean is more than a tool but rather a mindset for which a level of 'organizational internalization' is required. "As such, this development is one of testing the boundaries of Lean thinking and the contingent modifications of the approach (within sectors, across businesses etc.) rather than any fundamental change to the Lean enterprise "design logic" (p.1005). We adopt this thinking in this paper and when translating the concept of lean to e-government.

2.2 Application of Lean and the Public Sector

For the services industry it has been concluded that Lean has the potential to contribute to aspects such as efficient production processes, increased product variety and customer focus/satisfaction. But that attention should be paid to the reinterpretation of Lean tools and concepts such as value [16, 18, 19]. In e-government many public organizations deliver services to accomplish social values and to serve administrative goals and their processes inherently reflect this. Since Lean has been used in the services sector, we might assume the application of Lean in the public sector could be a legitimate and worthwhile one but might require adaptions.

Over recent years public organizations have applied Lean, although only for a limited type of processes. Often Lean projects were implemented in only a sub-part of public organizations [20]. Apart from health care and maintenance of army trucks, little application and research with regard to Lean in the public sector has taken place, although some organizations have adopted a so called 'Lean services approach' [6]. Some of these adoptions have explicitly gone under the New Public Management heading, which over the last two decades has strived to bring more control, efficiency and performance than the traditional Weberian view, by implementing more market-oriented elements into the public sector. Recently however, research in public management is debating how to address the supposed weaknesses of NPM. Two examples of research in typical public sector organizations identify critical success factors and potential barriers for successful adoption and implementation of Lean thinking in public sector environment [5, 6, 21]. These include: organizational culture and ownership, organizational readiness and employee support, objective (cost cutting/lay-offs or improvement of process), management commitment and capability, need for change, link between improvement programs and strategy, adequate amount and skills of resources, training and knowledge transfer, communication, clear customer focus, people working and thinking in silos or whole systems thinking, too many procedures and targets, awareness of strategic direction, general belief that staff are overworked and underpaid, rewards, 'identifiability' of impact and realistic time plan/natural pace of change. Womack and Jones [15] describe Lean as a philosophy which should be adopted throughout the whole organization. Radnor and Walley [21] emphasize that Lean works best when both senior management and employees are trained and involved.

The public sector has characteristics that may impose barriers for the application of Lean. Bharosa et al. [22] identify a list of relevant differences between the public and the private sector including equal access and rights, lack of choice and no competitors, legislations, transparency and accountability, fragmented decision-making and public values. Rainey et al. [23] present an extensive and detailed list of differences between the public and private sector, such as degree of market exposure, political influences, breadth of impact, public scrutiny, complex objectives and decisions criteria and personal characteristics of employees. Challenges for Lean application in the public sector described by Bhatia et al. [24] include 'taking the customer's perspective' and Rainey et al. [23] list 'less focus on customer as a characteristic stemming from/ finding its cause in less market exposure in the public sector'.

3 Research Approach

By striving to understand the nature and specific nature of Lean within government, we opted for a qualitative approach based on a case study research [25]. Case study research is a common qualitative method used in the information systems (IS) field [26]. The case study research methodology is particularly well-suited to IS research, since the object of the discipline is the study of IS in organizations, and the 'interest is shifted to organizational rather than technical issues' [27]. This research was based on interviews, document collection and evaluation in a qualitative setting. Ten interviews and several workshops were organized with over 20 administrative staff and public managers. One of the authors was involved in the process improvement and conducted process modeling and analysis tasks and presented these in workshops to gain feedback. Both feedback concerning the process improvements as well as the method was collected. Documents relating to the initiation of Lean projects, decision-making, implementation, use and improvement were investigated in the first half of 2012.

A case study was conducted within a large Dutch governmental service agency, that was considered a frontrunner in the application of Lean. Its processes have different levels of complexity and often include many instances of interaction with citizens. Armistead et al. [28] identify five types of processes within organizations; operational, support, direction-setting, managerial and change processes. Much of the existing research on Lean concentrates on operational processes. Our case study concerns a support process within a large public organization with typical complexities of the public sector, as the procurement is constrained by legislation, heterogeneous stakeholders are involved and the activities are fragmented over several departments. In this we confront the Lean approach with the public sector characteristics.

4 Case: Lean in Practice

4.1 Tender Process

In order to translate the concepts of Lean to the public sector a case of the 'tender process' in a large Dutch government administrative agency was investigated. This case study was conducted during the first half of 2011. This administrative body has nearly 20.000 employees of many different blood types, due to mergers in the last 7 years. One of the more extensive and complex Lean projects concerned the 'tender process'. The deputy director responsible for purchasing was keen on reducing the lead times of tenders, as public procurement laws stipulate strict terms for contracting authorities for contracts above a certain financial threshold. Not complying with these can lead to legal actions and financial and reputational damages. The time squeeze would allow suppliers to be in the driver's seat. Also actors within the process would complain that the process itself was difficult because 'everyone wanted to say something about it'.

The tender process consists of three phases; Specification, Selection and Contracting. The average lead time of a tender turned out to be 452 days, whereas the process was designed under the assumption that it would take a maximum of 365 days; the trigger of the process is a sign (from system or responsible purchase manager) that a contract will expire within a year, or an internal client/department requesting the purchase of a certain product or service. So the organization would have a year to conclude a new contract. The specification phase took about half of the 452 days. For scoping purposes, the three phases were further researched separately. The specification phase consists of five main process steps (Fig. 1). The result of this phase is a Request for Proposal (RfP), which is published and serves as an invitation for potential suppliers to be a candidate in the tender and send in their proposals. The RfP contains the selection criteria used in the selection phase to select a contractor.

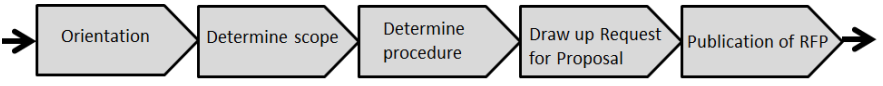

Fig. 1. Tender process: specification phase

4.2 The Five Principles of Lean in Case Study

Value: the customer in our case was the department in need of a certain product or service. This internal customer valued a signed contract, delivery of the product on time, and a product that was according to their needs. Of value in the specification phase is an RfP containing complete, correct and specific formulation of the needs and selection criteria, on which a selection can adequately be based.

Value Stream: For this project, we engaged a group of employees that were part of this process and fulfilled various roles. Together we mapped all 35 tasks within this process. This exercise gave us an insight into the order of activities, the time they took, who executed them and what kind of problems the employees encountered during execution. This process overview allowed us to identify the waste in the process. Table 1 shows that all of the waste categories were identified. In general, we concluded that about half of the steps did not add to the value of the desired output, e.g. waiting time, procedural/formal steps, steps not used to their purpose or another tool could provide more value.

Flow; First of all, many moments of transfer impede flow, because people of many different departments were involved usually one after the other. Secondly, the ideal tender process was not clear, nor was it in control in terms of steering progress and quality. In general cooperation between departments was difficult, due to internal focus (vs. seeing the whole) and focus on the content of laws and policies (vs. process view).

Pull; The customer did not act as a customer in defining exactly what was wanted or valued (not in terms of product that was the subject of the tender, nor in terms of what he needed the purchase department to do to help him get it). The process was not designed to have a trigger from 'the end of the line'/ downstream.

Table 1. Waste identified in tender process

1. Overproduction	*Activities executed before the content has been agreed upon by other actors (adjustments), documents that are not read (format not suitable, formalities)*
2. Waiting	*Documents waiting to be accorded, waiting for meetings to be planned, full agendas , no priority, many actors, conflicting and inexplicit interests*
3. Transport/Motion	*Collecting signatures*
4. Extra processing and duplication	*Adjustments to documents, rewriting in other format , signatures needed for (formal) approval, unnecessary reporting (formalities)*
5. (incorrect) Inventory	*Looking for the right document, unnecessary paper copies made*
6. Defects	*Unclear or lacking selection criteria (which would cause delays during the selection phase), top management adjustment in end of process, incomplete documents, late input*
7. Under-utilization of people/talent	*Purchase manager printing documents or collecting signatures, inadequate forms or system, limited authority/ dependence on formal functions*
8. Lack of customer focus	*Poor understanding of customer, skills /knowledge for clear specification*
9. Unclear communication	*Incorrect or incomplete information, lack of standard formats/ common language and ground, unclear work flow (mainly across the departments), inadequate cooperation, no clarity on responsibilities and mandates*
10. Variation	*Lack of procedures or standard formats, standard time not defined, procedures and standard formats exist but not used or not adequate for the purpose they needed to serve.*

Perfection; Previous steps were not fulfilled. During the improve and control (implementation) phases aspects of culture and change proved to be crucial (skepticism of change or drive for improvement, ownership/responsibility). Management commitment was lacking in the sense that managers were not keen on being transparent about the fact that their process could be done quicker and on a smaller budget (that would reduce their budget and power) and or an employee would be assigned to the Lean project, but in practice would not be given the time.

The measures implemented to reduce the lead times to less than a year and implement a controlled process with a higher quality outcome included the set up of multidisciplinary teams, designing a process in such a way that waiting times were significantly reduced and more activities executed simultaneously, more understanding of the tender process, redesign of formats, use of system throughout organization, paying special attention the quality of the product by for instance implementing quality checks/ go-no go decisions and training both purchasing and internal customers to be more specific on formulating needs and specs. Even though the implementation of these measures took time (and the lead times of tender did not allow a quick evaluation), the first results showed shorter lead times, more flow and a boost of employee and management sense of improvement, process view and morale.

5 Discussion; Translation Lean to E-Government

In the case the five Lean principles were used as a diagnostic tool. Assessment using the five principles of Lean showed that this process was 'far from Lean'. Hence, Lean can contribute to the identification of areas for improvement. The definition of value, visualization of the value stream and the identification of waste (the first two principles of Lean) was a valuable exercise, though purely diagnostic. Assessing the other three principles of Lean (flow, pull and perfection), resulted in the conclusion that there was no flow, no pull and no perfection. When attempting to translate the Lean concept to this new domain, we also need to consider (next to its use for assessment or diagnostic purposes) its potential to actually eliminate waste and how Lean could be fully implemented (i.e. all five principles fulfilled); or how both Hines' operational and the strategic level are translated [3]. We are inclined to identify a 'diagnostic' and 'holistic' purpose or level at which Lean can be considered.

Our findings suggests that a number of (interdependent) factors stand in the way of successful elimination of waste and establishment of flow, pull and perfection. Some of which are characteristic for e-government or fundamental to government structure, some are related to culture, public values and democratic system. Challenges and tensions include the following:

- System of appropriations and top management commitment; we see that adverse aspects play a role (e.g. a manager may be keen on improving his/her process but not on being transparent about the fact that this process can be done on a smaller budget, because that would mean a smaller budget would be appropriated in the following year. Such a change is also perceived as a loss of power or importance;
- Lack of cost-efficient and cost-effective awareness and behavior; sense of urgency or commitment to quality, few triggers to formulate needs and specs adequately, no clear customer focus or recognition of customer. The fact that nor customer nor supplier in the tender process acted as such may be more typical for support processes as the customer is internal. Nevertheless improvements are possible by taking the customer into account, including a better specification of the needs and selection criteria;
- Conflict between customer wishes (fast and low cost) with public values (transparent, correct and accountable);
- Waste from one view might not be waste from another view. Efficiency is favored over sound and transparent decision-making processes as is common in the public sector. The solely focus on waste and value from a customer perspective neglects the requirements coming from the broader social and democratic context;
- Emphasis on content of laws and policies and formalities, resulting in inward focus and lack of process view. Law is dominating the process and not the objective for having these laws;
- Bear-garden of decision-making; lack of effective control or means to effectuate decisions, activities fragmented over many departments, no culture where performance and renumeration/position management are linked;

Culture is crucial to successful improvement with Lean. It encompasses a wide range of factors seen in our case study, such as ownership, sense of whole and process, breadth of focus, commitment to quality or confidence in improvement and attitude towards change. It is also a factor that is manifest and specific for the public sector, likely to present the biggest impediment for successful implementation of Lean if not enough attention is paid to communication, motivation, empowerment, involvement and drivers.

Policies and legislation themselves do not necessarily have to constrain the possibilities of identifying and reducing waste; public procurement law was a main driver of the adoption of Lean and not an impediment, Lean helped to identify opportunities for improvement and contributed to the reduction of lead times of this support process, without compromising any regulations. However in the case it was not assessed whether the stipulations of public procurement law themselves where Lean, rather we took them as a given. We mostly identified formalities as 'not lean' since they did not contribute to the value materially. However, such legal constraints do have a value at a higher level of abstraction (in maintaining legality and legitimacy) and should therefore not always be counted as waste, or on the contrary are core to the role of government. Characteristics of government and its structures find their base in phenomena such as democracy, rule of law and separation of powers, which are generally valued greatly, or embed greatly valued aspects of life. Many structures (such as bureaucracies) and procedures have been built upon these phenomena and are firmly embedded in today's public sector. Even though, these are always subject of public debate, especially when fuelled by financial crises and public/societal discontent with governments. In our case, the supplier and customer were easily identified (despite the fact that they did not act as stereotype suppliers and customers) and so was the identification of 'value', which is the first principle of Lean. In general however (and potentially in further research into other kinds of government processes), it could prove to be difficult to identify who is the customer and what is of value to the customer. For collective goods in general there is no direct link between the demand and supply, nor signs for customers or citizens to 'value' a product or service. Instead, there is more push than pull and the supplier of services (the government) decides what is offered and when. This assertion brings us to the phenomenon of 'public value'; the customer of government in general is not only the citizen, but also a society as a whole. Lean puts the customer in front and do not consider other factors coming from the democratic system. In the quest to find the limits of Lean thinking and stretching its principles in order to find ways to improve public sector performance, what is of value and to whom needs to be determined, which is a much more complex exercise. Since NPM has failed to bring about a panacea for managing the public sector, the paradigm of Public Value Management has become increasing popular. The value then, comes in the form of enhanced safety, less poverty or better services and is determined by citizens. In this perspective citizens are the shareholders in how their tax is spent [29]. The focus is not primarily on efficiency, but also on creating social values like safety and accountability. Barking up the tree of public value for a useful interpretation of 'value', as the public sector equivalent to customer value in the private sector, needs further research.

Not all characteristics of the public sector need necessarily form impediments for successful implementation of Lean, rather different characteristics ask for different (management, change and process design) solutions. Some might even prove to be, if used appropriately, opportunities. For instance the fact that a sense of importance is present in culture ('we fulfill an important societal role') might be used to the advantage of improvement, when people are motivated by the fact that they contribute to the creation of public value.

6 Conclusions and Further Research

The concept of Lean was investigated in the setting of e-government in order to find out how and whether the application of Lean would be a valuable exercise. Whereas Lean is mainly used for operational processes, we conclude that Lean can also identify areas and solutions for improvement, especially waste, in a support process within a large public organization. It can contribute to the reduction of waste or the 'design-in' of flow and pull. In that sense Lean is a valuable diagnostic tool. But several tensions were found. The primarily focus on efficiency and customer does not take public values into account. Also the focus on customer (citizen) value creation does not consider the value for the democratic system. When adopted at a strategic level and implemented fully, it can optimize processes, stimulate culture and lead to continuous improvement. However, characteristics of government permeate all sorts of government process and greatly impede both the adoption, implementation and application of Lean in e-government settings. These specifics require adjustment of Lean tools and interpretations for better fit of application and solutions. In particular the following concepts should be given attention.

- Waste categories; some are less applicable or recognizable (transport), others may come in a particular form, such as the added 'incorrect' to inventory for use in service settings. Some aspects are not waste and necessary for the proper working of the democratic system
- Value; Government is about creating public value. Therefore the concept of Lean with its focus on customer (citizens) value should be complemented with public values. Opportunities for Lean in the public sector may lie in the concept of creating public value; where traditional Lean thinking is about creating customer value, Lean thinking for the public sector could be more holistic, by focusing on creating public value.
- Customer; in public settings customers in the actual sense of the word hardly exist. So they are harder to identify. In the Lean philosophy they are crucial, as they are the starting point for all other principles. We suggest that taking public value as a base can be useful.

Since aspect of culture such as both employee and management commitment are crucial, much attention must be paid to the establishment of a culture that recognizes the potential of Lean, improvement and joint creating of value. Further research

should answer how management and employee commitment in government settings specifically can be realized.

For the translation of the concept of Lean, we suggest that it could be valuable to make a clear distinction between 1) factors that determine the applicability of Lean in new settings (the applicability itself is enhanced by the evolution, broader interpretation or translation of Lean), 2) the factors that are relevant for the adoption and acceptance of Lean as a methodology and 3) impediments for successful implementation and improvement (of which 2. is a part). Such a distinction may help to ultimately separate the 'controllable variables' from 'unchangeable factors' and identify successful ways to improve government processes. In our case it was not assessed whether the stipulations of public procurement law themselves where Lean. The leanness of legislation and policy should be further researched.

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‘Demand Driven Development of Public e-Services’
Dominant, Hidden and Contrasting Stories

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Abstract. The idea of participation and demand driven development is not unique for the applied area of development of public e-services, it has for long been an issue in development stands and has moved relatively unchecked from the margins to the mainstream of development since mid 1980s. The promise of empowerment and transformative development has though been severely questioned during the past decade in development research and practice in lack of sufficient evidence that the idea is living up to the expected standards. However, in eGovernment, demand driven development of public e-service is on the contrary growing. Expectations such as enhanced use, better services and more efficient resource utilization are expressed in different contexts. In this article the idea of demand driven development of public e-services is analyzed discursively in order to gain a deeper understanding of how the narrative is told, retold and challenged. The results show that from a design perspective it is rewarding to acknowledge both the dominant, hidden and contrasting stories in order to understand challenges in development work.

Keywords: Demand driven development, public e-services, critical design approaches, discursive levels of design.

1 Introduction

In 2010 IDC Government Insight published a study [1] which describes IT spending and market-sizing forecast for the Western Europe government sector for 2008–2013 for hardware, software, and IT services in Western Europe will increase from $56.6 billion in 2008 to $68.5 billion in 2013. At the same time Europe is struggling with low usage of what is actually developed; “the majority of EU citizens are reluctant to use them [the public e-services]” [2 p. 3] and the European eGovernment Action Plan 2011-2015 stress, as several earlier documents have, the imperative of “involving users actively in design and production of eGovernment services” [2 p.7] as an important path to deal with this relation. Throughout the document the importance of a user presence is repeated over and over again in different shapes: involvement, empowerment, collaboration, flexible and personalized, user satisfaction etc. From

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 66–77, 2012.

reasoning it is understood that user participation is perceived as fundamental. The line of thought is expressed as a strong need to "move towards a more open model of design, production and delivery of online services, taking advantage of the possibility offered by collaboration between citizens, entrepreneurs and civil society" [2 p. 3]. So, the logic being that the citizens would use the e-services if they could be part of their creation and the underlying reason for the existence of e-services (and government IT spending) at all is articulated as "[public e-services] help the public sector develop innovative ways of delivering its services to citizens while unleashing efficiencies and driving down costs" [2 p.3]. The relation between these two statements and their interdependent logic; citizens would use the e-services if part of their creation and e-services would enhance service delivery and drive down costs, is though not further problematised.

The solution to this dilemma is though expressed as making the development of public e-services demand driven, based on the thought of ensuring the usage by letting the users-to-be to state what services they want, need and will use (even though these three elements not always corresponds) which is the starting point of this paper; the idea of demand driven development as the knight in shining armor solving many of the challenges eGovernment is facing today. The empirical context that will be addressed is based on the Committee terms of reference for the eGovernment Delegation ToR 2009:19 (decided upon at a Government meeting on 26 March 2009) stating the remit of the Swedish eGovernment Delegation. In this remit it is stated that "eGovernment, which is intended to simplify contacts with citizens and companies, should always be conducted on the basis of user needs and benefits..." [3 p. 6].The statement in the remit is regarded as one such instance (among many) where demand driven development is irradiated. What is put forward in this paper is that it is of great interest to explore in greater depth how the thought of demand driven development of public e-services is then conducted at a later stage. The design process of trying to put the idea of demand driven development of public e-services into practice is analyzed stepwise with a focus on the how early phases i.e. interpretations of overall goals into practical undertakings. In order to do so a discursive analysis of narratives is performed in a specific setting.

However, first, the paper is placed in the theoretical stream of 'critical design orientations' as a background to unseal the interpretative flexibility of IT-development and its practical undertakings, to actively reflect on the relation to existing politics and culture, and remove objects from the automatism of instant perception. Second, a methodology section presenting 'defamiliarization of taken for grantedness' as a method for enhanced critical reflection and deconstruction of taken for granted perceptions is put forward. Third, the case is presented and the three different stories that are unveiled (dominant, hidden and contrasting) are put forward, followed by a discussion on possible implications for eGovernment development work and ways forward. Thereafter the paper is closed with a conclusion and contribution section.

2 Analytical Framework: Critical Interpretative Flexibility

This article draws upon the tradition in the information systems (IS) discipline which focuses on interpretation, enactment and technological frames in relation to

technology in the making [4][5] in which our interpretations of technology are central to the understanding of our interaction with technology and how technology is constructed [6][7]. This gives that there is a need to address the design methodological limitations; social structures, culture, economy and institutional prerequisites etc. which impinge upon the design choices and the focus of the methodology. The view of the design process is then that it starts earlier than that often represented in traditional ISD understandings and that several delimitations are already constructed when IS designers traditionally enter the scene. What is interesting is then, not to continue searching for 'the right' requirements, but to create a deeper understanding of the nature behind normative constructs in order to design in a more reflective manner [8][9].The basic assumption is a more inclusive apprehension of design actions in which design actions are seen as stemming from perceptions, notions and ideas of a possible futures and the result of such actions are closely connected to these perceptions. They are co-created in multi-diverse contexts and often non-linear and complex, but still, they are design actions [10]. They are not always deliberative, conscious and elaborated upon, they might hide underneath formal and socially accepted norms with reference to development paths and possible futures, but, they will nevertheless, be unveiled during their creation. In the making of digital technology, highlighting, elaborating and analyzing these conscious and unconscious notions and ideas, creates a platform and structure from which to take constructs and situated meanings into account. As competing constructs of meaning are available it is important for interpreters to develop their skills to critically invest 'the taken for granted' and not uncritically accept 'ideas' because they are put forward by authority as being 'true'. A pre-design phase, not as in developing conceptual frameworks, but as in creating understandings of a vision, a goal on a more general level, not as a bridge between "technological research at the concept stage and social research at the impact stage" [11] but as the bridge between social research, at the understanding stage, and the technological research at the design stage i.e. to understand what the goal is.

How technology becomes enacted according to different interpretations is as such explained by the term 'interpretative flexibility' [4][5]. The concept of interpretative flexibility discloses the complexity regarding how different people interpret and create meaning in relation to technology and how these interpretations determine how digital technology is used and how it can contribute to the context [5]. In such an understanding, a critical base is important in order to understand the relationship between frames of reference and different interpretations; we are not equally positioned in relation to our possibilities to interpret, translate or enact technology. This also implies that empirical closeness and analysis of practice is of great importance and that the interpretations and enactments must be analyzed and judged in relation to the symbolic logic; "...practice needs to be criticized, analyzed and reinterpreted." [12 p.124]. This paper is linked to the critical tradition in terms of questioning existing forms of production of knowledge and especially hegemonic discourses, taken for granted character, and its embodiment in different processes, giving the concept of 'false consciousness' a central position. This is more in line with Orlikowski and Baroudi's understanding of the critical stance as the focus is on the taken-for-granted assumptions and the objective is to expose

deep-seated structures [13] and Walsham's [14] emphasis on construction and enactment, and historical and cultural contingencies.

Furthermore, it links the critical tradition more closely to design methodological understandings as in 'critical design' [15 p.11] highlighting deconstruction and defamiliarization [16] as a rewarding pathway for empirical studies. By focusing on a broad conceptualization of design practices, i.e. information systems' and or digital artifacts' in their making, the process of designing starts, in the first instance, from the standpoint that information systems and technological artifacts are linked to a certain discourse. The importance of 'defamiliarizing' and 'making strange' is linked to the "ideological dimension of everyday technologies" [15 p.2] and the objective of questioning "a culture of relentless innovation for its own sake" [15: introduction].To defamiliarize is to provoke, making ambiguous, and making strange is in order to discuss hidden social meanings. If not, we might be "superimposing the known and comfortable into the new and alien" [15 p.17]. Defamiliarizing could then be used as a methodology to break free of structures, in line with rethinking the assumptions that underlie technology [17]. Making the constructs (discourses) strange provides designers with the opportunity to actively reflect on existing politics and culture, and develop new alternatives for design [16] i.e. to remove objects from the automatism of perception. Questioning the naturalized assumptions inherent in the design opens up design spaces, and is a critical endeavor for two reasons: it (i) questions the taken for grantedness and (ii) reveals possibilities for transformative redefinition. Bell et al describes defamiliarizing as being essentially a rich description which renders strange the familiar [16].

3 Research Methodology: Defamiliarization of Taken for Grantedness

In order to do so, reflexive defamiliarization [16] is put forward, not only as a theoretical concept (as done above), but also as a methodological approach. Defamiliarization offers a means of criticizing presuppositionless representations and filters out subjective contaminants in order to enter into a dialogue with them. As such, it consists of different techniques for unveiling hidden structures, and enables a conversation about their concealed symbolic logic. This is in line with what Ceces-Kecmanovic calls 'demystifying technological imperatives' in order to expose hidden structures, reveal interests of privileged groups, and how they (mis)use IS [18]. As Bijker points out, what is imperative today in order to understand how technology is made is rather to focus on 'technological culture' as a unit of analysis (as opposed to the 'singular artifact') since; "technologies do not merely assist in everyday lives, they are also powerful forces acting to reshape human activities and their meanings" [19]. We need to understand the closed-in-hardness and the closing-out obduracy [19]. The closed-in-hardness occurs when we are significantly included within the associated frame (we are so intertwined with the frame that it is difficult to determine alternatives outside it) whereas the closing-out obduracy acts when we are excluded from the associated frame (we are so alien to the frame that it is difficult to determine

alternative interpretations inside it and therefore lack the possibilities to intervene). As such Bijker argues for a conceptual framework for politicizing technological culture; show hidden political dimensions, putting issues on the political agenda, opening issues up for political debate [19].

In this paper 'defamiliarization' is conducted by firstly performing the analysis in two contrasting steps; by identifying the obvious (what is repeated, what is often supported, what goes unquestioned) and then by challenging it from two aspects (what is not said, when silence occurs and when streams of arguments are interrupted and the opposite of what is said, by using the obvious as a mirror image). As such it is possible to create a dialogue in between the dominant and the hidden stories; a space in between them is created and an opportunity to relate them to each other evolves, which constitutes the third step. Taken together these three steps assist in relating the theoretical ideas on defamiliarizing in order to provoke, making them ambiguous, making them strange and discussing hidden social meanings, and to create deeper understandings of the ideological nature regarding how our everyday social and cultural experiences are mediated by digital artifacts. This is in order to, touch upon the complex nature of design activities and to contribute to a perspective in relation to digital technology and social change "from within", i.e. digital technology in the making.

4 The Case: The Idea of Demand Driven Development of Public e-Services

As is often the case associated with public development, different delegations, investigations, working groups, and spheres of responsibilities are created and re-created through periods of political shifts and organizational changes; in this case, the eGovernment Delegation was formed after the eGovernment Action Plan was decided upon in 2008. The Delegation was established in order to "strengthen the development of eGovernment and create good opportunities for inter-agency coordination, a delegation for eGovernment is being established" [3]. It consists of the sixteen director generals and two experts, and, as support, there is, in addition, a secretariat. The first task of the Delegation was to propose a strategy for the government agencies work on eGovernment which was delivered in 2009 (As simple as possible for as many as possible - from strategy to action for eGovernment, SOU 2010:62) [20]. A proposal in this document was that responsibilities were to be divided into four different developing areas (business and business enterprise; geo-information and property information; private citizens; vehicle and drivers) with one appointed responsible public authority linked to each developing area. This structure was approved of and the Swedish Companies Registration Office (hereafter referred to as SCRO) was appointed as the responsible authority for one of this responsibility areas; business and business enterprise.

In order to accomplish this, they set out to have so called 'dialogue meetings' as an initial activity in order to have the opportunity to listen to the stakeholders (other public authorities and different interest groups).These dialogue meetings took place during the autumn of 2011 (four meetings were held during September and October)

and they constitute the primary context in which the observations were performed. The objective of these meetings was to reach the foundation SCRO needs "to decide upon how to proceed with action plans and continued dialogue". Each meeting lasted for four hours (starting with a joint lunch), had between 11-28 participants, and was based upon six questions (which had been previously given to the participants) and one of these questions was explicitly: - How can we ensure a customer and demand driven development? reinforced by the additional remit from the Minister of IT; "to make IT serve the citizens". As such these dialogue meetings could be seen as one location (among others) during which the idea of demand driven development is performed and translated, and will therefore constitute the context of this study. The participants at these dialogue meetings are, in this study, all considered as being part of the making of 'demand driven development' in terms of translators and communicators of the idea. They are also key actors in terms of their leading positions in their respective organizations and are therefore interesting to close in on as early translators with specific conditions to influence later development phases.

The analysis is, in accordance with the methodological framework conducted in three steps: (1) to listen to the dominant stories; what is repeated, what is often supported, what goes unquestioned, (2) to challenge these dominant stories in two ways; listen to what is not said and (3) the contrasting stories; actively searching for the opposite of the dominant stories.

4.1 Dominant Stories

During the observation, and confirmed during the reading of the notes, five dominant stories surfaced very explicitly. They were repeated over and over again, often confirmed by the other participants and almost never questioned. The first and strongest was (i) the easy-argument. It was presented in the introduction (with reference to the Minister of IT and the document "As simple as possible for as many as possible - from strategy to action for eGovernment", SOU 2010:62) and returned to by many of the participants in different forms. It was talked about as: "one-stop-shop"," one-way-in"," it should be easy"," the importance to simplify the processes", "as simple as possible"," to simplify every day activities"," simplicity as the keyword"," a really easy way in", "preferably performed without effort at all", "easier", "one task one time". In all but two of these instances, these statements were never questioned.

The second and next strongest was, (ii) the need of cooperation and shared efforts. This was also presented in the introduction without any clear reference, but, was somewhat related to the remit of the eGovernment Delegation to coordinate and standardize. Cooperation and coordination were talked about in two slightly different ways, the need for cooperation and the complicatedness of being coordinated: "to cooperate is important"," important that we are able to coordinate us", "synchronize", "everybody builds their own solutions" (stated as something they all needed to stop doing), "the responsibility to be coordinated", "to coordinate the infrastructure", "the importance of us talking to each other in order to coordinate". But also: "let oneself be coordinated", "to choose to accept to be coordinated"," we ask for coordination and steering but we are having trouble in accepting to be steered".

The next three were present in equal force. The third was (iii) the need of a shift of perspectives. The participants often returned to how this should be made as a shift in perspectives; “an enhanced customer orientation will change it”, “making change in attitudes”, “all authorities should have the company perspective”, “to try to understand the companies’ perspective”, “the company perspective”, “we are changing the perspectives”, “we have to view this from the entrepreneur’s perspective”. The fourth, (iv) concerns the importance of listening in order to understand the needs: “the importance of listen and learn”, “how do we pick up the need”, “how do you pick up the point of views”, “it is hard to get hold of the entrepreneurs’ point of views”, “hard to reach”, “the importance of dialogue to listen and get hold of good ideas”, “dialogue is a keyword”. Finally, the fifth story, was (v) how to ensure demand driven development; “we need to ensure demand driven development, but how”, “we often talk about this, but how do we do it?”, “how do we pick up creative and forward-looking solutions?”, “how are you doing to get a customer focus?”, “the trick is the methodology in this, can we find a collective way?”, “how do we ensure this?”, “how do you do?” (addressing the whole group), “it is hard to get hold of the viewpoints”.

The five dominant stories appeared to be incorporated, or on their way to being incorporated with the help of the dialogue meetings. Some’ how-questions’ were touched upon while stressing the importance of listening in terms of “how do we...” and “it is hard to...” but they were left untouched and did not render any further attention. Only on one occasion did one of the participants quite silently state that: “maybe it should not be that terribly simple, an amount of slowness is constructive”.

4.2 Hidden Stories

After analyzing the material with the objective of identifying the dominant stories, the material was returned to with a counter objective; searching for what is not said and what the opposite is of what is said and three very interesting stories were present in their absence. When returning to the material it was quite noticeable that they were left out. The most absent story (i) was the taken-for-grantedness of the idea of demand driven development of public e-services in itself. None of the participants reflected upon whether there were any difficulties, threats or complexities intertwined with the image of demand driven development of public e-services that might require attention. This awakens several interesting interpretations, for example the power relations between the participants and the organizers and between the participants. The organizers highlighted the idea of demand driven development of public e-services in the introduction of the dialogue meeting as an already agreed upon goal, not explicitly referring back to the remit (“eGovernment, which is intended to simplify contacts with citizens and companies, should always be conducted on the basis of user needs and benefits...” [3p. 6] but vaguely, as something ordered from above, and it might, as such, imply that there should be some uneasiness to be questioning the organizers. Furthermore it is possible to interpret the silence being as if the participants did not want to be the one questioning something that all the other participants obviously agreed upon, in other words, to be the odd one out.

The interpretation was thus that it was not felt that the dialogue meetings were the appropriate forum for the participants to have such open discussions. Even so, by not questioning and scrutinizing the idea in relation to demand driven development, the opportunity to discuss shared challenges was missed. Another interesting reflection on the absence of questioning is in relation to how easily these kinds of ideas might travel on different levels. Of course, it is also possible to interpret the absence as if the idea of demand driven development of public e-services has already been identified, acknowledged and entrenched in each participating organization. Their participation is then, in itself, only a confirmation of their shared interest.

The second absent story was (ii) the absence of technology. A great many hopes and goals were expressed and, in a way, all of them involve technological solutions, but the technology in itself was never touched upon. One interpretation of this might be a view on technology as being uncomplicated, as a device that makes everything possible, and that the participants shared a trust in technology to solve all the issues. In one instance, one participant reflected upon the possibility that innovation might not be as quick and easy as is often claimed and that they might be rather too technologically Utopian in their expressed hopes, but, nobody reacted to that statement and it remained uncommented upon. The absence of technology at these dialogue meetings is interesting since much of what is conducted in the next step is both very technologically intense and focused, and the participants represent important positions as they hold different leadership roles in relation to technological development in the organizations they represent. The fact that technology is not touched upon in this more visionary phase awakens an interest in knowing when and how it actually surfaces later on.

Thirdly (iii), there was not a complete silence but a very modest attention given the relation between wishes and complex roads to goal fulfillment. The dominant stories of easiness, cooperation, shift of perspectives, importance of listening and the importance of ensuring a demand driven development were very seldom accompanied by reflections on a possible complexity in achieving them. It was almost as if the participants interpreted the meetings as an opportunity to encourage each other that they needed to do this. If and when they were to discuss roads to fulfilling these goals, was not actually touched upon.

4.3 Contrasting Stories

To then perform the second form of defamiliarization and contrast the dominant stories with their opposites, several interesting images develop. The contrasting stories are similar to the hidden ones but with an important distinction; they take the dominant stories as a starting point attempting to actively search for their opposite (whereas the hidden stories are not as closely linked to the dominant stories). By using the dominant story as the take-off-point, certain limitations are present which are not present in listening in relation to what is not said (as in the hidden stories).

The five dominant stories; (i) the easy-argument, (ii) the need of cooperation, (iii) the need of shift of perspective,(iv) the importance of listening and (v) the search for methods to ensure that the development is demand driven and are made strange in the

analysis. They are interpreted as strange statements and their opposites are made familiar i.e. put forward as less strange and more possible. By doing so, five new stories emerge, the contrasting stories (see table 1 below):

Table 1. Contrasting stories of demand driven development

Dominant story	Contrasting story
The easy-argument	*The complexity-argument:* It is not as easy as it sounds to create easiness for the users; there is an inbuilt complexity that needs to be taken into account.
The need of cooperation	*We could do it separately*: There is no need of, or too hard, to cooperate. The development is done separately by each organisation.
The need of shift of perspectives	*Tunnel vision*: There is no need of, or too hard, to shift perspectives. The development is done by narrow definitions.
The importance of listening	*In house centricity*: There is no need of, or too hard, to listen to stakeholders outside the own organization. The development is done in house with no openness to needs and perspectives from outside the own organisation.
How to ensure demand driven development	*No need to ensure*: There is no need of, or too hard, to ensure a demand driven development i.e. it is possible to talk about demand driven development but no need to ensure that it is done.

In summation, the combination of the contrasting stories provides a picture of a development process that is more likely to be complex, they are doing it on their own, they stick to the accustomed view of their users, their apprehensions are that there is hardly any use in listening to the users and if they were to perform demand driven development it is not that important to ensure that they are actually working in such a way.

This picture might be somewhat exaggerated but at the same time it addresses several interesting challenges for practitioners to deal with. If, (i) the dominant stories are the stories that are performed and reinforced in public, (ii) the hidden stories are those that are possibly performed in disguise, and (iii) the contrasting stories are those that are not actively talked about. In the next section these three different logics will be analyzed in relation to their consequences for IS design practitioners.

5 Discussion: The Discursive Level of eGovernment

As shown in the case above, by playing with different ways of hearing, listening and interpreting, several stories become visible; what is said, what is not said and what the 'is said' is making strange. What is said (the dominant stories) is important to recognize since it is probably the message that will be actively communicated forward in other situations. It is what the participants interpret as being important to know and say and will be referred to as the 'result' of the workshop and the meeting with other leaders in the other organizations. The dominant stories are legitimate, and made legitimate. As such, the dominant stories will travel and be strengthened as normative

visions of what should be done and how. The hidden stories are, on the other hand, what is not said, what will not be communicated. The hidden stories consist of things that the participants passively stay away from in relation to forward communication. They are not consciously avoided; they are merely hidden and forgotten about. They are, as such, not legitimized as being the dominant stories, they are rather forgotten and seldom touched upon, and do not exist in everyday practices as explicitly as the dominant stories (and sometimes the contrasting stories). The way the hidden stories travel is different from both the dominant and the contrasting stories (which are more similar), they are not kept alive since they are not touched upon, and they are not questioned or challenged, since they lead a concealed life. Lastly, the contrasting stories are the opposites of those being promoted as the dominant stories. The contrasting stories consist of aspects that the participants will actively stay away from in relation to forward communication and if they are to communicate them they will be very careful about who they are actually communicating with. They are threatening in several ways (to the individuals and to the organizations). They are, as such, not only hidden but also sometimes actively and collectively denied. The denial is, however, an effective way of keeping them alive, what is kept in the dark is often very vivid.

Thus, what are the consequences for eGovernment practitioners of the three different approaches (dominant, hidden and contrasting stories) and their inner characteristics (see table 2 below). The dominant stories are the 'from above communicated visions' the practitioner will meet in the phase of understanding the articulated goals of what should be done. They are often put forward as guidelines for the organization and translated and enacted upon at different levels in the organization in relation to the specific activities. As such, they appear as translated guidelines in the visions relating to the change work. However, for the practitioner they are not uncomplicated. They are often on a visionary level weakly linked to the organizational context. They are shared visions on the visionary level but, in practice; they seem to change and be challenged.

The hidden stories are more complicated, they are harder to discover early in the process, they are more often experienced down the road of the development work as things that the organization should have been aware of. They are somewhat challenging for the practitioner since he or she might feel the need to communicate them back to the organization but, at the same time, becomes aware that it might not be hers or his responsibility, and that it is a rather sensitive area in which to enter.

The contrasting stories are even more challenging; they are actively retained in disguise. Organizational members might have many strategies with which to deny their

Table 2. Implications of different stories

Design implications	Type of story	Design phase	Design challenge
	Dominant stories	Early	Weekly linked
	Hidden stories	Quite early	Sensitive
	Contrasting stories	Late	Threatening

existence. This means that their discoveries often occurs at too late a stage in the development work, and also sometimes form part of the reason that the change process fails.

The above analysis is only one illustrative example of how reflexive defamiliarization might work in order to deepen the understanding of the discursive level of design. It illustrates several challenges that practitioners will experience sooner or later in the development work and that they might need to be aware of in a more knowledgeable and reflective manner.

6 Conclusions and Contributions: What Is Not Said is Maybe What Is Done

The line of argument in this paper is that it is of great interest to explore in greater depth how the thought of demand driven development of public e-services is conducted at a later stage. In order to do so a discursive analysis of narratives is performed in a specific setting and placed in the theoretical stream of 'critical design orientations' as a background to unseal the interpretative flexibility of IT-development and its practical undertakings. Defamiliarization of taken for grantedness is used as a method for enhanced critical reflection and deconstruction of taken for granted perceptions and three different stories are unveiled (dominant, hidden and contrasting) and their influence on practical development work is discussed.

The thorough analysis of constructs and situated meanings in relation to digital technology in the making, directs the attention to the early phases of transformative work in practice, highlighting the challenges that practitioners are facing later on. As such, methodologies aimed at 'twist and turn the taken for granted' are constructive. Defamiliarization and making strange place the ideological dimension of 'technology in becoming', in this case demand driven development of public e-services, in the limelight. It is argued here, that reflexive defamiliarization is not only a theoretical approach but also a hands-on methodology; a tool for practitioners to create a deeper understanding of the relation between the discursive level and the later phases of more tangible design decisions.

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Improving PA Business Processes through Modeling, Analysis, and Reengineering

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Abstract. Too often e-government services are derived from "old style" intra- and inter-administration Business Processes without taking into account the potentiality of adopted technologies.

In this paper we present our experience in Inter-organizational Business Processes modeling, analysis and reengineering in order to make them more effective and efficient. We used semi-formal notations to model three complex services. To do that we directly involved domain experts and civil servants. Thanks to the resulting models, we identified several pitfalls and opportunities for improvements. As a result we were able both to derive ameliorated versions for the analysed services, and to identify common "bad habits" in the specification, permitting to define a general quality framework for services improvement.

1 Introduction

Since the 90s, the Public Administration (PA) has changed profoundly thanks to the introduction of Information and Communication Technology (ICT) delivered by the investments made by PA for the development of the digital society. PA services are today widely available via ICT based solutions. Nevertheless poorly structured organizational Business Processes (BPs) result in low quality PAs outcomes, inefficiency and ineffectiveness.

Initially ICT solutions have been introduced within single offices, successively the challenge became the possiblity of permitting the direct interoperation of different software infrastructure, so to have an integrated PA. Nevertheless such integration is still on-going and many issues still need to be solved. In particular the intregration initially referred to the communication infrastructure and now the effort is particularly interesting with respect to the application level. At this level BP specification is the main instrument to describe how related administration could effectively cooperate. Nevertheless BP specifications are extremly complex and careful evaluation should be undertaken to assess their effectiveness and efficiency. For instance too often specified BPs strictly reflect paper based interactions, and do not take into account possible opportunities that ICT solutions could provide.

In this paper, we report on our experience in BP modeling, analysis and re-engineering. In particular we considered three BPs of various complexity. Together with domain experts we modeled them using BPMN 2.0 The notation

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 78–89, 2012.

resulted to be highly intuitive so to permit the easy exchange of information and idea between technology and domain experts. Thanks to the notation we were able to identify common pitfalls and to suggest solutions for re-engineering processes.

The rest of the paper is organized as follows. The next section presents related works, whereas Section 3 introduces basic concepts in BP modeling. In Section 4 we describe the various case studies and then in Section 5 we report the derived quality framework. Finally, before drawing some conclusions and opportunities for future work in Section 7, we describe the re-engineering phase.

2 Related Work

Modelling and re-engineering PA BPs are quite complex tasks. It is well know that between 60re-engineering is considered a mean of rightsizing government. At the same time it is a possibility for information systems redesign [1]. Generally speaking several approaches can be found in the literature regarding the re-engineering of BPs for improving government. This aspect has been discussed in general by the US federal government and the US Department of Defense in [2] and with respect to specific context of use, e.g. department organization in [3], and electronic voting in [4]. In literature there are also example of more structured approaches. In particular, in [5] the authors discuss a methodology to support an integrated environment that can be used for better law and process re-design by performing formal analysis on the BP specification. These approaches are different from what we propose here since they do not particularly face the challenges of complex inter-organizational BP, where communication and coordination play a fundamental role.

3 Business Process Modeling

Technically services are modelled and implemented using notations and tools based on the BP concept. "*A BP is a collection of related and structured activities undertaken by one or more organizations in order to pursue some particular goal. Within an organization a BP results in the provisioning of services or in the production of goods for internal or external stakeholders* " [6]. In addition to the BP concept collaborative BP represents an issue in order to reach the suitable point of view able to represent the right abstraction level [7]. Recent works show that BP modelling has been identified as a fundamental phase in Business Process Modeling (BPM). The quality of BPs resulting from the BP modelling phase is critical for the success of an organization. Its importance exponentially grows in order to support inter-organization process and related service delivery. Different classes of languages to express BPs have been investigated and defined. There are general purpose and standardized languages, such as the BPMN 2.0 [8] or the Event-Driven Process Chain [9] and many others. There are also more academic related languages, being the Yet Another Work-flow Language [10], based on Petri Nets, the most prominent example.

In our work we refer to BPMN 2.0 [8] an Object Management Group (OMG) standard. This is certainly the most used language in practical context also given its intuitive graphical notation. We mainly use collaboration and conversation diagrams in order to have a complete representation both of internal process as well as of the message exchange structure. In particular, conversation diagrams are suitable to models message exchange between participants that together achieve a common goal.

4 Case Studies

The work we present relies on three real case studies concerning PA provided services. All of them are examples of inter-organizations BP with several interactions between PAs. In particular, the considered services are:

- ***Family reunion*** – this is a service available for people legally residing in Italy which can apply on behalf of their relatives (spouse, depending parents, children less than 18 years old) for the purpose of family reunion and only after having provided evidence of their status with respect to "sufficient" incomes and a permanent address.

- ***Grant citizenship*** – this is a service used to ask for Italian citizenship by a foreigner or stateless person who has married to an Italian citizen or who is continuously residing in Italy since not less then three years.

- ***Bouncer registration*** – this is a service used to register bouncer in order to carry on their activity within public places.

The first and the second service require complex and inter-organizational BPs and they are in place for several years now, therefore can be considered deeply tested. To give a quantitative indication in 2010 the Prefecture of Ancona (the capital city of Marche Region, in Italy) received 469 applications for family reunion and 760 applications for granting citizenship. For what concerns the bouncer registration service, even if it presents a simple scenario, we choose it because its deployment is still on-going. We had the opportunity then to intervene and contribute to its development. In the following of this section we illustrate the different processes, and we provide some data useful to have an idea of their complexity. For each process we developed a BPMN 2.0 specification in the form of a collaboration diagram that we do not report here given its graphical complexity and needed space[1]. In the following we provide a general description of each service, as they have been initially described by domain experts in the form of scenario specifications.

Family Reunion. The family reunion service is based on the principle of "family unity". In 1986 the first immigration law was promulgated in Italy as a result

[1] Source of process models can be find in: http://ueg.blog.cs.unicam.it/?p=414

of the large number of applications submitted by foreigners in order to be reunite with their relatives. The Law went through several changes before the current version. The latest changes have been made by the legislative decree of 3 October 2008, n. 160 and then by Law 15 July 2009 n. 94 named "Measures for public safety".

Several participants are involved in the delivery of this service. The beneficiaries are both the foreigner, which applies for family reunion (or a patronage that acts on his/her behalf), and the family members to be reunited. The different PAs involved in the service delivery are:

- The Prefecture is the main driver of the process, on behalf of the Department for Civil Liberties and Immigration of the Ministry of Interior according to the geographical location of the applicant.
- The Police headquarters is in charge of public security controls and they give opinions on the feasibility of the application.
- The Italian authorities abroad (consulate or embassy) is responsible for verifying the subjective requirements.
- The Ministry of Foreign Affairs communicates the result of the procedure to the Italian authorities located in the state of the requesting beneficiary.
- The Ministry of Finance is in charge of releasing the fiscal code for the incoming relative.

To support the process the Department for Civil Liberties and Immigration of the Ministry of Interior developed and deployed a "one stop shop" service for immigration, named SPI. All the 106 Italian prefectures can access and use the system, which permits to the beneficiaries to electronically apply and verify the status of the request, via a secured access. The main steps of the BP supported by the SPI are described in the following.

1. The BP starts with a reunion application done by beneficiaries living in Italy using a downloadable software client freely available after registration.
2. The application is managed by the SPI and assigned to a prefecture that asks, for public safety constraints, to the Police Headquarters and than invites the beneficiary to the Prefecture in order to check her/his status. Both the opinions from police and Prefecture may be cause of application rejection. Otherwise in case of acceptance the Ministry of Foreign Affairs provides the go-ahead ("nulla osta").
3. After the release of the "nulla-osta" the relative that has to be reunited goes to the Italian consulate or embassy in its country, and proving some specific requirements asks for VISA in order to come to Italy.
4. Once in Italy the foreigner must go (within 8 days) to the Prefecture in order to register his/her arrival in Italy, to receive the fiscal code, thanks to the interaction with the Ministry of Finance, and to finally obtain the residence permit.

Grant Citizenship. Grant citizenship is a service to be used by foreigners and stateless persons to ask for Italian citizenship. The first regulation is the Law of

13 June 1912, n. 555 implementing the concept of family relationships assigning a position of absolute pre-eminence of the husband respect to his wife, at that time commonly recognized. After several law evolutions currently the law n. 91 5/2/1992 declares as main principle that of "ius sanguinis". At the same time, taking into account the strong migration occurred in our country, people can obtain Italian citizenship for marriage or after long residence.

Several participants are involved in such service. The beneficiary is the foreigner which applies for Italian citizenship and the participants are the different Public Administrations involved in the service delivery as following:

- The Prefecture, on behalf of the Department for Civil Liberties and Immigration of the Ministry of Interior according to the geographical location of the request, is the main actor and drives the process, receiving the request, checking the requirements and giving the opinion;
- The Ministry of Interior receives electronically the request and the documentation, checks them, valuates the instance and took the final decision;
- The Municipality officiates to the new citizen sworn;
- The Ministry of Foreign Affair, Police headquarters, Ministry of Justice and public security offices such as Information Agency and External Security, Information Agency and Internal Security, give their opinions on the application.

In order to support the process the Department for Civil Liberties and Immigration of the Ministry of Interior decided to develop an electronic system, named SICITT, suitable to manage requests and documentations for granting citizenship. SICITT satisfies the needs of the Ministry of Interior to communicate with other offices involved in the process of grant citizenship mainly to obtain the opinions. It is in use in all the Prefectures and in almost every police-headquarter. The main steps of the BP supported by SICITT are described in the following.

1. The process starts with a request done by the foreigner by ordinary mail or delivered by hand to the Prefecture. The SICITT foresees that an employee uploads the request.
2. Document verification is the next step according to the following conditions.
   a) The prefecture asks to complete the documentation in case some document is missing. Then the applicant has to produce and deliver the required documents to the Prefecture, otherwise the citizenship office begins the procedure for instance rejection.
   b) The prefecture notifies the begin of the rejected procedure if some requirement is not satisfied. In 30 days the applicant has to solve such condition otherwise the request will be classified as inadmissible.
3. On the other side when the documentation is complete and all the requirements are satisfied.
   - The request inserted in SICITT becomes visible to the police-headquarters that checks the absence of impediments, and then expresses an opinion. If the Prefecture does not receive the police-headquarters opinion in 6 months, it solicits the office.

- Only after receiving the opinion of the police-headquarters, the Prefecture sends its opinion to the Ministry of Interior. Contemporary to the receiving of the application to the Ministry of Interior, the SICITT automatically sends a request of information to other involved offices.
- Only after receiving all the opinions, the Ministry of Interior verifies the instance and it can decide to: (i) ask for an integration of the documents; (ii) start the procedure for the rejection of the instance; and (iii) confirm grant citizenship. Any final decision is sent to the Prefecture that is in charge to notify the applicant about the decision.
- In case of confirmation, the Prefecture asks to the municipality to call the applicant for the oath. Only after the communication that the applicant has sworn, the process is closed.

Bouncer Registration. The bouncer is a person employed by a cinema, recreation ground, nightclub or similar establishment to prevent troublemakers from entering or to reject them from the premises. In Italy, a national registry has been created according to the Ministry of Interior decree of 6 October 2009.

Several participants are involved in the provisioning of such a service. The beneficiaries are the managers of public place or vigilance institute that do the request, and the bouncer who will be registered in the list. The participants are the different PAs involved in the service delivery. In particular, we refer to the following:

- The Prefecture, on behalf of the Department of Public Security of the Ministry of Interior according to the geographical location of the place, has to receive the request and decides for granting or rejecting decree;
- The Police headquarters and several police departments such as Police anticrime, General Investigation division and Special Operation (Italian acronym DIGOS) that give their opinions.

To guarantee the process the Department of Public Security of the Ministry of Interior is developing an application, named BTF to electronically manage the requests of inscription in the registry. Up to now the BTF is going to be used by all the Prefectures and the police-headquarters, but it is expected that in a second phase it will support a fully interactive service. The main steps of the BP supported by BTF are described in the following.

1. The process starts with a request delivered by hand or by ordinary mail, from a manager of a public place or of a vigilance institute, to the Prefecture in charge to manage it. The request is successively manually uploaded into the BTF by an employee.
2. The Prefecture proceeds with the documents verification, it may happen that the documentation is incomplete. In this case it asks for integration to the applicant.
3. When the documentation is complete, the Prefecture analyzes it and then waits for the opinion from the police-headquarters that has to come within two weeks. If the Prefecture does not receive the opinion, it has to solicit the police-headquarters.

4. Before giving the opinion, the police-headquarters asks to other police offices, Police anti-crime and DIGOS, for receiving more information about the bouncer.
5. After receiving all the opinions from all the police-headquarters, the Prefecture decides the instance. If it is positive the inscription in the list of bouncers is authorized, otherwise the request is rejected.

Case Studies Modeling with BPMN 2.0. The scenarios informally described above are made complex by the many possible exceptions which can occur after their activation. It was quite clear that a natural based language specification would have shortly ended in chaotic descriptions. In cooperation with the domain experts we started to model each BP using BPMN 2.0. This notation resulted enough intuitive for domain experts and with our help we managed to derive diagrams for each BP. The first step has been the definition of involved actors and of the communications intervening among them. This led to the definition of the BPMN 2.0 communication diagrams for each case scenario.

Successively we iterated several times in order to define the collaboration diagram for each service. As said, given space constraints, we do not report the diagrams here, nevertheless some number can roughly provide an idea of the complexity of such BPs. For the different classes of graphical constructs provided by BPMN 2.0, Table 2 reports the number of instances which are included in the different BPs for each different class of constructs. It is worth mentioning that each message exchange typically introduces complex relationships among different actors (pools), leading to intricate workflow scenarios. Moreover unnecessary synchronizations, caused by message exchange, tend to reduce the degree of parallelism possibly leading to BPs lasting longer than necessary.

Table 1. Complexity of services under study

	Pools	Activities	Events	Decision Points	Message Flow
Family Reunion	8	57	74	29	36
Grant Citizenship	11	75	93	42	62
Buncher Registration	6	16	24	14	17

5 A Framework for Analysis of BPs for the PA

In this section we report our findings on possible improvements for BP related to PA service delivery. Having in mind that e-government service provisioning is the result of a close collaboration among different PA, a fundamental aspect to consider, improving quality of service, is the overall vision of the process. The optimization of the whole service delivery can be reached if and only if all intra-administration processes implemented by different PA are optimized. A delay or a lack in one organization has a negative impact on the overall quality perceived by the user. This aspect has to deal with the need to clarify, from the very beginning, which are the participants and the activities involved in the process,

and how they can cooperate and share or exchange information. It is important to provide an overall view on the service in term of inter-organization processes where each view is implemented in the different PAs.

In our work we iterated many times among modeling and analysis activities. During analysis phases we tried to identify possible pitfalls leading to low quality or unjustifiably expensive BPs. Each identified issue was recorded and we successively tried to generalize and classify all of them in order to make easier their verification with respect to any modeled process. The result is a sort of quality framework that can be used to easily assess and improve BPs for the PA. Identified critical aspects can be classified in three main areas as follow.

- Involvment of All Participants in the Modeled BP and Resulting Software System.
R1: We discovered that sometimes a participant was included in the list of involved action but no precise task was clearly assigned to it. Moreover all the involved PA has to be integrated as much as possible in the system supporting the BP. This means that when possible all the activities have to be performed on-line and all the communications between PA have to be done electronically through the IT system.

- Back Offices Integration and Optimization.
R2: There must be just necessary activities and when possible those with the same input/output without process status change should be merged. We can evaluate the activities considering the value that they add to the BP. It may be useful to identify the value according functionality that has to be provided (i.e. in activities with the delivery of documentations, the values add is the document delivered, while for verification activities the value is identified as a check).
R3: Communication between PAs should be direct without intermediate steps. We refer to the case of a "word of mouth" where a participant receives a communication and immediately after the reception sends it to another participant without any kind of transformation of the received information.
R4: Document management has to be a core issue in the PA back office. Documents mainly result from the execution of a task and can represent its input and/or output. A document may be produced in an activity during the investigation phase, or it may concern a final decision. In both cases, it should be fully integrated in the BP.
R5: Documents, and more generally data, already available by one or more PA should be shared avoiding continuous requests for data to the citizens. All the documents produced during the process have to be recoverable.

- Communication with the Users.
R6: Communications between PAs and users have to be exchanged electronically. To reach all the population and according to the problem of digital divide, it must be possible to communicate with the PA through several channels, for example mobile phones and digital television, in order to allow everyone to use the service.

6 BPs Re-engineering

In this section we report the interventions we have done on the various BPs in order to improve their overall quality. For each modification we report here a reference to the specific guidelines presented in the previous section, and to which the modification is related.

Family Reunion
[**R1**] - We noticed that many communications among the different offices of involved PAs were done outside the SPI system mainly using fax, even though the data exchange could have happened within the system. The re-engineering aimed at reducing such type of communications stressing the importance of PAs effective collaboration;
[**R2**] - The BP presents many "null added-value" activities, in particular (i) in managing the expulsion all the communications goes to the SPI and that task forward to the office in charge to complete it, (ii) the SPI has to receive the paper based confirmation from the Foreign Affairs before delivering the nulla-osta and (iii) the Prefecture delivers the nulla-osta at home to the applicant after the release. In such cases we propose the following modifications: (i) the expulsion decision is managed between the offices involved to solve the problem, (ii) the one stop-shops releases the nulla-osta after on-line check of Foreign Affair, and (iii) the Prefecture delivers the nulla-osta when the familiar to be reunite comes to Italy and visit the Prefecture.
[**R2**] - With respect to merge activities in the process version "as-is", the applicant fills and sends the instance after he/she is contacted by the Prefecture for delivering the documentation. This results as an on-line delivery of request. Invitation is limited to users presenting incomplete documentation.
[**R5**] - The introduction of the electronic transmission of the instance per se does not reduce the number of people visiting the Prefecture offices. In order to complete the application the beneficiary has to personally deliver the documents necessary to the service. The main advantage of such transmission refers to the automatic management of agenda to schedule appointments, avoiding long queues. We believe that the introduction of legally valid digital documents should be a real advantage in term of office efficiency.
[**R5**] - The submission of the request requires a complex sequence of operations that seems to discourage independent and direct submission by the applicant and in most of the cases the applicant asks for support to a patronage qualified to submit the request. We also noticed that application forms and documents of instructions are written only in Italian. This increases the fear of making mistakes in the compilation compromising the successful outcome of the practice. To make easier the interaction with the users, in the "to-be" process the instance submission is done by a web application in both Italian and English, rather than with the intricate downloadable client.
[**R6**] - Another important issue refers to the many requests done by the administration with respect to information that they already have, or can easily obtain by other PAs. To analyse this point we refer to the "nulla-osta" that the famil-

iar to be reunited must present to the Italian consulate or embassy in his/her country. The Prefecture records the emission of the nulla-osta in the system so, the Italian authorities abroad may easily check on-line the emission of the document. In such a way the delivery of the permission is avoided and workload for the Prefecture is reduced. It has not anynore to call and receives the applicant for delivering the original permission for the subsequently presentation to the Italian authority abroad.

Grant Citizenship

[**R1**] - The investigation activities done by the Prefecture are mainly carried on outside of the SICITT system. The re-engineering aimed at introducing the management of such activities directly within the SICITT. In this context, an observation is made on the stage of preliminary investigation conducted by the Prefecture, and then on communications between the Prefecture and the applicant. The procedure provides the ability to produce templates to create documents, but the function is not widely used. Some prefectures prefer to use local applications for easier creation of documents and to ensure the automatic conformance to the electronic protocol. Other Prefectures in the management of the investigation proceed manually using traditional document editors. In the "to-be" version the idea is to foster integration and than standardization of the Prefectures back office.

[**R1**] - With respect to the the integration of the different participants in the SICITT system we considered the need to introduce municipalities connections in order to implement a direct channel with the Prefecture and than with the same objective also between Prefecture and the Ministry of Interior. In the process version"as-is" the lack of connection between municipality and Prefecture leads to an exchange of information using ordinary mail. We also highlight that the exchange of information between Ministry of Interior and municipalities could be direct without involving the prefecture so to reduce its workload.

[**R2**] - Regarding the elimination of "null added-value" activities, instead of continuously transmitting the decree from the Prefecture to the municipality, and thanks to the sharing capability, the re-engineering establishes that the municipalities can retrieve and analyze the decree directly using the SICITT.

[**R5**] - In term of communication with the users the novel process support users integration in SICITT or e-mail based interactions rather than ordinary mail. However, at this level we recognize that some document has to be delivered in original version so the automation cannot be implemented.

Bouncer Registration

[**R1**] - Regarding the full involvement of the parties all the police offices have been included in the BTF. This is particularly relevant for communications between police-headquarters and all the other police-offices, in relation to give opinions on a specific instance, and at the same time for rejection interaction from Prefecture to police-headquarters. Up to now some documents are managed in the back office, for example integration request of documentation or

solicitation to the police-headquarters. This lacks a partial integration of the back office activities inside the BTF that compromises the quality of the process. The communications between the Prefecture and the applicant should be automated.
[**R2**] - The Prefecture cannot declare the rejection of the request until the police-headquarters have not given their opinion. This causes a workload for the police-headquarters that must carry on the check activities even when the Prefecture has already decided to reject. A "lazy" approach, in which the opinion of the police headquartes is requested only in case of a positive evaluation from the Prefecture has been introduced in the process.
[**R5**] - The process version "to-be" supports direct users integration in the BTF not forgetting to include security aspects. The modification we described above

Table 2. Characterization of "to-be" process specifications

	Pools	Activities	Events	Decision Points	Message Flow
Family Reunion	7 (8)	53 (57)	54 (74)	24 (29)	29 (36)
Grant Citizenship	11 (11)	64 (75)	79 (93)	30 (42)	51 (62)
Buncher Registration	6 (6)	19 (16)	28 (24)	16 (14)	16 (17)

led to the specification of the "to-be" versions for the various processes. In Table 2 we report the characteristics for the improved versions of the BPs. Within parenthesis we report the number of constructs for the version "as-is" for the same process. As can be noticed the two processes already in use could be made more efficient reducing the foreseen activities. On the other side the framework permitted to better specify the BP which is still under development. It is worth mentioning that we also validated the correctness of the derived processes requesting a deep review to the different civil servants involved in the delivery of the related services. This activity as been carried on asking to the civil servant to reproduce his/her activities with different fake input to the service. In all the simulations we carried on the "to-be" version of the process resulted to be adequate with respect to the civil servant expectations.

7 Conclusion and Future Work

In the PA domain requirements can come from many different sources and the deployed software often foresees the interactions of many authorities. Particularly tricky to discover and represent are those requirements coming from laws and internal regulations. In this paper we presented our experience in modeling, analysis and reengineering BPs supporting the delivery of services to citizens. We strictly cooperated with civil servants and domain experts to model processes using graphical notation. The intuitive nature of the representation permitted to conduct an analysis of the deployed processes and to identify many pitfalls. Discovered issues have been classified in a framework and an improved version

(to-be) of the processes have been derived to overcome identified issues. The result was really positive since the notation permitted to remove the "wall" among technology experts and domain experts providing a common "blueprint" on which to work. In the future we plan to observe how the novel BPs behave and to derive measurements for the defined improvements. At the same time we intend to continue our cooperation with the PA to experiment the approach on other BPs.

Acknowledgement. We are indebted to our graduate student Barbara Petrini from the Master of Science in Computer Science who helped us in preparing and conducting this research. We also thanks Prefettura di Ancona for the fruitfull collaboration.

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Issues and Guiding Principles for Opening Governmental Judicial Research Data

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Abstract. The opening of data is considered to provide many benefits. However, opening up data by public bodies is a complex and ill-understood activity. Although many public bodies might be willing to open up their data, they lack any systematic guidance. In this paper, guidance is provided by investigating the publishing processes at the Dutch Research and Documentation Centre (WODC), which owns governmental judicial research data. We developed guidance by providing 1) a list of issues that play a role in deciding whether to open data, 2) an alternative to completely publishing data (i.e. restricted access) and 3) solutions for overcoming some of the issues. The latter include dealing with privacy-sensitive data, deletion policies, publishing after embargo periods instead of not publishing at all, adding related documents and adding information about the quality and completeness of datasets. The institutional context should be taken into account when using the guidance, as opening data requires considerable changes of organizations.

Keywords: open data, guiding opening data, institutional theory, opening governmental data, judicial research data.

1 Introduction

To quote from the Obama Administration, establishing openness in governmental organizations is considered to increase transparency, public participation and

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 90–101, 2012.

collaboration and therefore to "strengthen our democracy and promote efficiency and effectiveness in government" [1, p. 1]. Over the last years, various studies have argued that opening up data by governments may provide considerable advantages [2-5]. The European Commission [6] states that "Public Sector Information is an important primary material for digital content products and services" [p. 1].

According to Geiger and Von Lucke [7], open governmental data can be defined as "all stored data of the public sector which could be made accessible by government in the public interest without any restrictions on usage and distribution" [p. 185]. We adopt this definition because it does not necessarily include the publication of all stored governmental data and it may exclude the publication of public sector data which must remain confidential or are privacy-sensitive.

Opening up data by data producers is a complex and ill-understood activity, because many barriers counteract these processes [8]. An important barriers is the threat of privacy violation by opening data and of being legally liable when opened data are misused [9]. Although many governmental organizations might be willing to open up their data, they lack guiding principles derived from practical case studies that help them in doing this [10]. Some helpful guidelines for opening up governmental data were published in the past [10, 11], but none of these guidelines were derived from and tested in practice.

The process of opening up public sector data demands considerable changes in the public sector, such as changes in the funding and reward systems of organizations. However, it is usually not possible to explain how those types of e-Government initiatives evolve over a certain period of time by the current e-Government linear progression models [12] and the development of composite e-Government services is usually ad-hoc [13]. Avgerou and Wahid propose to use institutional theory to study the implementation of information systems (IS) within organizations [14] and to explain how collective awareness or isomorphic change occurs [12, 15]. "Institutional theory postulates that organizations are driven to incorporate the prevailing rules, values, practices and logics in the institutional environment in order to increase their legitimacy and survival prospects" [16, p. 103, 17]. The latter may also be applied to governmental organizations that want to open up their data. In line with the foregoing, Scott [18] states that institutional theory "considers the processes by which structures, including schemas, rules, norms, and routines, become established as authoritative guidelines for social behavior" [p. 2]. From this perspective, Scott argues that "the boundaries of organizational fields are often vague or weak, allowing alternative logics to penetrate and support divergent models of behavior" [18, p. 11]. "Suppressed groups and interests may mobilize and successfully promote new models of structure and repertories of acting." [18, p. 11-12]. In line with this, Avgerou points out that "IS innovation is to a large extent sustainable by its own institutional forces, irrespective of its contribution to the processes of organizational change" [14, p. 1]. Moreover, from the perspective of institutional theory Orlikowski and Barley argue that IS-research should take into account the institutional context where IS are developed and implemented [19].Taking an institutional lens is considered to be useful for this research, as it shows that the current institutional context should be taken into account when focusing on organizational changes [19]. The aim of this paper is to develop guidance for opening up governmental data. We focus in particular on judicial research data and we use an institutional lens to understand the issues at hand [12, 14].

2 Research Approach

The publishing process of datasets was investigated at the Research and Documentation Centre (Wetenschappelijk Onderzoek- en Documentatiecentrum; WODC) in the Netherlands. The WODC is a criminal justice knowledge center that is part of the Dutch Ministry of Security and Justice. In this organization data are mainly gathered to advise about and to define the current and future research agenda of the Dutch Ministry of Security and Justice, to answer policy-related questions and to indicate the possible implications of research findings for standing policy. For this purpose the WODC systematically collects, stores, enhances and provides criminal justice information produced by external organizations.

To get more insight in issues and guidance possibilities of the publishing process, we first thoroughly analysed 45 datasets of which 3 were opened and 42 were not opened. We inductively tried to identify issues that may be relevant for guidance for opening data. While doing this, the following aspects were taken into account:

a. The context. For instance, the WODC works with confidential judicial research data, so that confidentiality and privacy-sensitivity should be taken into account.
b. Current situations, including norms, values and beliefs [14, 18]. This means that the requirements and guiding principles should be embedded in the current situation, so that, for example, the limits of costs and time-consumption for an organization and the practices related to privacy sensitive information should be taken into account.
c. Dominant rules, values, practices and logics in the institutional environment in order to increase their legitimacy and survival prospects [16, 17]. For instance, in the current practice of the WODC, data are not opened when the WODC wants to reuse the data in the future itself.
d. The boundaries of organizational fields are often vague or weak, allowing alternative logics to penetrate and support divergent models of behavior. A new model of acting [18] that could be promoted at the WODC may be that certain types of descriptive, contextual and detailed metadata should be provided when data are published.

The previous steps resulted in an account of the issues that should be considered when opening governmental data. The list of issues was validated by carrying out eight interviews with three researchers working at the WODC. The validated account of the issues, the interviews and the aspects of institutional theory resulted in solutions for overcoming some of the issues. Finally, the possible solutions were discussed with two WODC-employees.

3 Case Study Background

The WODC aims to facilitate the reuse of research data, as this may provide the organization with benefits, such as the possibility to scrutinize and validate the data and to decrease the workload of the WODC. From 1982 until 2000 the WODC has

opened up 21 datasets. In 2001, the Dutch Personal Data Protection Act (Wet Bescherming Persoonsgegevens; WBP) was introduced, which aims to guarantee citizens the right to privacy protection [20]. In connection with this new act and an increase in attention for privacy protection in society, the WODC changed its open data policy in 2007. No WODC-datasets have been opened between 2000 and 2008.

Between 2008 and 2012, data that are considered by WODC-researchers to be qualified for public opening have partly been collected and stored in a so-called digital 'research data safe'. Over these 4 years, 45 datasets have been stored in the safe. Almost all the datasets contain crime-related research data that have been used to write reports on. The reports have been published between the years 2002 and 2009 and can be downloaded from www.wodc.nl. In 2008 and 2009, three WODC-datasets that were stored in the research data safe have been opened by means of publication by the Data Archiving and Networked Services (DANS, www.dans.knaw.nl).

In addition, the WODC receives individual requests for data (e.g. via e-mail). The WODC receives about 120 requests per year and most of them are being approved. The requests may be seen as a form of restricted access to data, since certain types of data users are excluded from access to certain data, such as students.

When we look at the WODC from an institutional perspective, we see that in line with the current norms WODC-data are usually not being opened. It was stated that the WODC considers opening up data to be risky when decisions about opening or not opening data are based only on random individual datasets, without taking a broader framework into account. It was also argued that the privacy act does not provide sufficient guiding principles for opening up data. Because of these risk avoiding norms, it becomes automatism not to open up the data and it becomes very difficult to change this culture. Therefore, we decided to develop guidance for opening up governmental data.

4 Guiding Opening Data

In section 4.1 guidance for opening data is provided in the form of a list of issues that should be taken into account when opening WODC-data. This list provides input for section 4.3, which presents ways in which these issues can be identified in organizations and by making a distinction between three ways of access.

4.1 Guidance by Identifying Issues for Opening Data

Institutional theory suggests to take into account current situations, including norms, values and beliefs when developing guiding principles for opening public sector data [19]. In the current situation, considerable issues play a role in determining whether to open data. In this section, guidance is developed in the form of a list enumerating the most important issues. In the list of issues a distinction was made between two categories: 1) general topics, which concern the dataset as a whole, and 2) dataset related issues, which concern the content of the dataset (see Table 1).

Table 1. List of issues that should be taken into account in developing guidance for opening up WODC-data

Category	Issue
General	Policy confidentiality
	Deletion policy
	Embargo placement
	Organizational changes including time-consumption and changes in funding and reward systems
	Ownership
	Privacy-sensitivity and anonymization
	Lack of metadata
	(Re)use of data by WODC itself
	Policy-sensitivity
	Unlawfulness
Dataset	Completeness and exhaustiveness
	Representation
	Validity
	Reliability
	Clearness and comprehensiveness of column, row, value, variable and other names
	Provision of additional reports
	Overall data quality
	Other/rest category

In the first place policy confidentiality was considered to be an important issue. For instance, opening certain data may be dangerous to the state. Furthermore, the access to data may be restricted because a deletion policy may apply to the data [21] and/or they may be placed under an embargo period. Data can, for example, only be used for a year and should then be deleted in accordance with law or appointments that are made with data providers. When these data have been opened and should be deleted after a year, it is not possible to control whether all people that downloaded these data will also delete it. Other issues with regard to opening up data concern organizational changes. In this context, opening up data requires the creation of a policy for opening data and a focus on opportunities. With regard to individual datasets organizational changes concern changes in funding and reward systems and in time consumption structures [8]. In line with institutional theory, governmental organizations have a limited amount of money and time to spend on opening their data. In addition, data may be owned by different organizations so that the interests of all organizations should be taken into account [22].

Two very important aspects of opening governmental data are the right to privacy [3, 9] and the provision of metadata. In case that pending research is still using or will use certain datasets, it is not in the interest of the organization to open up these datasets. Besides, data may be policy sensitive. This issue is related to the unclearness of how data users are going to use open governmental data [8]. Policy sensitive data are not privacy sensitive data, but these data may be easily prone to misuse, misinterpretation and triggering of spurious findings. In addition to this, the

consequences of publishing misused, minsterpretated and spurious findings may create negative publicity for the data producer. For example, the WODC monitors crime statistics about business communities. Over the last year, the name of this monitor has become a brand name that is important for the WODC. Therefore, misuse of this brand name may result in negative publicity for the WODC. According to institutional theory, this institutional belief should be taken into account. Another issue that is important for the reputation of the organization and possible damage to the organization concerns the legal responsibility for opening data. Opening certain datasets may be unlawful. Multiple authors [3, 23, 24] state that organizations encounter substantial uncertainty, which is partly caused by legal principles competing with other values, such as security and system integration.

Other issues that are related to the context of the datasets concern completeness and exhaustiveness, the representation of the data, the validity, the reliability, the clearness and comprehensiveness and the provision of reports about analyses of the data. In line with these content related issues, the overall data quality should be taken into account. Finally, a remaining issue was added, as there may be other issues or combinations of issues that have not been identified by the analysis of datasets, but that would have been identified when other WODC-datasets or datasets of other organizations would have been analyzed.

Issues that were identified frequently from the 45 datasets are privacy-sensitivity and anonymization, a lack of metadata, a lack of clearness and comprehensiveness of column, row, value, variable and other names and the overall data quality. Policy-sensitivity, deletion policy and unlawfulness were identified infrequently.

4.2 Guidance for the Identification of Issues

Figure 1 shows a systematic process for guiding the identification of all the issues that were enumerated in section 4.1. The questions that are expected to easily rule out opening up a certain dataset are placed on top of the list, whereas questions that require further examination are placed at the bottom of the list. This is done so that data that cannot be opened are quickly identified. Aspects of institutional theory were taken into account in Figure 1 by considering the risk avoiding governmental culture. For instance, due to the fear of wrongful interpretations of the data and the impact of wrongful interpretation on the organization, such as hitting the news with a damaged reputation, guidance is provided to make the chance on wrongful interpretations as small as possible. The latter is done by presenting a list of metadata aspects that should be provided together with the data themselves. Preferably, metadata would be derived directly from the source, although the interpretation of the data could still be difficult even with considerable metadata. Furthermore, the guidance takes into account the general legal framework that is already provided by the WBP, the Dutch Law for Openness of Administration (Wet Openbaarheid van Bestuur; WOB) and the general government conditions for distributing tasks for the performance of services (Algemene Rijksvoorwaarden voor het verstrekken van Opdrachten tot het verrichten van Diensten; ARVODI).

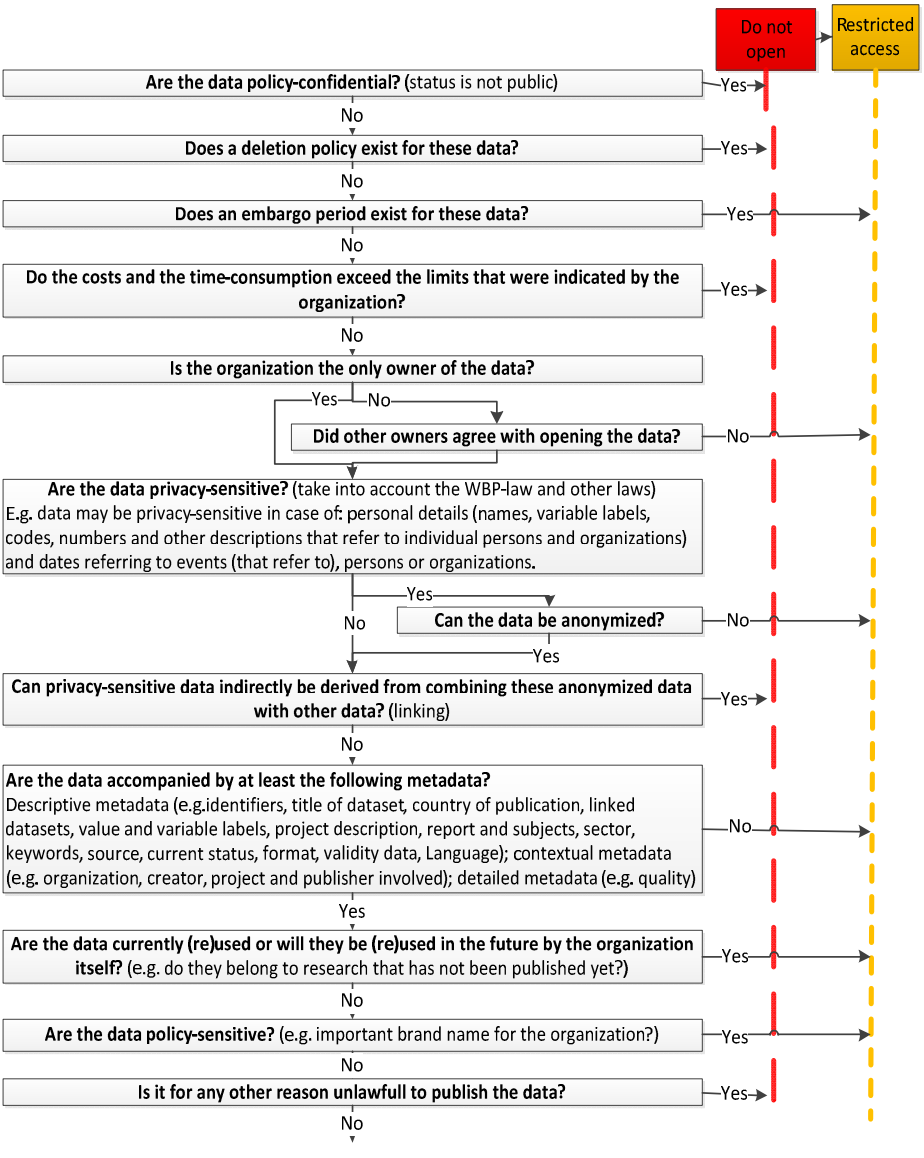

Fig. 1. Guidance for identifying issues for opening up governmental judicial research data

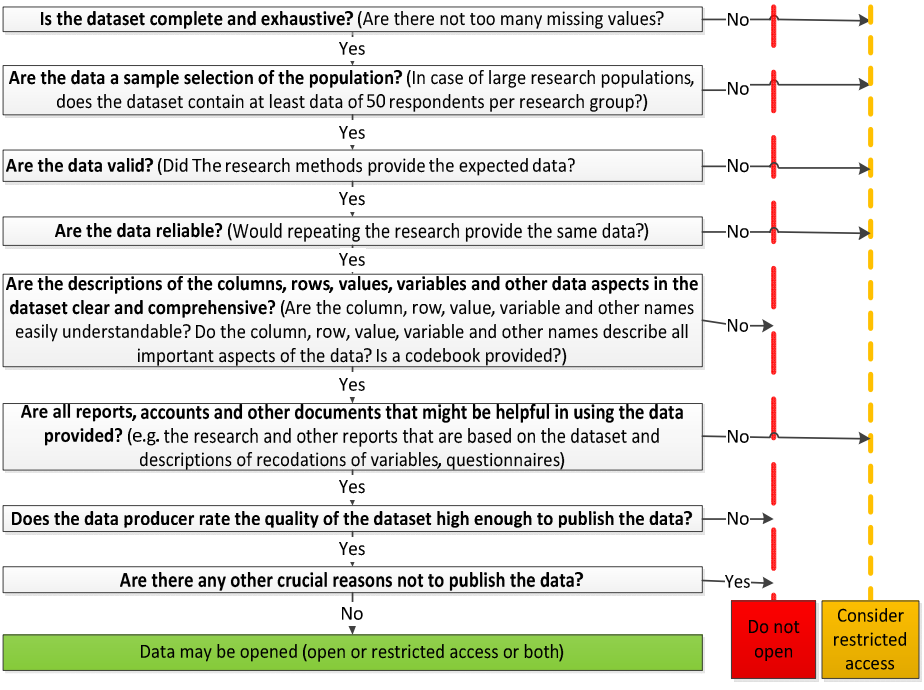

Fig. 1. (*Continued*)

4.3 Guidance for Dealing with Certain Issues

In accordance with the possibilities that DANS provides for opening up data and the WBP, WOB and ARVODI, we suggest as guidance the use of three directions when opening WODC-data: open access, restricted access and combined open and restricted access. These directions will be explained in further detail in the following sections.

4.3.1 Open Access

When all the questions in Figure 1 are answered and none of them points at the red 'do not open'-line, data can be opened according to the open access method. This means that data can be opened without any access restrictions.

A decrease of the risk on privacy violation while opening data in accord with open access could be arranged by anonymisation of personal details [e.g. see 25]. Also when the dataset is linked to other datasets, it should be avoided that this results in the exposition of the identity of individuals or groups of users [9, 25]. An example of the latter is provided by Kalidien et al. [9], who argue that the publication of data about the mean age of sex offenders per year, gender and city combined with data from other datasets, might expose the full identity of such a person [p. 3].

In addition, considerable attention should be paid to the provision of metadata, as metadata can yield significant benefits including creating order in datasets, improving find ability, accessibility, storing and preservation of data, improving easily

analyzing, comparing, reproducing, finding inconsistencies, assessing and ranking the quality of data and avoiding unnecessary duplication of data [26] and hereby encouraging linking open government data [27], so that public value can be created.

Moreover, attention should be paid to the representation (Do the data represent a sample selection of the population?), the validity (Did the research methods and definitions provide the researcher with the type of data that he/she wanted and expected to obtain?), the reliability (Would repeating the research provide the researcher with the same data as this research did?) and the clearness and comprehensiveness (Are the column, row, value, variable and other names easily understandable and do they describe all important aspects of the data?) of datasets. Furthermore, the provision of additional reports, accounts and other documents that are related to the dataset may be helpful in interpreting the data and these should therefore be published with the data and linked to them.

4.3.2 Restricted Access

Under the circumstances that data cannot be opened by using the open access method, the data producer may consider opening up the data with restricted access. Data producers may, for example, fear opening postal codes on a street level or on a neighborhood level. Instead of not publishing the postal codes at all, these could be provided in accord with restricted access. We propose to consider restricted access when the questions in Figure 1 point at the orange 'restricted access'-line. When restricted access is provided, data users first have to ask the data producer for permission to obtain access to the dataset. The data producer may decide whether or not to provide access to the dataset, depending on the type of data, the type of user and the purpose of the use for these data, where the openness of data should be seen as a function with various parameters, such as:

- Retrievability of certain data. A dataset may contain personal details or show content restrictions and can therefore only be provided to the data user when he or she signs a contract with the data producer. Furthermore, certain datasets can be fragmented so that only by using a specific IT system it becomes possible to pull together the whole dataset. Similarly, it is possible to make data meaningless unless the end user (or the software the end-users is permitted to use) has a 'key' which transforms the data into something useable. Moreover, datasets may be put on a waiting list providing restricted access on the short term or opening the data after an embargo period.
- Accessibility of data for certain users. Access to data is usually arranged through software which makes it possible to restrict openness in line with the purpose of the data user, although no control exists on how data are used once the end-user has brought the data of interest outside of the IT system. However, one can restrict certain types of search, make some parts of the dataset invisible and restrict the use of the data in combination with other data.
- Purposes of certain data use. Data providers may only want to provide their data when they know for which purposes the data will be used. The data provider may then have a better idea of the possible outcomes of the data use. Signing a contract is also a possible solution for this parameter.

- Users. Typically users may be classified in 'security rings' around a source; furthest out are all people, then increasingly restricted are continental nationals, country nationals, organizational employees (e.g. government), departmental employees, project or team employees, trusted employees. This may be more sophisticated by characterizing individual users according to previous history and other characteristics. Dependent on the type of user, the data producer may provide him or her with suitable specific advice with regard to this use.

4.3.3 Combining Open and Restricted Access

Finally, a dataset may be opened with both the open access method as well as the restricted access method. Consider for example a dataset that consists of both privacy-sensitive data as well as non-privacy-sensitive data. The non-privacy-sensitive data may be opened with the open access method, whereas the privacy-sensitive data may be opened with the restricted access method. Whether a data producer wants to provide both open and restricted access depends on the considerations of the data producer.

5 Discussion and Conclusions

From an institutional perspective, we found that on the basis of the prevailing standards, at the WODC-data are usually not opened. In the current situation risks are avoided as much as possible, due to the fear of privacy violations and the impact of inadequate decisions (violating privacy, hitting the news). However, the WODC has shown that it intends to open up more data by making policies and contracts about openness, such as a contract with a Dutch data archiving organization (DANS). Nevertheless, issues with privacy, legal liability, resource intensiveness, data quality and confidentiality are mentioned as considerable barriers for opening WODC-data. Because of these barriers only few datasets are opened.

Furthermore, institutional theory shows that organizations tend to have a risk averse culture and therefore views not-opening data as the default option. In addition, the opening up governmental data requires cultural changes in organizations.

An analysis of 45 datasets was performed of WODC-datasets that have and have not been opened in the past. The analysis resulted in a list of issues that should be taken into account when opening up a dataset. The general list of topics includes: confidentiality, deletion policies, embargo placement, cost and time consumption, ownership, privacy-sensitivity and anonymization, lack of metadata, reuse of data by the organization itself, policy-sensitivity and unlawfulness. Besides this general topic list, a list with content-related topics was created, which includes completeness and exhaustiveness, representation, validity, reliability , clearness and comprehensiveness of column, row, value, variable and other names, provision of additional reports, the overall data quality and a rest category. On the basis of these issues, guidance for opening up governmental data was developed.

Because thinking binary in terms of opening and closing is too narrow, our guidance suggests alternative options to avoid rigorously not publishing data that potentially might be opened with three ways of opening up governmental data,

namely open access, restricted access or combined open and restricted access. However, it may be difficult to simply follow the guiding principles by giving a yes/no-answer to the questions, because people have different values and they work in different institutional contexts and they may interpret the guidance differently. More insights in these institutional contexts and interpretations is necessary.

This research is a first effort in this field and the guiding principles that are presented in this paper are based on a single case. Further research should focus on the extension of the guiding principles and their applicability in other organizations. Furthermore, the guiding principles should be expanded, extended, specified and extensively tested. Nevertheless, the list of guiding principles can be used as a general means to check which issues should be discussed when one wants to open up governmental data.

Acknowledgements. This paper is related to the ENGAGE FP7 Infrastructure Project (An Infrastructure for Open, Linked Governmental Data Provision Towards Research Communities and Citizens; http://www.engage-project.eu), that started in June 2011. The authors would like to thank their colleagues of the ENGAGE project and the WODC for their input for this paper although the views expressed are the views of the authors and not necessarily of the project or the WODC.

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"5 Days in August" – How London Local Authorities Used Twitter during the 2011 Riots

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Abstract. This study examines effects of microblogging communications during emergency events based on the case of the summer 2011 riots in London. During five days in August 2011, parts of London and other major cities in England suffered from extensive public disorders, violence and even loss of human lives. We collected and analysed the tweets posted by the official accounts maintained by 28 London local government authorities. Those authorities used Twitter for a variety of purposes such as preventing rumours, providing official information, promoting legal actions against offenders and organising post-riot community engagement activities. The study shows how the immediacy and communicative power of microblogging can have a significant effect at the response and recovery stages of emergency events.

Keywords: Twitter, microblogging, social media, London riots, UK local government, emergency communication, disaster management.

1 Introduction

Public authorities are increasing embedding social media in their traditional communications in an attempt to develop and support new types of interactions with citizens e.g. [2], [15]. Microblogging or the practice of sending brief online updates to large audiences seems to be one of the most promising set of tools e.g. [5], [23]. In addition to the prospect of building new relationships with citizens, the immediacy and real-time nature of microblogging services raise a question about their potential to support communication related to emergency or unexpected events.

During emergency events, communication plays a critical role since it can reduce the immediate effects of the crisis, as well as simplify the recovery stage [11]. Particularly in situations that involve public fear and uncertainty, the importance of timely and accurate communication has been highlighted [7]. However, it is common that communication with the public might be disrupted by conflicting or inconsistent information due to factors such as lack of time, high stress, limited resources, difficulties to evaluate the situation and design an appropriate dissemination strategy [7]. Previous studies have examined the enabling role of Twitter (by far the most popular microblogging tool) in emergency events such as the Haiti Earthquake in

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 102–113, 2012.

2010 [14], the Australian fire disaster in 2009 [19] and the violent events that took place in USA University campuses in 2010-2011[9].

In this paper, we investigate the use of Twitter as an emergency communication tool from the perspective of local government authorities. Our study takes place in the context of the summer 2011 riots in London. During five days in August 2011, parts of London and other major cities in England suffered from extensive public disorders, violence and even loss of human lives. We identified and collected a total of 699 riot-related tweets by the official Twitter accounts maintained by 28 London Local Authorities (LAs). The analysis of the tweets indicates those LAs realised the communicative power of Twitter during and beyond the riot events. Not only they were able to control and possibly reduce the immediate effects of the crisis, but they also managed to accelerate the recovery stage by promoting post-riot activities even when disturbances were still in place.

The next section briefly reviews information about Twitter and its use in emergency communication. Section 3 establishes the background of events related to the London riots and sets the scene for the subsequent methodology and analysis sections. The final sections discuss and reflect on the study findings.

2 Twitter in Emergency Communication

Despite criticisms such as the one that they might assist in rapidly spreading misleading information, microblogging services are gaining interest among Internet users along with the whole range of social media applications. Twitter was launched in 2006 and its membership base now exceeds 200 million users [13]. Twitter allows its users to post updates of maximum 140 characters via mobile devices, its web interface or desktop applications, e.g. TweetDeck. Twitter messages might contain additional content such as links to websites, photos or videos and they are usually publicly available by default. A Twitter user can follow the stream of messages posted another user, but this connection is not necessarily reciprocal, unlike other social networking sites such as Facebook.

The most distinctive characteristic of Twitter is its immediacy, real-time nature and pace of updating with new content. Although Twitter development sourced from the concept of microblogging, certain conventions using the symbols "@" and "#" were established by users to support more collaborative and conversational features [10]. The symbol "@" allows users to directly address other users or refer to them in conversations. The symbol "#" (hashtag) defines streams of tweets that organise discussion about a specific topic or event [20]; for example #London2012 for London's Olympic Games 2012. Another conversational practice is retweeting i.e. the reproduction of another user's message in its original form or including some small modification or comment. Reasons why users might retweet messages include publicly agreeing or disagreeing with someone, supporting a cause by spreading a message, helping an interesting message reach new audiences or even attempting to gain personal status [3].

Research on Twitter has been growing rapidly with studies exploring its effects in areas such as political communication [20] and the organising of collective action [18]. In the public sector, it has been argued that Twitter can assist in reaching new audiences, build relationships with citizens and various stakeholders, as well as broadcast and share information across networks [25]. A few empirical studies found that the communicative patterns of Twitter accounts maintained by governmental agencies are more complicated than simply broadcasting information to as many users as possible [5][23].

During emergency communications, normal use of Twitter is expected to change in terms of both content and frequency of posts [9]. Users are likely to start following new accounts or even join Twitter at the first place; for example, during the riots in England considerably more people started following police accounts [6]. A critical characteristic of Twitter in emergency communications has been the capability to control initial levels of anxiety by providing the public with credible, timely and accurate information [14]. Furthermore, Twitter seems to involve high as a medium in terms of supporting dialogue between users, organising discussions around hashtags, reproducing others' messages and to providing links to other sources. Such flexibility can be exceptionally useful in emergency communication, given the fact that crisis events are rarely identical and tend to generate dissimilar information needs that are difficult to predict [11]. Additionally, it has been suggested that monitoring social media can assist in understanding the emergency situation and level of social tension, with Twitter hashtags being a powerful feature in this direction [14].

Those previous studies have investigated general patterns of Twitter in emergency communication by the full range of Twitter users. Our investigation in the context of the London riots focuses on tweets produced by local government authorities. As suggested in the next section, there has been interest to examine the role of Twitter in reducing the immediate effects of riots (emergency response) and organising post-riot activities (emergency recovery).

3 Study Background: The Summer 2011 London Riots

The widespread public disorder in August 2011 was a shocking event in England. The riots across the country lasted for five days. They started in London Tottenham on Saturday 6 August 2011, following protests caused by the death of a local man named Mark Duggan by the London Metropolitan Police two days earlier. From 8th to the 10th of August disorders spread rapidly across London and nationally leading to a total of 66 areas affected, including cities such as Bristol, Manchester and Birmingham.

The official report by the specially formed Independent Riots Communities and Victims Panel [17] states that five people lost their lives and hundreds more lost their businesses and homes in a total estimated cost of over half a billion pounds. About 13,000 - 15,000 people were actively involved in the riots. The Home Office reported that more than 5,100 crimes were committed of which the majority (68%) occurred

in London. Crimes committed in London include violence against individuals (217 injuries), arson and criminal damages (over 270 residential and commercial buildings affected), thefts and shop looting (over 300 million pounds loss).

The extent to which the situation in London got out of control during the first three days of rioting is partially blamed on the absence of certain key responsible officials (e.g. the Mayor of London, the Home Secretary) who were on a planned annual leave in the middle of August. One of the key moments in reducing the level of violence in London was the deployment of 16,000 patrolling police forces on the 10th of August. Another important action against the riots was the peace-rally called by Tariq Jahan whose son was killed during the violent disturbances in Birmingham. Moreover, the London Metropolitan Police started a robust campaign to arrest suspected rioters through monitoring more than 200,000 hours of closed circuit television (CCTV) footages.

One of the key issues of the riot events relates to the use of social media. Extensive public debate was generated about whether tools such as Facebook, Twitter and particularly BlackBerry Messenger (BBM) reinforced the riots by rapidly publicising them and even acting as an organising tool [1]. A study by Tonkin et al. [22] shows that Twitter was not used to promote illegal activities, but instead acted more as news broadcasting, information sharing and community organising medium. Tweets during the riots contained information from news agencies, police and other authorities to calling for the public to help individuals, identify suspects, volunteer to clean the streets or raise funds for repairing damaged properties. #LondonRiots and #RiotCleanup were among the most popular hashtags [22].

The "Clean-up" campaign was an exceptional campaign proposed by the Mayor of London effort where Londoners encouraged the community to come along with bin bags and brooms for the purpose of cleaning the streets from the disorder caused by looters. Over 60,000 volunteers were mobilised in the most affected areas of London to help local shopkeepers and show solidarity with communities that experienced chaos and violence.

Although London LAs engaged in Twitter-related activity three days after the first incidents happened, it is suggested that their involvement in those activities was dynamic and influential, especially in terms of raising awareness in local communities regarding the situation. For example, on the 12th of August, London LAs, with the help of the Metropolitan Police, released camera images of more than 600 wanted suspects in a blog called "Catch a Looter" that was hosted by Tumbler. In parallel, they used Twitter and Facebook to seek public assistance in identifying those rioters. The London riots point to a fruitful case to study the effects of microblogging in emergency communication from the perspective of local government authorities.

4 Research Methodology

The findings reported in this paper are part of a wider project which examines the use Twitter in the UK local government based on the official list @Directgov/ukcouncils that groups the accounts of 191 UK LAs [16]. Those are general accounts, covering

the whole range of local topics, although some LAs maintain additional more specialised ones for local services such as libraries. The data used in this study were collected in September 2011 using the Twitter developers' database (http://dev.twitter.com/), which is also available for academic research. A total of 21,911 tweets were collected from 28 accounts out of the 33 LAs composing the Greater London administrative area. Most of those accounts were created in 2009 and, at the time of study, they were followed by approximately 1,700 users on average, ranging from 127 to 4,541. Since their creation, they had posted an average of 734 tweets, ranging from 45 to 2,374.

The investigation of the riot events focused on 699 messages tweeted in the period of 9-12 August 2011. Messages prior and subsequent to these dates were not found to be relevant. Previous studies have discussed the particularities of analysing tweets due to the brief and specific nature of the medium that limits messages to 140 characters and uses the aforementioned conventions to support conversational characteristics [4], [10], [21]. To examine the evolution of collective tweeting activity within the four days, first we conducted a time-series analysis. This was followed by a structural analysis that identified patterns of tweet characteristics in terms of:

- Using the symbol @ as a form of addressivity to refer to other users or directly reply to their messages.
- Using the symbol # to contribute to discussions organised in hashtags.
- Retweeting messages from other LAs, citizens, the London metropolitan police, media or other organisations.
- The source of tweets (e.g. desktop or mobile device).

At the final stage, we analysed the actual content of the tweets to systematically recognise and classify emerging themes. An open coding grounded approach was used, which has been established as standard for exploratory microblogging studies [8], [9], [12]. Initial communication patterns were derived from the findings of [9], further developed and adapted to the particular case after two rounds of coding in which two coders were involved. The total number of tweets classified in categories is 792 because some of the original 699 were classified in more than one category. The final themes were identified as:

1. Press releases/announcements
2. Statements from the police
3. Information seeking
4. Situation description
5. Preventing rumours
6. Clean-up actions
7. Legal actions
8. Community appraisal

This coding framework serves the specific needs of the study and, along the structural analysis of tweets, provides the opportunity to understand how those Twitter accounts were used during the riots. The next section presents the study findings.

5 Findings

This section first presents the general features of the 699 tweets collected from 28 London LAs that tweeted information related to the riots. Next, the results are categorised based on the patterns identified in the dataset.

Tweets by LAs concerning the riots started to spread on the 3rd day of the incidents (i.e. Tuesday 9th August) and continued until Friday 12th August. Table 1 summarises the top 10 authorities with the highest number of tweets during the days of the riots. As explained, most of the incidents took place between the 8th and 9th of August when the disordered behaviours, lootings, damages and so on spread across London and other English major cities causing a domino effect [17]. Therefore, it is not unexpected that more than 70% of the tweets were posted on the 9th. It should be noted that not all London LAs were directly affected by riots. Yet, it is interesting to observe that most of the tweets were dispatched by the one the non-affected authorities i.e. Hillingdon Council, and the least number of tweets belongs to one of the most affected ones i.e. Southwark Council. Another severely affected area was Ealing where 36 messages were posted by the official account during those four days.

Table 1. Top-ten London LAs by number of tweets during the riots. Those not directly affected by the riots are marked with a star.

London authorities	9 Aug 2011	10 Aug 2011	11 Aug 2011	12Aug 2011	Total
Hillingdon Council*	85	27	18	9	139
Sutton Council	29	26	17	5	77
Greenwich Council*	32	31	7	5	75
Hounslow Council	31	7	2	3	43
Hammersmith & Fulham Council*	10	16	9	3	38
Ealing Council	16	8	8	4	36
Wandsworth Council	19	7	3	4	33
Westminster Council	3	10	7	7	27
Barking & Dagenham Council	8	5	5	4	22
Southwark Council	3	7	3	7	20

Figure 1 illustrates the streams of messages throughout the days in which most of the tweets were posted between 12pm and 6pm. A peak of 157 tweets was observed in this time frame on the first day after the outburst of disturbances. This was declining steadily in subsequent days to reach about what can be estimated as a normal activity for the middle of August in day 4.

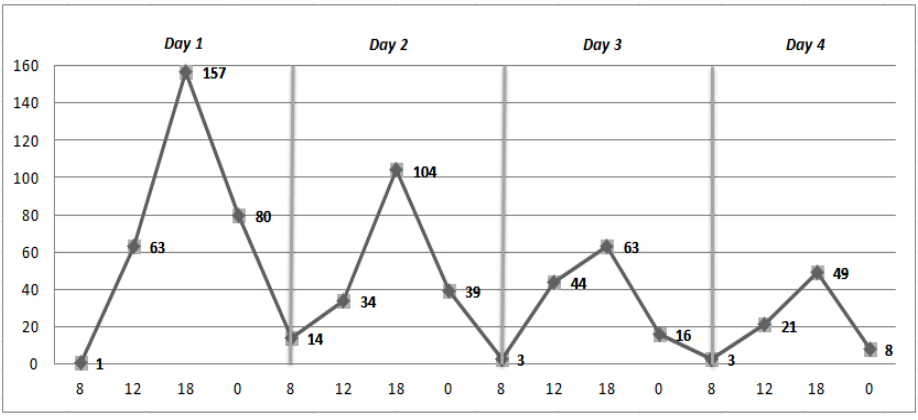

Fig. 1. Time-series of the tweets

About 25% of all tweets were dispatched after normal office hours; an observation which encouraged the researchers to investigate the sources of tweets as shown in table 2. More than half of the tweets were posted through the web (i.e. twitter.com). About 10% of the tweets were posted from mobile applications that were normally used outside office hours. Few tweets were referred from twitter-feed, which indicates that the authorities did not use extensively other social media (e.g. Facebook, Flickr, etc.) to feed their tweets. Some tweets not posted from mobile devices still conveyed a live broadcasting tone, for example, the Hillingdon Council tweeted: *"Just popped out of the office into Uxbridge town centre. Everyone seems fine and people are going about their day."*

Table 2. Sources of tweets

Source of Tweets	9 Aug 2011	10 Aug 2011	11 Aug 2011	12 Aug 2011	Total
Web	159	117	56	48	380 (54.4%)
Desktop applications	106	44	29	25	204 (29.2%)
Mobile applications	46	11	10	2	69 (9.8%)
Twitter-feed	17	12	11	6	46 (6.6%)

The next stage in the analysis was to examine the mode and trends of tweets. The first entails looking at how authorities engaged directly with citizens by answering their questions via Twitter, as well as how many messages they retweeted from citizens, other LAs, the Metropolitan Police and so on. Also, the analysis captured the number of times messages from the LAs were tweeted. The results of this analysis in table 3 show that the number of replies to other users, mainly requests by citizens, is about 34% of all tweets. The total times posts by those LAs were retweeted is 730.

Table 3. Modes of tweets

Mode of Tweets	9 Aug 2011	10 Aug 2011	11 Aug 2011	12 Aug 2011	Total
Replies to other users	122	47	34	23	226
Retweeted from citizens	25	18	2	13	58
Retweeted from another LA	0	6	8	2	16
Retweeted from the police	3	9	9	14	35
Retweeted from news agencies	3	6	6	12	27
Total times retweeted by others	*302*	*191*	*126*	*111*	*730*

Next, the extent to which LAs are following the UK Twitter trends during the riots was investigated by identifying the use of hashtags. Those hashtags and the number of times appearing in LA tweets are summarised in table 4. Topical hashtags, which group information about a LA, were the most popular. The other four hashtags are among the most popular ones related to the riots as reported by [22].

The final stage was to conduct the content analysis where tweets were classified in 8 thematic categories or patterns with respect to their content. Table 5 shows the distribution of patterns per day. As explained, those patterns are non-exclusive; for example, certain tweets that were classified as press releases or statements by the police also contained situation-describing information. The highest number of tweets during the four days of the riots related to clean-up actions; two examples of tweets in this category are: *"Please show your support for our local businesses - shop local #cleanup"* **and** *"Clean up volunteers show true spirit of borough"*.

Table 4. Following trends through hashtags

Following Trends	9 Aug 2011	10 Aug 2011	11 Aug 2011	12 Aug 2011	Total
#LondonRiots	12	21	6	7	46
#StaySafe	1	2	0	0	3
#RiotCleanup	3	14	9	7	33
#WitnessAppeal	0	0	21	20	41
#[Name of the council]	11	29	14	19	73

This large number of posts seems to have encouraged individuals and groups to organise large scale clean-ups after the riots and actively support their communities. It was also related to the 143 posts that praised local communities about their quick and effective response to the call of action; even the phrase "the riot heroes" was frequently used in tweets to thank local citizens involved in those activities. Examples of tweets in this category are: *"Thanks again to all who turned up at #Camden this morning to help clean up. Great to see the community coming together*

and helping out" **and** *"200+ people prepare to clean up #Clapham Junction. Boris [Mayor of London] says it's 'London Fighting Back'. Thanks to everyone!"*.

Table 5. Distribution of tweet patterns

Tweets Patterns	9 Aug 2011	10 Aug 2011	11 Aug 2011	12 Aug 2011	Total	% of all tweets
Press Release	29	31	22	11	93	13.3%
Police Statement	14	24	16	6	60	8.6%
Information Seeking	9	17	23	0	49	7.0%
Situation Description	48	26	35	26	135	19.3%
Preventing Rumours	44	14	0	1	59	8.4%
Clean-up Actions	114	31	0	2	147	21.0%
Legal Actions	3	39	41	23	106	15.2%
Community Appraisal	77	23	19	24	143	20.5%

About 22% of all tweets concerned press releases or official police statements. Press releases included official announcements by the authorities as well as statements by local elected representatives. Usually, a link to the full announcement to the LA's website or other online sources was included in the tweet.

Another important pattern identified mainly within the first two days was "preventing rumours" through direct replies to tweets by other users or pro-active announcements. This was also a response to the fact that several people tweeted false and untrue information about the situation resulting possibly in an increase of the level of anxiety. For instance, the Hounslow Council posted: *"If people only tweet what they actually see as opposed to what they have heard in #hounslow then we will have a clear picture"*. On the same day, the Hammersmith and Fulham Council tweeted: *"Reporting calm in H&F [Hammersmith & Fulham]. Please question rumors rather than spread them. #londonriots #Hammersmith #Fulham #ShepherdsBush"*.

The number of tweets regarding information seeking and legal actions was also noteworthy. For example, one of the most affected authorities posted: "*We've just uploaded CCTV images of people wanted for questioning over disturbances. Pls help up find them*.". Another tactic in this direction was to tweet information about legal actions happening even during the riots, for example Greenwich Council retweeted a message from the Metropolitan Police stating: "*We have started knocking on doors to arrest people. We arrested a total of 888 people in connection with disorders*". This message was retweeted 127 times by other users (e.g. citizens, other councils, etc.).

6 Discussion

Regular Twitter use is expected to change (even radically) during emergency events [9]. In our dataset, this was noticeable both in the sudden increase in the volume and frequency of messages, as well as in the particular topics on which London LAs

focused their tweets. An average posting activity of those accounts is normally not more than 10 tweets per day and usually concerns a wide range of local issues. Interestingly, we found very high activity generated by certain LAs that were not directly affected by social unrest, combined with low activity by some of those that were severely affected. Such an asymmetry cannot be fully understood within the scope of this study, yet it might point to more localised factors about how those accounts are administrated. For example, LAs such as Hillingdon and Greenwich, even though not directly affected by riots, increased their number of tweets by responding to citizen queries in addition to making formal announcements.

On the basis of the previous studies discussed in section 2, it is reasonable to expect that an interactive real-time tool such as Twitter could be useful for LAs in their effort to handle communications with the public during the riots. The findings support this case by revealing specific mechanisms related to the emergency response and recovery stages.

At the response stage, Twitter was used for reducing the immediate effects of the crisis in terms of preventing rumours, responsibly informing the public and spreading the information about legal actions in progress. Twitter also seems to have extended communication beyond official working hours and spaces, for example through the use of mobile devices. While providing timely, accurate and credible information is of apparent importance [14], spreading the news about legal actions in progress seems to be a more innovative use that is likely to have contributed in controlling social disorder. This is because most of those involved in the incidents across the country were youngsters [17], therefore more eager to come across information on social networking tools.

Furthermore, the role of Twitter was evident in terms of accelerating and simplifying the recovery stage of the riots. This was achieved very shortly after the riots had taken place by: (1) organising community support activities and (2) regularly praising citizens participating in those events. In this respect, Twitter seems to have reinforced grassroots community action and the rapid mobilisation of available resources by LAs and individuals. Indeed, according to [24], community collaboration and the ability to think outside traditional command and control hierarchies can be a successful element of emergency recovery.

The later also raises a question about the duties that local government officers had to assume during the riots, also given the fact that the events happened in the middle of August when certain officials were on annual leave. This might explain why some accounts tweeted asymmetrically less than expected and possibly suggest that officials administrating Twitter accounts had to assume increased public relations responsibility than regularly. Therefore, in certain cases of very active of LAs, it is difficult to distinguish whether their innovative use of Twitter was a pre-planned strategic effort or simply the result of ad hoc creative behaviour by officers.

The practical implications of this study reveal some elements of good practice in public sector microblogging during emergency commutations. However, potential improvements can be observed in the way LAs used Twitter during the riots. First of all, it seems that LAs were quite slow in their initial response, with no relevant tweets found in the period of 6-8 August. Furthermore, the use of hashtags was not

extensive, hence resulting in reducing the visibility of tweets since hashtags are critical in building an ad hoc space to monitor a topic [9].

Those two aspects reinforce previous suggestions that authorities should make consistent effort to enhance the level of education and awareness of officers communicating with the public using social media [19].

7 Conclusion

This paper examined the role of microblogging during the summer 2011 riots in London by analysing 699 riot-related tweets posted by 28 London LAs between the 9th and 12th August. The findings indicate increased use of Twitter during the riots to support the deployment of several anti-riot mechanisms at the response and recovery stages. Those mechanisms were enabled by the conversational and communicative elements of Twitter such as the ability to retweet messages or group discussions through hashtags. Therefore, the London riots seem to provide certain evidence that Twitter can be used as a significant extension of traditional emergency communication.

Nevertheless, fully assessing such as a claim might not be possible given the limitations of this study. This is because we focused only on tweets posted by London LAs without a broader examination of other information channels that those LAs might have used during the riots. Apart from a cross-examination of other sources, the analysis could also be expanded to riot-related tweets by citizens, police authorities, news agencies and so on. Further research on microblogging communications can certainly elaborate on some of those aspects in the context of unexpected events.

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Shared Services in Irish Local Government

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Abstract. This paper investigates the demand for ICT shared services in Irish local government, why has the take-up to date been so limited and what the barriers to adoption are historically and are today. The research shows that there is an apparent large demand for ICT shared services from all local authorities, but that in practice take-up is low and there is a strong preference for local solutions over national offerings. A number of barriers to adoption are identified and discussed.

Keywords: ICT, shared services, local government, e-government, governance.

1 Introduction

1.1 Research Questions

For a variety of reasons, e-government has given rise to a renewed interest in shared services in government ICT. The most recent cause of this has been the emergence of cloud computing, but pressures to save costs have also been a significant factor [21]. In Ireland, the use of shared services in local government goes back nearly three decades and its chequered history over this period offers a particular opportunity to study this phenomenon. The low take-up of shared services Irish local government is surprising. Research suggests that shared services are a logical way of organizing ICT for non competing entities delivering similar services. Ulbrich [27; 28] describes wholly owned systems as an "unaffordable luxury". A survey by AT Kearney in 2003 [1] found that popular candidates for shared services include human resources management and ICT.

The lack of take-up is even more puzzling given that local authorities are a particularly good fit for shared ICT services. There are many variations of shared service model. One is where a number of non-competing organisations provide broadly the same range of services to different customers, clients or constituencies. Examples of such groups in the public sector include hospitals, parts of the education system and local government. Local governments typically provide an almost identical range of services to different geographical areas. Such services include maintenance of roads, provision of water and sewage services, social housing, planning, emergency services and refuse collection. A computer system designed for one local authority (LA)

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 114–125, 2012.

should in theory fit all LAs or require only minor local tailoring to do so. Consequently, when it comes to the provision of ICT services, there is a number of strong arguments for collaborative development and sharing including economies of scale, sharing of scarce resources and pooling of expertise. Despite this, in Ireland, instead of sharing services many local authorities choose to ignore centrally developed systems and instead develop their own equivalents. Two obvious questions are why is this so and what, if anything, can be done to change this position? This research therefore set out to answer the following four questions:

- What is the potential demand for ICT shared services in Irish local authorities?
- What is the level of take-up of shared services in Irish local government?
- What are the barriers to the adoption of ICT shared services in Irish LAs?
- What might increase the level of use of shared services by LAs in Ireland?

1.2 A Brief Background

The main Irish local authorities comprise 29 county councils and five city councils A shared service provider, the Local Government Computer Services Board (LGCSB), was established in 1973 with a mission to provide computer services, particularly software application development, to all LAs in Ireland. While a range of services continue to be shared, the success of the LGCSB (now part of the Local Government Management Agency or LGMA) has not been what was hoped.

2 Literature Review

2.1 Defining Shared Services

The concept of shared services in local government goes back to the earliest years of computing. In 1961 the *United States Federal Advisory Committee on Intergovernmental Relations* (cited in [24]) defined the term shared services as:

"*Intergovernmental cooperation at the local level either by formal written contracts or by informal verbal agreements which often provides a workable method of meeting particular problems*."

Shared services are often considered a form of outsourcing [13]. Corradini [8] endorses the view of the shared services centre as an internal function. Within these conceptualisations there are several variations. For example, while the shared services might be provided by an internal or separate, but wholly owned, shared services provider (SSP), the SSP may in turn outsource some specific services (such as the provision of Wi-Fi) to one or more third parties (figure 1).

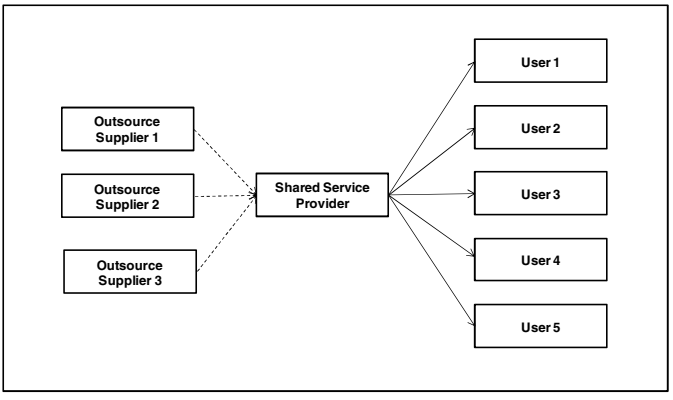

Fig. 1. Single owned provider shared services model (with optional outsourcing)

Tompkinson [26] describes shared services in local government as the shared provision by more than one local authority of a specified service in which service aims and objectives are mutually shared and for which local people are the end users. McWilliams [18] further differentiates between centralisation of ICT and shared services. Centralisation, he states, is about standardising services whereas shared services are customised for individual customer sets. Thus a shared service may be provided by a single internal entity or may be in the form of a network with different individual LAs providing a specific service or set of services.

These are only two of several possibilities. There are many other definitions, see, for example [4], [15], [16], [20]. The definitive characteristic of an ICT shared service is that the users get their ICT services (applications, networks, etc.) from the SSP. For the purposes of this paper shared services will be defined as the sharing of ICT infrastructure including hardware, software, communications and support between two or more local authorities in a centrally hosted environment whether that host is real or virtual, single or multiple hosted. It is accepted that there are other possible definitions, but a more detailed discussion of these is beyond the scope of this paper.

2.2 Governance

An important aspect of this research is the *governance* of shared services. Bannister [2] argues that the mere mention of shared services can result in an outbreak of a power struggle and an accentuated desire for independence based on fear about, *inter alia*, excessive central control. This problem became evident Ireland in an (unpublished) study carried out by the Institute of Public Administration in Ireland (IPA) in 2004 into the financing of shared ICT services in Irish local government. Power is a major factor in shared service acceptance, though as Ren and Wagenaar [23] point out there are several other reasons for the resistance to adoption of shared services. These objections range from the problems of one-size-fits-all to security risks, the loss of influence over implementation costs and problems with proposed timelines, project plans and local priorities. In this context, the decision making structure within the LGMA itself is a significant factor. This is discussed briefly below.

For these reasons Weill and Ross [29] argue that for the successful implementation of a shared service solution there must be strong ICT governance. By governance they mean that the processes by which organizations align ICT actions with their performance goals and assign accountability for those actions and their outcomes. To be effective, ICT governance must be actively designed and not the result of isolated mechanisms (such as steering committees, offices of ICT architecture, service level agreements, etc.) implemented at different times to address the challenges of the moment. Good IT governance is essential to overcome barriers to the adoption of a shared services solution. Janssen and Wagenaar [14] discuss the frustration that can occur at user level and the potential for alienation between shared service providers and local users. If this is to be avoided there have to be clear responsibilities and structures. Strong communication, both formal and informal, is important to ensure that this kind of difficulty does not arise. To avoid the types of problem identified by Bannister [2] and Ren and Wagenaar [23], a shared service requires a carefully executed strategy, the re-organisation and redesign of activities and roles, the standardisation of processes, applications and the underlying architecture and the management of the transformation involved by the engagement of all stakeholders [17]. Colman [6; 7] suggests that there is a necessity for strong "strategic" management and a good eye for what areas would benefit most from streamlining and consolidation and argues that the quality of the service level agreement (SLA) is critical to success. He argues that a SLA needs what he calls two way accountability, i.e. customers must also be accountable to service providers for their behaviour. Customers of an SSP must be able to feel in control [11], but providers must be respected.

Finally a critical component of good governance is a clear perception of all of the stakeholders. Mitchell *et al* [19] suggest that power, legitimacy and urgency are attributes that can be used to identify stakeholders. Janssen [12] concurs, noting that stakeholder management is essential to successful shared services.

2.3 Cost Reduction

While there are many benefits of shared services, in practice shared services are often driven by pressures to reduce costs. David [9] suggests that centralising business processes can cut costs by between 25% and 30%. Centralising using a shared service eliminates duplication and can thus reduce costs even further. In Ireland, as elsewhere in the world's public sectors, there is constant pressure to produce more with less.

Smith et al [25] argue that one of the problems in shared services models is cost containment and that such models tend to fail unless there is a demonstrated reduction in cost. Sometimes savings will only become visible over a five to seven year period which is a long time in government thinking. A further contentious issue is the question of how the costs of shared services are to be spread amongst users. LAs resent having to pay for services that they do not use even if they could use them, but choose not to. They feel pressured to use what they regard as an inferior service simply because they are paying for it, something which can become a further source of friction. Nonetheless, shared services as a source of savings are firmly on government agendas (for example in the UK [22]).

This has only been a brief review of the literature, but a number of key points can be drawn from it. First, there are several conceptualisations of shared services. Second, a key problem in shared services take-up is perceived loss of power and control, but there are several other barriers to take-up. Third, while cost savings are often a primary driver of shared services, often driving out other reasons for implementing such a system, in practice cost savings may be hard to achieve in the short term which can lead to political problems if other benefits have not been part of the business case. Finally, as in so much in information systems, good communication and stakeholder identification and management are critical to success.

3 Research Methodology

This research was carried out in the spring and summer of 2010. A mixed methods approach using a questionnaire and a small number of extended semi-structured interviews was used. The survey instrument was divided into four sections. The first section collected background/demographic information such as experience, staffing levels and size of budget. The second section asked for factual information about current and potential shared services. The third section sought attitudes and opinions about shared ICT services. In the fourth section respondents were asked about perceived barriers to the adoption of shared services. The instrument included a variety of question types, some using Likert scales and others which were open and which invited free-form comment. The first version of the survey was discussed and modified a number of times before being pilot tested using a number of senior managers in the LGMA. After feedback had been received from them the survey was redesigned and then checked by an expert in survey design. Because of the small number of local authorities, rather than sampling, a census was used. The questionnaire was sent to the Heads of Information Systems (HIS) in each of the 34 local authorities in June 2010. After following up the initial request a total of 23 responses were received.

Following the survey semi structured interviews were held with five senior managers in Irish local government. Three of these were County Managers (i.e. the chief executives in the relevant LAs); the other two people interviewed were senior executives in the LGMA. Each interview took between one and two hours and was undertaken at the interviewee's place of work. While the results from the survey were used in guiding the questions in the interviews, the findings of the survey were not given to the interviewees in advance. In preparation for the interviews, a detailed desk study of the interviewee's organisation and that person's role within that organization was undertaken. Detailed notes were taken and these were written up immediately the interview and checked with the interviewees for accuracy.

4 Findings

4.1 Survey

A feature of the HIS group is that the majority of them have been in their roles a long time. Forty percent have been in their current role for over 10 years and a small

number have been in their job for over 20 years. The views expressed were therefore mostly those of people with long experience of shared service in Irish LAs. Of the 23 LAs that responded to the survey, 22 reported that their LA either currently participated in at least one shared service or had done so in the past. Table 1 shows the breakdown of shared service currently offered by the LGMA and the number of users of each.

Table 1. Usage levels of shared applications

System	No.	System	No.
CORE Human Resource (HR)	16	Finance	7
Web Filtering Software	14	Road Management Software	7
Payroll	14	Web Filtering Software	6
Geographical Information Sys.	12	Backup Software	6
Website	11	Telecommunications	6
Higher Education Grants	10	Environmental System Complaints	5
Planning System (iPlan)	9	Project Management Systems	5
Anti Virus Software	9	Enforcements	4
Home or Housing System	8	Time Management system	4
Planning Enquiries	8	Email System	4
Register of Electors	8	Water Services Systems	4
Email Filtering Software	8	Fire Station Systems	3
Procurement	8	Road Design Applications	3
Library	7	Tracking Systems	2
Document Management Sys.	7	Compulsory Purchase Order	2
Library Systems	7		

The percentage rate of take-up can be computed as follows:

$$\frac{\text{Number of Shared Service Uses} \times 100}{\text{Number of LAs} \times \text{Number of Shared Services Available}} = \frac{22400}{23 \times 31} = 31\%$$

which is a low success rate for a service that has been available for nearly four decades. Table 2 shows the responses to the question what services the HISs would consider sharing:

A comparison of both tables shows that, while there is considerable overlap, there are inconsistencies in the responses. For example 18 respondents said that they felt that payroll was a potential shared service. However while this has long been an available service, only 14 of the LAs avail of it. On the opposite side, web filtering software is used by 14 LAs, but only seen as a potentially useful service by three LAs.

The HISs were then asked what services they perceived as primary candidates for shared services. The results are shown in figure 3. While e-mail was the dominant choice, what is noteworthy is the number of respondents who did not select any service suggesting that they did not see shared services as adding any value.

Table 2. Shared applications that users would consider adopting

System	No.	System	No.
Payroll	18	Telecommunications	7
GIS systems	18	Enforcements	7
Register of Electors	17	Time Management system	7
HR	14	Website	6
HEGS	14	Compulsory Purchase Order	6
Email System	12	Road Management Software	5
iPlan	11	Environmental System Complaints	5
Anti Virus Software	10	Email Filtering Software	4
Procurement	10	Road Design Applications	4
Finance	10	Web Filtering Software	3
Water Services Systems	10	Document Management System	3
Planning Enquiries	9	Web Filtering Software	3
Home or Housing System	8	Project Management Systems	3
Library	8	Fire Station Systems	3
Library Systems	8	Tracking System	2
Backup Software	7		

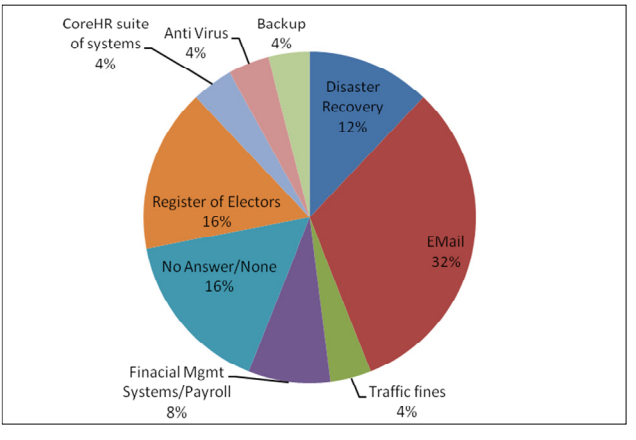

Fig. 2. Single most useful application as rated by users

It was noted in the literature review that strong governance is seen as critical to effective implementation of shared services. This was strongly supported by respondents (see table 3).

When asked about the problems and barriers to adoption, the barriers identified coincided with the literature, but none was strongly supported. The strongest concern was loss of local control and there was no clear view on technical issues or legacy systems.

Table 3. Importance of governance (rated from 5=strongly agree to 1=strongly disagree)

Question	Statement	Mean Score
12	For the successful implementation there must be strong IT governance.	4.48
18	Central leadership and drive is a critical factor for the adoption of shared services	4.40
16	Standardisation of platforms and systems is a key benefit of shared services	4.35

Table 4. Barriers to adoption (rated from 5=strongly agree to 1=strongly disagree)

Question	Statement	Mean Score
17	Loss of local control is a concern when adopting shared services	3.35
13	Frustration at the user-level and alienation between Shared Service Centres and local authorities is a problem	3.57
19	Loss of local technical skill and knowledge is a concern when adopting shared services	3.35
14	Budget constraints have an impact on whether ICT shared services are adopted	3.30
15	Concerns about cost control are a barrier to the adoption of shared service	3.22
11	Lack of progress is due to technical issues such as problems with legacy systems and underdeveloped infrastructure	2.96

A number of interesting comments emerged from the free form question including the variety of views on the reasons for lack of take-up. Over 60 percent of respondents said that they would prefer a regional to a national shared services centre, but half said that their own LA would not be willing to act as a regional host. There was a diversity of view on who should take the leadership role in promoting shared services.

In the free comment part of the questionnaire the dominant barriers to take up were identified as culture, governance, affordability and lack of trust. This suggests that the lack of success in shared services in LAs in Ireland is due to a failure of leadership and management and has little to do with the technology. Problems such as lack of resources or shortages of technical skills were not considered significant. Poor business cases and lack of leadership emerged as the common themes as did failure to standardise business processes. Many respondents felt that trying to implement shared services without making key procedural changes first was a core problem. What emerges from the survey is reasonable support for findings in the literature, but also a wide diversity of views on every aspect of shared services from barriers to adoption to solutions to the problem of low take-up. It might be an exaggeration to describe this as a wicked problem [5], but it is certainly a complex one.

4.2 Interviews

A somewhat different perspective emerged from the interview. The county managers had a different worldview, placing the questions in a broader context by discussing a wide range of shared services beyond ICT though they too agreed that the pattern of adoption was patchy. There are places in Irish local government where there is extensive cooperation between local authorities and other areas where silos persist.

One of the questions that arose during the interviews was how ICT can learn from the success stories in other shared services within local authorities? Amongst the key things that emerged was that strong SLAs are critical; so-called 'gentleman's agreements' generally do not work. There need to be proper legal contracts in place. There also needs to be strong central management with clear roles and responsibilities. Agreed and acceptable allocation of costs and charges is important. Unpleasant surprises arising from cost increases need to be avoided as these undermine confidence. Political leadership is essential. The role of central government in promoting shared services is part of this. In contrast to the importance placed by the HISs on standarising business processes, the county managers emphasised that there are regional variations in business processes which must be addressed. Confirming what is reported in the literature, the managers were clear that for shared services to succeed there should be no perception of loss of local control. It was also felt that data sharing was perhaps more important than process sharing. There was a divergence of views on leadership. Everybody agreed that there is a need for strong leadership and that there is currently a lack of leadership, but there is no unanimity on where that leadership should come from.

5 Reflections

While it might seem self evident that there must be considerable scope of shared services in ICT in Irish LAs, there is no consensus on what services should be shared and a good deal of ambivalence about willingness to avail of such services were they to be offered. There is a conflict between the view that says everything needs to be standardised and the view that there are local variations which need to be taken into account despite the existence of national policies on many of these matters. A good example of the problem of local variation was provided by Dunn [10] when she examined the criteria for local authority public housing lists in all 34 local authorities in Ireland. She found almost no consistency in the rules that were applied for prioritising waiting lists. There is a need for more research into the extent of local variation in services.

The research confirms the conjecture underlying question two that take-up is low. Overall only 31 percent of the potential range of offerings has been adopted. The barriers to adoption were the subject of the third question. Those identified in this research coincide largely with those reported by other researchers. Almost nobody identified technology as a barrier. The barriers are classically those of management and organisational pathologies. The final question asked what might be done to increase the adoption rate? Historically it would appear that the very structure and role of old LGCSB and its unclear relationship with local authorities in general and the

larger LAs in particular was a problem from the start. The absence of proper SLAs and difficulties with the pricing mechanism have aggravated the problem. Technology difficulties, particularly with a centrally developed human resource management system, have not helped. As in many similar situations, while the technology gets blamed, it is only a proxy for other, more fundamental, problems. Finally, part of the problem lies in the current structure of the LGMA where decisions related to shared services are made by an IT committee comprised of county managers and HISs. It may be unrealistic to expect a group so composed to make decisions which would effectively transfer resources and power from their own organisations to a central body even if, in theory, they own that body [2].

The absence of strong and clear leadership has allowed a situation to develop which, if not anarchic, is diverse, uncoordinated and inefficient. The main hopes on the horizon may be the recent reorganisation of the LGMA and the emergence of cloud computing. Asked about cloud computing in the survey all respondents were positive and saw this as a promising development. Nonetheless the cloud too has the potential to become yet another technological patch which will not work unless more fundamental procedural, managerial, organisational and structural problems are addressed. That it can be done is not in question. It is also worthwhile noting there have been other attempts at developing shared services in Ireland which have been successful. One notable case is the Institutes of Technology (of which there are 16) which have over the past five years implemented an effective shared service solution not dissimilar to the type of solution envisaged for the local authorities [3].

It may be that financial pressures will force local authorities into more take-up of shared services, but that will only happen if they are convinced that shared services are more cost-effective and that the price of those services will be consistent over time. A more radical solution to the problem would be to put in place a strong central authority with essentially central financial control of ICT budgets throughout the local authority sector. This would be extremely difficult to put into practice politically and could hardly be considered to be democratic, but it may be the only long term solution.

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Information Technology and the Efficiency of the Brazilian Judiciary System

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Abstract. This article presents an analysis of the impact of Information Technology (IT) investments in the efficiency of the Brazilian Judiciary System. In order to conduct this investigation, it was adopted the case study method to deal with the complexity of the aforementioned phenomenon. The organizational structure and the informatization trajectory of the Brazilian Judiciary System, the legal framework for electronic lawsuits, as well as the role of the National Council of Justice (NCJ) on the automation of the Brazilian Judiciary System form the basis for understanding the context. A quantitative analysis of the correlation between IT investment and the efficiency of the courts shows a potential positive influence of IT on reducing the duration and cost of lawsuits, thereby increasing the operational and financial efficiencies of the Brazilian Judiciary System.

Keywords: Judiciary System, e-Government, Brazil, electronic lawsuit, IT investment.

1 Introduction

As the computerization of the Brazilian Judiciary System in Brazil evolves, e-government becomes an important tool to promote the access of Brazilian citizens to justice. In the meantime, units of the Brazilian Judiciary System are investing in Information Technology (IT) to build the infrastructure necessary to provide e-government services [1]. The adoption of the New Public Management paradigm in Brazil has identified e-government as a path to be followed by the Judiciary System. The continuing development of e-government increases the need for a restructuring of the state to provide these services in terms of routines and processes that need to be eliminated or modified through the use of IT tools [2],[3].

Strategic planning of the Brazilian Judiciary System, coordinated by the National Council of Justice (NCJ), focuses on IT as a tool for solving the efficiency problems of the Brazilian Judiciary System [4]. IT investment of the Brazilian Judiciary System might be evaluated by several indicators from political goal-based ones, such as

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 126–136, 2012.

governance, to technical-based ones, such as software performance. Transparency, info-inclusion, equity, quality, efficiency, capability, accountability, maturity, infrastructure, standardization, interoperability, availability and usability are just some of these performance indicators [5],[6],[7],[8],[9].

As Brazil is implementing its latest judicial reform, led by the NCJ, empirical research becomes very important to guide these IT implementation initiatives in order to assess the actual impact of Information Technology [10].[11],[12]. In its latest phase, Brazilian judicial reform has incorporated not just legal changes but also new elements related to management issues and investment in equipment, buildings and IT [4]. Among these new elements are attention to administration and management and investment in equipment, buildings, and IT.

However, the relationship between IT investments undertaken by the Brazilian Judiciary System as planned by the NCJ and the efficiency of the Brazilian courts of justice has not been researched in Brazil so far. Thus, this article aims to examine the correlation between IT investment and efficiency of the Brazilian courts assessed by two indicators, namely operational efficiency and financial efficiency.

2 Method

The case study method, described by [13], was chosen to conduct this research, in order to explore and describe a phenomenon in its own context, when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used [13],[14],[15]. The phenomenon to be studied - the correlation between IT investment and efficiency of the courts - is intricately connected to political, social, historical, and personal issues, providing wide ranging possibilities for questions and adding complexity to the case study [16]. The case study method conducted here follows four stages, namely designing the case study, conducting the case study, analysis of the evidence, and report writing [17],[18].

The unit of analysis for the case study is the Brazilian Judiciary System and the sub-units of analysis for the quantitative research developed were the State Courts [19]. Given the wide variety of the administrative units of the Brazilian Judiciary System and their differences, it was necessary to select a population that can be compared. There are 27 State Courts in Brazil that are similar in their attributions, which provide a large sample with similar characteristics in order to isolate the phenomenon under scrutiny. This choice allows a comparison between the sub-units of analysis, but does not remove the appearance of a single case study [13].

Although the choice of the case and sub-units of analysis is restrictive, it does not imply abandoning the possibility of generalizing the results obtained. The choice of the Brazilian state court as an object of study was necessary to establish efficiency comparisons. However, the results obtained in relation to the state courts can be generalized for the entire Brazilian Judiciary System, or even other countries, at least those with similar procedural dynamics.

The case study followed an exploratory/explanatory approach [13],[14], in which the analysis of the evidences was undertaken in three stages [20]. First, the

organizational structure of the Brazilian Judiciary System is unveiled in order to make clear where the phenomenon under research is located, via the analysis of several documents issued by the Brazilian Judiciary System. Second, the informatization process and stage of the Brazilian Judiciary System are set forth, including the implementation of the electronic lawsuit, through the analysis of documents developed by the NCJ. Finally, data was collected for a quantitative analysis, by using the annual report "Justice in Numbers" issued by the National Council of Justice [21], in order to investigate a statistical correlation between the IT investments and the efficiency of the State Courts of Justice in Brazil, via data analysis of time series available from 2004 to 2010.

The congestion of lawsuits in courts (percentage of lawsuits waiting for a judge's sentence) is the best available proxy for operational efficiency, because it embodies both the regional characteristics and the number of lawsuits in a given administrative unit. It also provides the efficiency characteristics, as the court performance in judging the lawsuits that come before it. Besides, the cost per lawsuit judged (average cost of each lawsuit judged in an administrative unit) is the best proxy for financial efficiency that can be calculated from NCJ indicators.

As such, these are the two indicators used in this work to assess the IT-enabled efficiency of the Brazilian Judiciary System.

3 The Brazilian Judiciary System

The Brazilian Judiciary System consists of a complex combination of nature of lawsuit, physical location and level of jurisdiction [12]. The jurisdiction for deciding a certain issue is based on a combination of the right in dispute (nature of lawsuit), location of the dispute (physical location) and level of jurisdiction of the judge (level of jurisdiction). Although the explanation may be simple, the multitude of possible combinations offers a complexity of options that goes beyond the number of administrative autonomous units of the Brazilian Judiciary System.

Because Brazil is a federative republic, the basis of the Brazilian Judiciary System lies at state level. The macro-organizational structure of the Brazilian Judiciary System is established in Title IV, Chapter III, Section I, Article 92 of the Brazilian Constitution (Figure 1): "Art. 92. The organs of the Judiciary Power are as follows: I - the Federal Supreme Court; I - the National Council of Justice; II - the Superior Court of Justice; IV - the Courts of Appeal and Labor Assizes; V - the Courts of Appeal and Electoral Assizes; VI - the Courts of Appeal and Military Assizes; VII - the Courts of Appeal and State, Federal District and Territorial Assizes" [23]. Due to this division, Brazil has more than 100 autonomous administrative judiciary units [4]. Besides the federal and state justice, there are three more specialized instances of jurisdiction: labor, electoral and military.

With 26 states and a federal district, each one with its own structure for almost all of the 5 different instances of jurisdiction, coordination is no simple task. In this fragmented environment, information systems were developed in an uncoordinated manner, according to the local internal needs of the organizations [1]. Rarely were the

different stakeholders interested in the Judiciary administration heard [4]. This resulted in several concurrent and non-interoperable systems for lawsuit automation, with low knowledge-sharing and high costs [1].

In 2004, Constitutional Amendment No. 45 created the National Council of Justice (NCJ) and established the constitutional right to a "reasonable" duration of the judicial process (Brasil, 2010b). While the "reasonable" duration established a constitutional right with no adequate means to ensure its accomplishment, the creation of the NCJ was a response to the social demand for an external control of the Brazilian Judiciary System, given the broad autonomy of its units [1].

The attributions of the NCJ include defining strategic planning and the goals and programs for institutional evaluation of the Brazilian Judiciary System. Strategic planning could be found in units of the Brazilian Judiciary System since the early 1990s [24]. Most of these initiatives were isolated and/or discontinued in the course of time. The isolation was given by the fragmented structure of the Brazilian Judiciary System and the discontinuity was caused by the short duration of the administrations of the Judiciary units, limited to a two-year term [22].

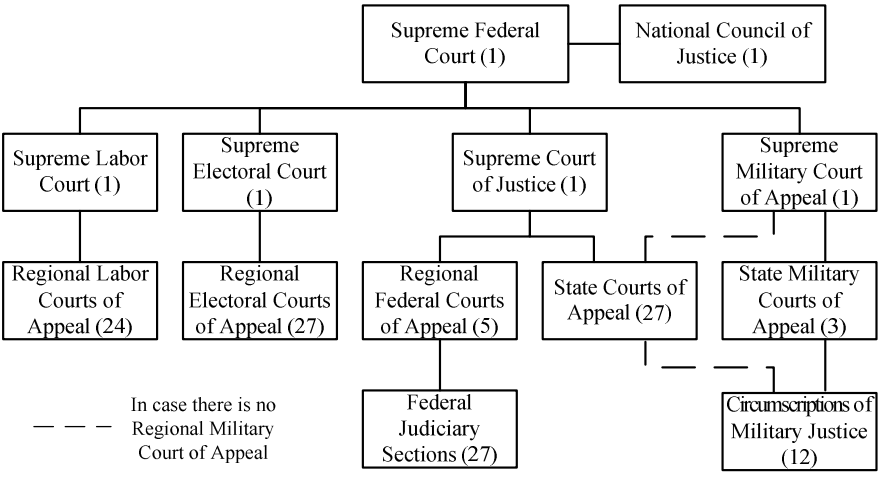

Fig. 1. Organizational Structure of the Brazilian Judiciary System

4 IT in the Brazilian Judiciary System

According to [25], there are three stages in the virtualization of working processes. First, the value chain is still physical, though there is the use of electronic tools such as word processors, spreadsheets and simple databases. Second, automation becomes part of the activities associated with the execution of working processes. Third, the value chain is fully digital with intensive use of IT.

The automation of the Brazilian Judiciary System is more than three decades old [1]. However, during this time there was hardly any coordination between the various individual initiatives. Indeed, until recently no coordinated IT planning was detected

and separate information systems were developed for each and every unit [26]. This problem is even more acute in the state courts, given the administrative autonomy of each state.

The evolution of the computerization of the Brazilian Judiciary System is fully compatible with Tapscott's model [1]. First, judges and civil servants use word processors and simple databases to type decisions and hearings and register information on the progress of lawsuits. Second, the courts implement information systems to control the progress of lawsuits, which [25] defines as "control of working processes", and early steps of automation. Third, the virtualization of lawsuits referred to as electronic lawsuits takes place, when the courts start to implement a fully digital value chain, with intensive use of IT, including e-government tools.

All the administrative units of the Brazilian Judiciary System have completed the first phase, and most of them have also implemented phase two. In rare cases, part of the lawsuits of a given court is not controlled through an information system. All of them have initiated the third phase (digital value chain), though none of them have completed it yet. It is expected that, by the end of 2012, the administrative units of smaller states will have completed this task, with all their lawsuits in electronic format

The increasing computerization of the Brazilian Judiciary System, motivated among other things by the desire to speed up judicial lawsuits, is a solution involving technical procedures rather than new lawsuit routines per se [27], [28]. Undoubtedly, the most important initiative in the field of e-government by the Brazilian Judiciary is the so-called electronic lawsuit. Although it is known by this name, it is a lawsuit in a differentiated physical medium with the same rules as traditional lawsuits, rather than a new type of lawsuit. Instead of the court dockets being on paper, the lawsuit is processed using electronic means. In other words, the standard principles and rules of judicial lawsuits are maintained, though documents that were stored on paper (and often generated via electronic media) are stored and managed electronically.

After the enactment of Federal Law 11.419/06 the implementation of the electronic lawsuit has been essentially pragmatic. The control of routines such as the distribution of initial briefs, fulfillment of court orders, accompaniment of lawsuits, publication routines, scheduling of hearings, among others, undoubtedly benefit from computerization [29]. The first instances of electronic lawsuits were implemented by isolated courts in the various autonomous units, often based on previously available lawsuit information systems [1]. In many cases, there is more than one system in place in each court [1].

In order to clear up this problem, the NCJ developed the Digital Judicial Lawsuit (PROJUDI) [22]. However, the autonomous administrative units of the Brazilian Judiciary System use different versions of the system and have a high degree of freedom to customize them. This situation repeats the same model of decentralized development, with high costs and low knowledge sharing, although on a common platform. The unification of the platform can contribute to reducing the problems of communication and interoperability that need to be overcome in order to achieve the fifth (seamless) stage of e-government initiatives, in accordance with UN/ASPA standards [30].

5 IT Investment and the Brazilian State Courts Efficiency

Although many existing works address many aspects of the problem of efficiency of the Judiciary, none of them links efficiency to the use of IT [10],[11],[12]. Given the constraints already discussed in the methodology, data analysis was conducted to establish if there is a reliable correlation between IT investment and state court efficiency. IT investment in the Brazilian Justice System refers to any of the possible items previously referred to: hardware, storage, software purchase, system development, network, Internet access, management and training.

The analysis of the correlation of IT investment and court efficiency was conducted by considering two dimensions, namely operational efficiency and financial efficiency [31],[32]. As already said, the congestion of the courts was selected for measuring operational efficiency, while the cost of lawsuits judged evaluates financial efficiency [33]. The selection of both the dimensions and their measurement variables is justified by the NCJ strategies and goals [34],[35]. The definition of the variables and its abbreviations are those provided by the NCJ, where available [34]:

- State population (H1) – number of inhabitants, according to data from the National Institute of Geography and Statistics (IBGE).
- Court budget (Dpj) – expenditure of a court in a given year, excluding expenses from previous periods.
- IT investment (Ginf) – all investment in IT resources, including those funded by third-parties.
- Total of sentences (Sent) – number of judicial sentences handed down in a given year.
- Congestion (tc) – Number of lawsuits awaiting a judge's sentence in relation to lawsuits in progress (lawsuits awaiting judgment plus new lawsuits). It is calculated by using the equation: $tc = 1 - (Sent / (CN + Cpj))$, where CN is the number of new cases in a given year, and Cpj is the number lawsuits carried over without judicial sentence from the previous year.
- Cost per lawsuit judged (DpjSent) – average cost of lawsuits judged in a given year. This is calculated by dividing the court budget (Dpj) by the number of judicial sentences handed down in a given year (Sent).

It is important to note that the higher the congestion (tc) is, the lower the operational efficiency. The same happens with the cost per lawsuit judged, i.e. the higher the cost, the lower the financial efficiency. Because of this, both variables are expected to have a negative correlation on IT investment. In other words, IT investment is supposed to lead to a reduction in both congestion and costs.

Brazilian states differ greatly in terms of environment and local conditions and feature a broad variance in important indicators such as population, number of municipalities, revenue, budget, and others. It is important to note that the budgets of the states in Brazil are heavily influenced by transfers from the federal government, especially in poorer states, and therefore do not necessarily reflect the economic activity of the state. The budgets of the State Courts (Dpj) are a percentage of the state

budget (@ GT), which in 2010 ranged from 3.5% to 12.1% (G2) [21]. IT investment (Ginf) is more irregular and varied in 2010 between 0.1% and 4% (inf1) of the court budget (Dpj) [21]. The tool chosen to reduce the regional inequalities was balancing the variables by the state's population (H1). This is expected to narrow environmental differences, since it is impossible to isolate all local variables that affect the functioning of the state courts to calculate its efficiency.

IT investment per capita (GinfH1) was calculated for each of the seven available years (2004 to 2010) using the equation GinfH1 = GInf / H1. The measurement of the congestion was limited to the regular courts, given the inherent difficulty in comparing these data with data both from appeal courts or small claims courts. No transformation was made to congestion (tc) or cost per lawsuit judged (DpjSent) because these are proportional measures. Then, to reduce the effects of annual fluctuations, all the variables were converted into an average for the seven available years. An average for Ginf for each state was found by adding up the results for Ginf and dividing by seven ($\mu GinfH1 = (\Sigma\ GinfH1) / 7$). The same was done to find an average for the congestion (tc) for each state ($\mu tc = (\Sigma\ tc) / 7$) and an average of cost per lawsuit judged (DpjSent) for each state ($\mu DpjSent = (\Sigma\ DpjSent) / 7$).

The analysis of the histograms of the transformed variables showed that none of them revealed normal distribution. Thus, Spearman's rho correlation was adopted because it does not require that data are from a normal population. The variable chosen to proxy the IT investment ($\mu GinfH1$) was then tested to establish if there was a negative correlation with the proxies for state court operational efficiency (μtc) and financial efficiency ($\mu DpjSent$), according to the hypothesis stated previously, namely that IT investment has a positive influence on efficiency. As a result, the one-tailed test of significance was selected and undertaken via SPSS Version 13 (see Tables 1 and 2).

Table 1. Spearman's rho correlation between average population-weighted IT investment ($\mu GinfH1$) and operational efficiency (μtc)

Correlations

			mGinfH1	mtc
Spearman's rho	mGinfH1	Correlation Coefficient	1,000	-,538**
		Sig. (1-tailed)	.	,001
		N	27	27
	mtc	Correlation Coefficient	-,538 **	1,000
		Sig. (1-tailed)	,001	.
		N	27	27

**. Correlation is significant at the 0.01 level (1-tailed).

The analysis of the outputs considered the highly restrictive significance level of alpha = .01. This means that the odds that the correlation is a chance occurrence are no more than 1 in 100. It was also adopted Cohen's criteria for interpretation of a correlation coefficient [36].

Table 2. Spearman's rho correlation between average population-weighted IT investment (μGinfH1) and cost efficiency (μDpjSent)

Correlations

			mGinfH1	mDpjSent
Spearman's rho	mGinfH1	Correlation Coefficient	1,000	-,425**
		Sig. (1-tailed)	.	,008
		N	27	27
	mDpjSent	Correlation Coefficient	-,425**	1,000
		Sig. (1-tailed)	,008	.
		N	27	27

**. Correlation is significant at the 0.01 level (1-tailed).

In both cases, there is a medium to high correlation by Cohen's criterion (see Table 3) within the confidence interval: -0.538 between the average spending on IT per capita (μGinfH1) and the measure of operational efficiency - average congestion (μtc) - with a ρ-value (denoted by Sig.) of 0.001; and -0.425 between the average spending on IT per capita (μGinfH1) and the measure of financial efficiency - average cost per case decided (μDpjSent) - with a ρ-value (denoted by Sig.) of 0.008. Therefore, one should reject the null hypothesis that $\rho = 0$, i.e. reject the hypothesis of no correlation and support the hypothesis of its existence. Besides, both are negative correlations. As such, assuming that the relationship is causal in the sense that spending on information technology influences congestion and cost, and not the other way around (although any expense does influence the cost), one cannot reject the hypothesis that IT investment has a positive effect on the efficiency of the Brazilian Judiciary System.

Table 3. Cohen's criteria for interpretation of a correlation coefficient

Correlation	Negative	Positive
Small	−0.3 to −0.1	0.1 to 0.3
Medium	−0.5 to −0.3	0.3 to 0.5
High	−1.0 to −0.5	0.5 to 1.0

6 Conclusion

The main goal of this research was to analyze e-government being enabled by IT investment of the Brazilian Judiciary System via the investigation of the impact of IT investments undertaken by the Brazilian Judiciary System on the efficiency of the Brazilian Courts of Justice. For this reason, an embedded single case study [13] was performed. Besides, this investigation intended to tackle one of the themes of the eGovRTD2020[1], namely assessing the value of government IT investments.

[1] eGovRTD2020 is a project co-funded by the European Commission under the 6th Framework Programme of Information Society Technologies. It seeks to project the scenario of e-government in 2020 and thereby identify future strategic research fields for the development of e-government and the public sector per se. See at http://www.egovrtd2020.org/EGOVRTD2020/navigation/work_packages/wp4_roadmapping/itvalue

Analysis of the role of the NCJ in the strategic planning of the Brazilian Judiciary System shows that it focuses on the efficiency of the courts and its capacity to judge the lawsuits in a timely manner. In order to accomplish this, the NCJ has chosen IT as one of the main tools (management being the other one).

As such, the NCJ's focus on operational and financial efficiency established the parameters for defining the variables to evaluate the effects of IT investment on the Brazilian Judiciary System. The existence of a medium to high correlation between IT investment and both measures of efficiency (average congestion and average cost per lawsuit judged) within a narrow confidence interval, shows that IT investment has a clearly positive influence on the efficiency of the Brazilian State Courts. As such, faster and less expensive lawsuits can become a reality and foster access to justice.

However, there are some research limitations in this work that must be addressed. How long does it take for the IT investment to mature and have the expected effects on efficiency? It is a difficult question to answer mainly if one doesn't know the structure of the IT investment. Investment in software development, notably in the early stages, has uncertain returns. Investment in training has a more rapid return. The solution adopted here was to consider all the time series available (seven years) to evaluate the results of medium-term investment in IT. This approach was designed to reduce the effects of the considerable fluctuations in IT investment from year to year within the same court but must be considered as a research limitation.

Another research limitation in this study was the use of data directly related to the activities of the Brazilian Judiciary System. It was the best approach available for the purposes intended, despite the fact that the currently available data do not cover all aspects of efficiency, such as correct and non-biased decisions, and promoting access to justice.

Despite that, the analysis of the data related to the role of IT investments undertaken by the Brazilian Judiciary System shows that there is an opportunity for the Brazilian Judiciary System to provide higher levels of e-government services through the Internet, such as electronic lawsuits. However, providing access to justice through e-government is no easy task, as there are several restrictions to the use of e-government services, particularly by the lower classes [7],[37].

Lastly, future research initiatives in this realm must investigate not just the impact of IT investments on the efficiency of the Brazilian Judiciary System but also on the accountability of the Brazilian State Courts. To [38], this concept may be understood as a question of democracy. That is, the more advanced the democratic stage, the greater the interest in democracy. Thus, government accountability tends to follow the advance of democratic values such as equality, human dignity, participation and responsibility. As such, it is important to further investigate the role of IT on this issue.

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The Tool That Has to Build Itself: The Case of Dutch Geo-Data

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Abstract. Standardisation is one of tools of Electronic Government (EGov). It refers to the development where individuals and organizations develop and/or adhere to standard IT solutions and associated work processes. Studies on standardization in information technology (IT) emphasize either only the technical side of standard construction (the 'what' and 'how'), or the socio-organizational side of the contextual processes in which standards emerge (the 'who' and 'when'). Our article has an alternative, socio-technical, approach, which emphasizes 'where' standards crystallize. Our empirical field to find where crystallization occurs concerns the geoIT sector. Through a qualitative approach, the data show that standard crystallization occurs at the hubs of inter-organizational relations, rather than at the top or the bottom of formal organizations. This claim is important because it contradicts the common strategy of standardization, which is largely centralized. Even though government has centralized the creation and distribution of geoIT standards, their actual creation and crystallization occurs at a more decentralized level: across municipalities. The conclusion is that bringing the standardization discussion to a point of where standardization actually happens, provides a better understanding of the socio-technical dynamic of governance of inter-organizational IT.

1 Introduction

When designed and implemented within an e-government framework, information technologies (IT) are intended to be both technologies for the bureaucracy -because it is in this kind of organizations that they are implemented - and technologies of the bureaucracy, as they aim at extending public administration functioning in relation to citizens. Either way, the IT is conceived as a tool in the hands of decision makers. Such a view on technology, usually contrasted to a techno-deterministic view, falls short in accounting for the quite frequently observed 'drift' [1] of large information systems. Although we would not make a groundbreaking claim that evolution of technology often eludes designers' intentions, here we adopt a stance which resonates more with [2], who conceptualize technology as 'gestell' (i.e. enframing) rather than a

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H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 137–148, 2012.

malleable tool at disposal of will. Our case corroborates their phenomenological stance, and expands it by identifying where crucial developments of geoIT actually happen. More precisely, we focus on the two-way relation between geoIT and inter-organizational processes.

Harmonizing technical with socio-organizational analytical perspectives with the aim to construct a comprehensive perspective on IT development and standardization has never been immediate. Specifically, engineering is oriented to define what works [3], so functionality is the legitimizing source for this kind of research. Contrastingly, socio-organizational science approaches are closer to the traditional science epistemology, aimed at explaining and predicting rather than doing. In the latter case, explanatory power –aimed at pushing the boundaries of what is known- legitimizes research. The mismatch between how the two communities "make a point" make it difficult to combine their views, therefore to develop a consistent conceptualization of e-government.

Given this mismatch this article proposes a different viewpoint, empirically first. Instead of emphasizing the construction of governance tools, the technical standards, and instead of emphasizing the contextual conditions for governance, the socio-organizational environment, we emphasize 'where' agency performs action, 'where' it takes place. In particular, we focus on 'where' standards are consolidated. We assume that analyzing the areas of influence in dynamic inter-organizational relations addresses this 'where' question. Our empirical domain is the Dutch geoIT sector. This sector, made up of professionals and scientists using and developing ICT related to (geo-)spatial processes and phenomena, is a sector where dynamic inter-organizational relations have developed historically. Such relations can be framed by the concept of Spatial Data Infrastructures (SDIs). SDIs are the socio-technical networks of 'geospatial technologies and institutional arrangements and practices that allow for the disclosure and sharing of geospatial data among various levels of government' [4]. Over time, SDIs have created standards of inter-organizational activities. Yet, whose standards are adopted, and where such standards emerge is largely unknown. Therefore, in this paper we look for where SDI standardization happens. We frame this question as a question of SDI crystallization (echoing the snowflakes from Staring and Titlestad [5], which gives primacy to so called 'de facto' standards.

This article continues in section 2 with an explanation of what the concept of information infrastructure (of which SDIs are an instance) crystallization would entail, and why it would be useful as an alternative stand to study standardization as a governance mechanism of inter-organizational IT. This section also presents how the dimensions of information infrastructure crystallization would apply to SDI developments, and how this would translate into empirical questions. Section 3 describes which cases are representative for SDI development, and for addressing the main research questions. Section 4 presents the results of the data collection. The concluding section derives how the findings provide added value to the knowledge of Egov tools.

2 Two Views on Where and How geoIT Standards Develop

Information infrastructures depend, in a way or another, on standards. Studies on standards either emphasize the technical side of standard construction i.e. the 'what' and 'how' [6-8], or the socio-organizational side of the contextual processes in which standards emerge, i.e. the 'who' and 'when' [9-11]. Where technical studies tend to emphasize the construction of standards as a solution to technical interoperability, the socio-organizational studies emphasize both the regulatory nature of standards within organizations, and the patterns of power preceding or resulting from standard-making.

Standards relate however also to scale, i.e. the 'where', either as a cause or an effect. In current discussions on how standards are formed and what role standards play in this formation of SDIs, two opposite agency standpoints are visible – through centralized and through decentralized agency (agency in its broad meaning of what performs action). When agency is argued as centralized, it can be localized more easily. When agency tends to be distributed, it can be situated in an "area" (corresponding to interest groups, lobbyists, organizations, etc.). Therefore, understanding the distribution of action across actors helps us in identifying the locus of SDI crystallization.

The centralized agency view posits that geoIT standards originate from national statutory tasks and centrally led initiatives. Public sector actors are linked through a pyramid of different levels of public administration [12]. The statutory mapping tasks of national actors require them to decide on national mapping standards. The only way for national agencies to have interoperable maps within all government agencies is through requiring other agencies at other administrative levels to use the same mapping standards. In this view the highest level SDI is the aggregate of all lower level SDI. The highest level standards are the aggregate of all lower level standards. This pyramid view assumes undisputed lines of power, which are visible through the formalization of relations between the actors through bilateral or multilateral procedures, laws and/or regulation; the working processes follow agreed rules, laws, written and distributed regulations. The decisions on who is in the SDI and who is out are designed to be formal, and the standards are pre-defined and distributed along the formal lines.

In contrast the decentralized agency view posits that geoIT standards are shaped decentrally. At the extreme, there is a relevant role of voluntary production of geo-information through crowdsourcing initiatives, and by citizens. These people drive the change in technology and in doing so implicitly set the standards of data, data sharing and exchange, and work processes of data collection and distribution. In more recent years, "voluntary geo-information" (VGI), is challenging the exclusivity of geoIT handling by public organizations [13-15]. The decentralized process of standards development is one whereby actors are assumed to operate within a large open network of relations. There is no clear-cut boundary between who is in and who is out. Recent VGI efforts and standard development operates similarly to an "internet-like" process, the standardization process co-develops along with globally dispersed activities. One of the questions is thus: who or what decides on the rules "here", in this setting. The relations are mostly built upon informal links between actors and stakeholders, and what drives these relations is a common, yet temporary, interest.

Comparing both views shows a difference in locus of standards crystallization. The first view emphasizes the coercive nature of national and central governance mechanisms. Standards emerge in this view as a direct effect of legislation and regulation. Contrastingly, the second view emphasizes emergence of standards at local levels. Standards in this view are caused though the autonomy of local actors, whose aggregated actions constitute certain decisions and practices. Although both views acknowledge that the discontinuation of one standard and the start of a new standard is more gradual than punctuated, in both perspectives standards change over time, and the origin of this change relates to the context in which actors operate. It is therefore remarkable that neither of the two views recognizes that professional actors often operate through professional networks which are loosely connected to the national or local level [16, 17].

Information infrastructure studies focus on the relations between information systems, and the underlying processes between actors working with the systems once information systems are connected. An information infrastructure perspective could address this void. From this perspective, inter-organizational relationships depend on which agency can exercise what type of influence on organizations and individuals. Standards, in this view, have the effect of regulatory agency beyond a single organization, or a single level [18]. Hence, standards (or lack of them) do not emerge within single organizations, but emerge and crystallize in inter-organizational processes regardless of the level at which they take place. By emphasizing the network relations between actors at any level, this study does not emphasize the self-contained organizational structure so much, but instead the organizing processes [19]. Understanding the organizing processes of standardization thus implies having to look into the diverse relations across organizations. The characteristics of the relations thus reveal the location of where standards form and where and how standards crystallize.

3 Methodology and Cases

Our overarching empirical research question is: Where do inter-organizational relations working with geoIT produce SDI standards? This has three main components which were each evaluated: 1) the cases of inter-organizational relations in connection to the use of geoIT; 2) the artifacts that justify that SDI standards are being crystallized; 3) the determination of the location of the production / emergence of standards.

Addressing the first component relied on case study methodology. This is relevant, because the boundaries of the phenomenon under consideration, the locus of standardization, and the context, the geoIT world of practitioners, and the public administrative structures, were unclear from the onset. As [20] argue “the structure of an organizational field cannot be determined a priori, but must be defined on the basis of empirical investigation” (p.65). The review and comparison of cases in the Netherlands drew upon extensive experience and subsequent empirical data collections in the area by de Vries [21-23]. The selection of cases for this study relied on one element which

was different between cases: the control structure. This allowed verifying if the location of regulatory control was relevant in coordinating of the inter-organizational relation. Using this selection criterion derived three cases: Cadastral case, Dataland and Dimpact.

The Cadastral case refers to a national organization 'Kadaster' (the National agency for Land administration and land registration) with sub-national working relations with municipalities. The Kadaster historically has strongly coordinated the inter-organizational work processes to maintain parcel-based spatial information, captured with geoIT. The Dataland case refers to a national association Dataland made up by municipalities. A central office Dataland centrally aggregates real estate information through coordinating work processes in municipalities. Real estate information is collected and distributed through geoIT. The Dimpact case refers to an association of various municipalities. The Dimpact office coordinates ICT work processes for municipalities. This office relies on staff from member municipalities in the development of information and ICT solutions for other municipalities. GeoIT is one of the components.

Our conceptual entry point for the second component is the hypothesis that either type of agency (central or peripheral) creates SDI crystallization. We assume hereby that such crystallization is visible along three dimensions, following Miscione, Staring and Georgiadou [24]. These include accreditation, coalition, alongside with the activities related to the adoption of standards. Accreditation refers to the influence of actors to guarantee access. Coalition refers to the possibilities of establishing couplings between data and related activities and organizations. Adoption of standards refers to both the data and to organizational processes compliance to common guidelines. These aspects do not distinguish technical and socio-organizational dimensions a priori. They are also mutually dependent, and help in describing inter-organizational processes. For example, a public body may decide what standards have to be used for geo-information. Nevertheless, existing systems in use in accredited organizations may require different strategies of data integration. The method of collecting data about the values within these three dimensions was a combination of semi-structured interviews, complemented by a workshop with representatives from municipalities, and a survey among geoIT practitioners. We conducted 15 in-depth interviews with representatives within all cases. We transcribed all interviews and the discussions during the workshop. The survey data were collected through an online questionnaire. We coded both the transcriptions and all other relevant documents with the help of a qualitative analysis support software. All data were coded applying an open coding strategy of Lee [25] and Lewins [26]. In total there were 99 respondents.

For the third component we relied on an interpretative approach. Upon completion of the coding we specifically queried both 'change' and 'location' aspects emerging from the coding results. We assumed hereby that agency can be seen through respondents' references or associations to both change and to the origin of change. In both cases the interpretation of the coding and associated quotations relied on both explicit and implicit references to 'change' and 'origin of change'.

4 Findings

We present our findings following the three specific research questions.

1. Cooperation using geoIT

In each case the actors shared responsibilities in relation to the geoIT data. With regards to the data this concerned the harmonization of georeferencing definitions (such as coordinates and zip codes), the type of spatial objects to use (collection of lines, areas, or points), the type of attributes to include per spatial object and the scale and associated required accuracy of data. The type of data varied per case. In the Cadastral case the Kadaster maintained collections of parcels, each having parcel identifiers, whereas each of the municipalities maintained collections of buildings, each having address identifiers. Moreover, The Kadaster and Dataland organizations maintained their own database on their own server, whereas the Dimpact organization relied on the generation of services extracting from the data collections within each municipality.

The crucial agreements on procedures concerned decisions on data collection and maintenance. Municipalities are by law responsible for the definition and the collection of buildings and address data, and are implicitly responsible for the quality (accuracy, reliability) of these data. The Cadastre on the other hand maintains these data for all municipalities. Dataland coordinates the maintenance of cross-boundary municipal data on behalf of the municipalities. Not entirely surprisingly, the influence that the central office in each case (The Headquarter Cadastre, and the Bureaus of Dataland and Dimpact) can exercise on local municipalities diminishes as the central office is further away (both physically and institutionally) from these municipalities. A respondent from a smaller municipality stated ironically on the data collection and distribution responsibilities: It is all very nice what the central office comes up with, but we don't need them. You only hear once, and afterwards you really have to push to get any information from them. It is all written for bigger municipalities. It is absolutely unusable stuff for smaller and medium sized municipalities like us.

Sharing data to third parties was another joint concern, working with the huge amounts of data on a daily basis is very different among the cases. A Kadaster representative stated *We just have to process as many transactions as possible. 500,000 transfers of deeds, 500,000 transfers of mortgages, 20 million digital transactions. It's just production work*. A Dataland representative highlighted: *In our regular database we have 7 million objects, yet if no one wants to use any of those data it would be dead capital. Still, we receive all our data from the municipalities, and from all the revenue that we generate, 15% goes back to the municipalities to pay for all their delivery costs. From the remaining 85% we can pay our own costs of data management.* In other words, both organizations work as data factories, with factory-like business models and business attitudes, and the procedures therefore emphasize immediate efficiency interests. In both Dataland and Dimpact the municipalities agree jointly, via the coordination bureaus, on the conditions of how and to whom to distribute their individual or combined datasets. Since the Cadastre, Dataland and individual municipalities own fees through the distribution of data, customers are crucial for

the existence of the organizations. A Dataland representative even stated during an interview: Our customer focus is so big… It is our lifeblood.

So, we can note a geographical and topical convergence between these organizations. Both cooperation and standards are created and sustained by actors which are mostly geographically clustered and have ongoing relations already. Dimpact members are often geographically clustered groups of municipalities, and Dataland non-members are also geographically clustered. This does not mean that data quality is homogeneous within clusters, because as for example within Dataland it is noted that: Almere and Lelystad [both Dataland members] are adjacent cities. They have the same history, both were created in Flevoland province. Than one would expect a similar quality, but they score very different in quality indicators. While membership may be geographically fostered, data quality standard within the organization is also related to local information management practices. Our explanation is that a clustering of actors follows a narrow set of thematic data applications, such as real estate (Cadastral and Dataland cases).

2. Shaping of inter-organizational relations in terms of accreditation, coalition and adoption of standards

The accreditation in the cadastral case mainly depended on the degree to which the Kadaster was able to convince the ministry of spatial planning of their price policies. The Kadaster could autonomously decide on all data management processes, yet only needed a ministerial approval for the pricing policy when distributing data. The Kadaster thus implicitly accredited the data quality, yet the price for the data required an accreditation from the ministry. In the Dataland case, the Dataland head office set out a series of data quality parameters, which they did not enforce, yet which they monitored within municipalities. The purpose of the monitoring was to develop gradually a list of best practices, and a list of best municipalities adhering to these practices. The Dataland head office accredited data quality through organizing a price for the best municipality. The accreditation thus relied on the promotion of this price by peers, and the positive image for municipalities attached to this price. In the Dimpact case, the setting of the data and services quality relied heavily the technical representatives of individual municipalities. They jointly decided on certain quality parameters, such as specific GIS solutions, and were though these decisions implicitly accrediting themselves.

The organization of coalitions differs per case. The Kadaster was maintaining individual contracts with each municipality, yet this would change soon given the implementation of national key registers. New legislation on key registers would distribute data responsibilities for collection and distribution to the Kadaster and municipalities in more detail. This new legislation is likely to change the contractual agreements between the organizations. In the Dataland case the coalition relied on inter-related structures of memberships. The Dataland central Bureau administers memberships, and coordinates cohesion among members. Dataland itself is a cooperative of municipalities with Dataland foundation and Dataland corporation, and an executive Bureau Dataland. In the Dimpact case, the coalition was organized voluntary membership rules. Municipalities were voluntary members to an association of municipalities,

while an executive bureau Dimpact coordinated the coalition alignment at technical and policy level.

With regards to the adoption of standards in the Cadastral case, all data and operational processes were largely set by the Kadaster, operating under the authority of a Cadastral law. In the implementation of this law the central theme was how to generate 'efficient core registration (of government data)'. In the Dataland case, The Dataland Bureau was setting validation rules for checking the data quality, and applied these rules to check data of individual municipalities. In this process the core theme was 'improving accessibility (to government data)'. In the Dimpact case, the technical solutions for data problems were created by private companies in outsourcing contracts. Central in the management of the data standard and data production standard creation was the repeated catch phrase 'improving (e-) service to citizens'. These 'catch phrases' mentioned during individual interviews are exemplary of the how actors tried to steer standards in a particular direction: We do not want to be politically interesting, but we lost 40 or 50 million revenue due to the real estate crisis. As a result we decreased out cost with 15 million. The mechanism that we agreed was to operate like a normal business. (Senior Kadaster representative); Our whole story is about access to government information. 'That is the core and mission of Dataland. That is the point. Dataland wants to make public municipal data more accessible'. (Senior Dataland representative); Dimpact is indeed a cooperation between municipalities, which, just like any other association, become a member to a central image, that of e-service. Like you join a tennis club to play tennis, you join our club to realize e-services as member. (Senior Dimpact representative)

The Kadaster representative has a clear preference for standards based on (cost) efficiency norms. The Dataland representative emphasizes accessibility as the most crucial norm. The Dimpact representative emphasizes collectivity as a key norm. The efficiency of the Cadastral case is quite different than the improving accessibility, or improving e-services to citizens. Which standards emerge as a result is however greatly affected by these 'buzz words'. Despite the fact that coordination of standards relied on centralized coordination activities , the results under 'responsibility' show that the space of influence from the central office decreases, as the distance to where standards are actually used (at the level of municipalities) decreases. A possible explanation is that the acceptance of centralized standards relates to the degree by which municipal staff feels themselves represented in the decisions on standards. In the Cadastre case, a number of representatives of larger municipalities explicitly rejected to accept the central standards, and preferred to use standard resulting from a process in which they were involved themselves. The argument was that internal alignment of geoIT standards with other internal departments received higher priority than alignment with external agencies. Smaller and medium sized municipalities preferred to be included in clusters of municipalities, so that they could follow and influence geoIT developments more directly. Both Dataland and Dimpact provided this facility, as their central office was directly constituted by the municipalities themselves (Dataland), or was directly implemented by municipal staff (Dimpact).

3. Where do changes occur?

Two types of changes were apparent. The first type reflected a gradual change. The size of Dataland and Dimpact cooperation consortia gradually increased even during the data collection process related to these cases. The number of actors involved increased both in number of organizations and in number of professionals involved. The staff members working in these cases indicated that this increase of actors made the coordination of standards, even if it were on a voluntary basis, more complex. Despite this increase of members there was no change in the coordination and governance structures between the organizations. This is remarkable, because one would expect the work processes and the way that people agree on these work processes might get more complicated, and hence might need adaption.

A second type of change was more punctuated. The introduction of the new law on base registrations affected all actors in all cases. Although the new law had been in preparation for a considerable amount of time, and although many of the technical staff members had been involved in proposing the details of this law through working groups, still the approval of the law had immediate legislative consequences. As a result, staff members perceived a change in their management activities, in particular within the municipalities. As stated above, in the Cadastral case the distribution of responsibilities between the Cadastre organization and the municipalities changed, and had given municipalities more responsibility in the maintenance of address and real estate data. Many municipal staff members perceived however that they only had limited capacity to deal with this task, while maintaining other tasks at the same time. This additional work load required them to rethink their operational procedures, and allocation of tasks to staff.

A third type of change in the use of geoIT standards was expected, yet did not occur. The standards of the citizens (customers of the products and services of all the cases), such as open geospatial data standards, were hardly taken up within the internal processes of the cases. Some municipalities indicated adhering to open data standards principles, but neither in the statutory duties or in their voluntary agreements did they insist on relying on these open data standards. Standard geo-data handling and provision thus still strongly relies on existing working relations within the larger agencies.

In sum, one may conclude that the stability of the internal coordination structures (aiming for standards in geoIT) is not really rooted in the specific number of members in a consortia, or in either hierarchical relations (coerced by law) or in bottom-up relations (emerging from daily interaction with citizens/customers) but in the similarity of relations that the new actors had in comparison to the existing members. Coordinating standards on geoIT seems thus strongly dependent on existing coordination structures on other issues. Hence, the locus of standards crystallization is not central or peripheral, but at the point where long-term mutual relations already exist.

5 Discussion

Overall, the data show the importance of a middle level ground between central administration and a famous Internet motto: “rough consensus and running code” as the way an information infrastructure establishes itself. This can also be read as a liminary position between expert and lay knowledge. Our underneath interest to focus on the ‘where’ question was to avoid usual accounts, deeply entrenched in the public administration -and usually elicited by interviews: “How does standardization happen?" is likely to get answers like "a formal process has been put in place, followed, different viewpoints have been considered, together with technical viability". In the cases understanding ‘where’ standardization of geoIT takes place cannot be reduced to understanding how SDI has evolved within the traditional public sector only. A number of relevant and emerging phenomena on the fringes of mapping agencies' core business have emerged as well. So, our research focused on the crystallization of relations across inter-organizational relations across the Dutch geoIT organizational field. We saw that geoIT standardization takes place in an environment which consists of both hard and formal relations (contracts between public authorities, with public mandates in the field of geoIT) and soft an informal ones (voluntary associations having voluntary working relations and rather loose decision and control mechanisms). Hence municipalities proved to be central middle ground between central bureaucracy and citizens, are places where standardized practices crystallize, thus where standardization occurs. It is relevant, because municipalities are non-specialized bodies for geoIT standardization. This counteracts a common assumption, as specialized bodies at national level are the primary knowledge holders of the domain. Yet, in their need to combine all sorts of top-down requirements to implement the execution of legislation on the one side, and deal with external geoIT users on the other side, actors at the municipal level act as mediators between those requirements, and de facto act as standardizors. We explain the role of municipalities by being entangled with both bureaucracy the citizens, not only through work relations, but also through representation and legitimacy.

So, we identified a significant window of opportunity at the municipal level, which is strategically between central administrations and citizens. In information infrastructure terms, the municipalities are the hubs of an emerging network, and the hubs of the network actually drive the process of crystallizing socio-technical relations into standards, rather than adopting what has been designed elsewhere. Where the traditional view would predict that there is a central definition of standard, which is then applied throughout the hubs, the findings show that hubs are at the encounter of different geo-information flows and combine them in use, this crystallizing the standards. So, as detailed below, rather than being entitled to set standards, what affect and explain standardization are the loci of accreditation and coalition. This is particularly relevant within the public sector, where standardization is expected to be led by professionalized, dedicated bodies. Our analysis identified an interesting tension between the trend towards more autonomous cooperation among smaller public organizations and organizations which are lower in the administrative hierarchy and less specialized. So, what is the role of the people at these levels, and the standards they

are shaping? Are these people being ruled or are they ruling? Our point from the empirical cases and information infrastructure research is that this dichotomy is not very suitable to frame the problem and answer the question. Rather, we put at the center the locus where standards actually happen to crystallize. Indeed, municipalities are a crucial point of encounter along the tensions they are intertwined with, and this position sheds new light on geoIT standardization. From this perspective, 'street level' public sector officers are gatekeepers, being at the intersection of geo-information production and use. This is our proposal for a conceptualization of SDI as a tool which has a sensible degree of autonomy from what decision makers have in mind and express through designers. Such autonomy explains how and why this 'tool' also builds itself more than conventional accounts acknowledge.

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Cross-Border Legal Identity Management

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Abstract. Electronic Identities (eID) and their cross-border recognition are on top of the agenda of various e-Government initiatives of the European Commission (EC). Therefore, the EC launched the EU large scale pilot STORK, which was running for about 3.5 years and finished at the end of 2011. In this period, STORK has established a European eID interoperability platform for citizens. The focus of STORK was to achieve eID interoperability of natural persons. However, many e-Government processes are conducted by representatives of legal persons. Hence, this paper proposes an eID interoperability framework for the cross-border identification and authentication of legal persons or professional representatives using electronic mandates. The framework strongly bases on the findings of STORK and introduces an extension of the STORK framework supporting cross-border identification and authentication of legal persons.

Keywords: Electronic Identity, eID, Identity Management, Legal Identities, Legal Persons, Empowerment, Electronic Mandates, STORK, Interoperability.

1 Introduction

Identity Management (IdM) related to secure identification and authentication of citizens defines one of the major challenges in the past years and will last a few more years. A lot of European countries have already rolled-out different kinds of electronic identity (eID) solutions to enable secure identification and authentication of citizens in online processes. Especially in the area of e-Government transactions, IdM is of major interest because in many cases sensitive personal data are processed.

Due to a higher mobility of citizens and businesses within Europe, secure cross-border identification and authentication has gained high importance. However, most European countries rely on their own national approach for IdM, which burdens the economic growth and competitiveness within the European Union. This also makes citizens' mobility within the EU difficult and hinders cross-border transactions. To fill this gap, the European Commission has launched the large scale pilot (LSP) STORK[1] (Secure Identity Across Borders Linked) in the year 2008. The STORK vision was *"to establish a European eID Interoperability Platform that will allow citizens to*

[1] https://www.eid-stork.eu/

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 149–161, 2012.

establish new e-relations across borders, just by presenting their national eID" [1]. STORK has built an eID framework on top of various national heterogeneous solutions to make them interoperable. The main focus of STORK lay on secure cross-border identification and authentication of natural persons only.

However, many e-Government transactions are conducted by legal persons or professional representatives. Electronic mandates for the expression of proxyship[2] are one solution for that. Other approaches are the usage of attribute certificates or the assignment of appropriate credentials to the representing natural person. Some EU countries have such an e-Mandate solution in place or are planning to establish one. Similar to the situation of natural persons before STORK, the identification and authentication of legal persons is unresolved in a cross-border context. Hence, the present paper proposes and discusses an eID interoperability framework for the cross-border identification and authentication of legal persons using electronic mandates.

The remainder of the paper is organized as follows. In Section 2, we describe related work with regard to mandate management and the Austrian and Dutch mandate systems as examples. Section 3 gives a brief introduction to the findings of the large scale pilot STORK and explains its interoperability models. The subsequent Section 4 describes the extended STORK architecture enabling cross-border authentication of legal persons or professional representatives for a chosen scenario. Finally, we draw conclusions summarizing the main facts and open issues.

2 Related Work

While IdM for natural persons in the EU has been widely achieved with the roll-out of national eIDs, there is a green-field situation in many Member States (MS) regarding legal IdM. The IDABC Study for eID Interoperability for PEGS [2] reports for representation and mandate management

"[…] that a systematic approach to mandate management and authorization functionality – i.e. the ability to allocate, retract or verify specific permissions of a specific entity - in the examined eIDM systems was still altogether rare. 22 countries out of 32 (69%) have no form of mandate/authorisation management, other than the allocation of certificates or credentials to the representatives of a specific legal entity."

and

"[…] only two countries have implemented systems of mandate/authorisation management which can be characterised as systematic."

Besides Belgium, Austria is the second country mentioned by the 2009 IDABC study. Since then, also the Netherlands have introduced a systematic approach to legal IdM called eRecognition [3]. The following subsections give a brief overview of the Austrian and Dutch systems to demonstrate how legal IdM is realized on a national scale using systematic approaches by accessing central registers.

[2] E.g. a natural person is empowered to act on behalf of another person.

2.1 The Austrian Mandate System

Authentication and identification in Austrian e-Government is based on the so-called citizen card, the Austrian national eID. The citizen card is a secure signature creation device (SSCD) that can be used to create qualified electronic signatures (QES) compliant to the EU Signature Directive [4]. The identification data (name, date of birth and unique national identification number) of the citizen are stored in a special XML-based data structure on the citizen card. The legal basis for the citizen card is laid down by the Austrian e-Government Act [5], which came into effect in 2004. Representation of legal persons has been considered by the Austrian e-Government strategy from the beginning and is thus also an integral part of the Austrian e-Government Act. On this basis, Austria has built an infrastructure for legal IdM using the concept of so-called "electronic mandates" [6]. Electronic mandates are security tokens asserting that a person is empowered to act on behalf of another natural or legal person. The asserting authority is the Austrian SourcePIN Register Authority, a sub-organization of the Austrian Data Protection Commission. From a technical point of view, electronic mandates are well-defined XML structures holding the following information:

- Electronic identity of the representative including name, date of birth and unique national identification number
- Electronic identity of the mandator including name, date of birth and unique national identification number
- Date and place of mandate issuance
- Content and scope of empowerment
- Unique mandate ID
- Any restrictions (financial, timely, etc.)

The Austrian mandate management infrastructure fits seamlessly into the IdM system for natural persons and is based on a just in time (JIT) generation of electronic mandates [7]. This means that the SourcePIN Register Authority acts as an Attribute Provider (AP) by fetching the information for the power of representation, i.e. the mapping between legal and representing natural persons, from constitutive registers, for example the Company Register or the Central Register of Associations. Based on this information, an electronic mandate is created on-the-fly, asserted by the SourcePIN Register Authority through an electronic signature and provided to the identity provider and subsequently to the service provider. Details of this process are discussed in more detail in Section 4 because the Austrian concept is used as sample national legal person management system for demonstrating our cross-border solution.

2.2 The Dutch eRecognition System

Parallel to DigiD[3], the national IdM system for natural persons, the Dutch Ministry of Economic Affairs has provided a systematic approach for legal IdM called eRecognition [3]. This approach is quite similar to the Austrian solution and relies on the

[3] http://www.digid.nl/

so-called eRecognition network to authenticate and identify legal persons. This network consists of the following entities:

- A **service catalogue** where service providers can manage their services.
- An **authentication service** to identify and authenticate the representative (natural person).
- A **mandate registry** containing the information for the power of representation. It establishes the link between a legal person and the representing natural person, e.g. the company manager.
- A **recognition broker** creating and asserting the authentication information for a legal person (represented by a natural person) and providing this information to service providers.

3 Stork

Many European Union countries have already rolled-out national eID solutions or are planning to do so. Those solutions are usually issued by national or regional governments and aim for more secure identification and authentication processes in online transactions. Secure identification and authentication defines a major requirement especially in the fields of e-Government or e-Business where sensitive personal data needs to be processed.

Currently, most Member States rely on smart card-based approaches supporting two-factor authentication. However, in addition e.g. Austria and Estonia offer their citizen its eID solution based on mobile phones. Although the first national eID solutions have approximately been existing since 1999 (e.g. Finland [8]), most solutions are tailored to support domestic and national requirements only and lack in cross-border applicability. Hence, citizens from one European Union country are not able to use their national eID for online services of other European Union countries. This fundamental gap has been taken up by the European Commission in 2008 which introduced the 3-years lasting European large scale pilot project (LSP) STORK [1].

This co-funded project by the EC aimed on implementing and piloting a technical interoperability layer to achieve cross-border acceptance of various national eID solutions within the EU. Hence, the main objective of STORK was not to develop and introduce a new eID concept for all EU Member States but instead taking the heterogeneous existing solutions as a basis and set up a framework on top of it to make them interoperable. However, the focus of STORK was to achieve eID interoperability of natural persons only.

In general, the STORK architecture sets up on two different basic models, the so-called PEPS (Pan-European Proxy Service) and MW (Middleware) model. The first model follows a proxy-based approach where a single gateway is installed and deployed in each Member State. Those individual gateways build a kind of trusted federation network which enables cross-border authentication. On the one side, the aim of these gateways is to hide complexity of national eID solutions from the interoperability layer. The other side is to implement the transport protocol for cross-border identification and authentication data transfer. For taking part within the STORK

interoperability layer and depending on their home country, service providers (e.g. public authorities or private sector enterprises) offering online applications connect electronically to their adequate gateway (PEPS). Within the second model (MW model) no central instance exists and the service provider itself needs to support several eID tokens using a common middleware. In contrast to the PEPS model the middleware is directly installed in the service provider domain. Comparing both models, the PEPS model hides all specifics of national eID infrastructures whereas in the MW model the service provider needs to maintain all different eID tokens that are supported. However, in terms of liability and privacy the MW model has its main advantage as a direct communication channel between the service provider and the end user is possible. In contrast to that, the PEPS acts as trusted intermediary between the service provider and the end user.

Based on these two different basic models, four interoperability models can be distinguished within STORK:

- PEPS – PEPS interoperability model
- MW – MW interoperability model
- MW – PEPS interoperability model
- PEPS – MW interoperability model

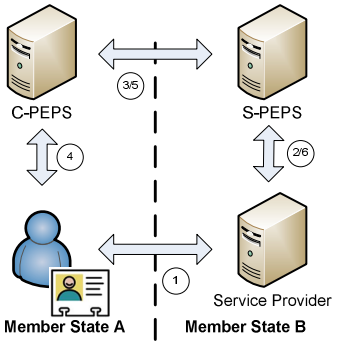

Fig. 1. PEPS – PEPS Model

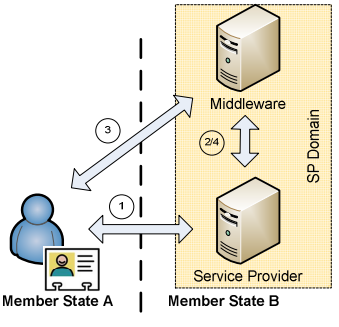

Fig. 2. MW – MW Model

Fig. 1 illustrates the PEPS – PEPS interoperability scenario. In this case, a citizen originating from Member State A wants to access and use a certain service in Member State B which requires authentication (Step 1). Both Member States follow the PEPS approach and each MS has a single gateway (PEPS) deployed. By the help of the STORK interoperability architecture, the citizen of Member State A can use her own national eID token for authentication at the service provider in Member State B. Regarding the process flow, the service provider of MS B forwards the authentication request of the citizen to its national PEPS (Service Provider-PEPS or S-PEPS), cf. Step 2. The S-PEPS presents the citizen a country selection page where she can select the country she is originally from. Based on this information, in Step 3 the S-PEPS

redirects the user to the PEPS of the citizen's home country (Citizen Country-PEPS or C-PEPS). Authentication and identification fully takes place at the C-PEPS involving one or more identity or attribute providers[4] using the citizen's national eID token (Step 4). If authentication was successful the C-PEPS transmits the citizen's identification and authentication data back to the requesting S-PEPS (Step 5). In turn, these data are forwarded to the authentication requesting service provider (Step 6). Based on these transferred data the service provider can either grant or deny access to the requested services. The protocol for structuring the identification and authentication data and its transfer is based on the well-known standard Security Assertion Markup Language (SAML) [9]. Details on this common protocol can be found in the common STORK interface specification [10].

Fig. 2 shows the MW-MW interoperability model on an abstract level. In this use case, both the citizen and service provider country follow the middleware approach. In this approach, no intermediary between the user and the service provider exists. The authentication handling middleware is directly installed and maintained in the service provider's domain. It is assumed that a citizen originating from MS A wants to access a certain service in MS B (Step 1). For authentication, the citizen is forwarded by the service provider to the deployed middleware which integrates all desired national eID tokens (Step 2). In the MW model, in most cases identity information is directly stored on the citizen's eID token and does not need to be fetched from other identity or attribute providers. The middleware extracts the desired identity information from the eID token (Step 3) and forwards these data to the authentication requesting service provider (Step 4).

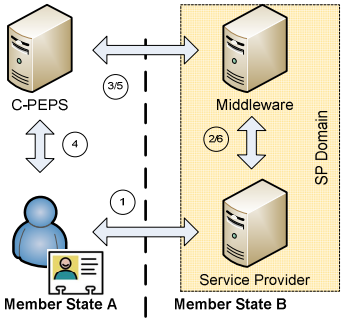

Fig. 3. MW – PEPS Model

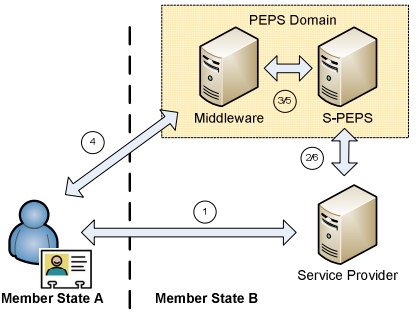

Fig. 4. PEPS – MW Model

The first interoperability model combining both STORK basic models is shown in Fig. 3. A citizen originating from a country that follows the PEPS approach (MS A) wants to use a service at a service provider whose country relies on the MW approach (MS B), cf. Step 1. After requesting authentication, the middleware deployed in the

[4] Identity or attribute providers are not especially illustrated in fig 1. They are assumed to be part of the C-PEPS in this picture.

SP domain does not directly access the citizen's eID token but forwards the authentication request to the corresponding C-PEPS of the citizen's home country (Step 2 and 3). Similar to the PEPS-PEPS scenario in Fig. 1, the citizen identifies and authenticates at the national C-PEPS in his home country (Step 4). The retrieved identity and authentication information is returned to the middleware in country B (Step 5) and further transferred to the service provider who regulates access control (Step 6).

The second STORK interoperability model combining both basic models is shown in Fig. 4. In this case, a citizen originating from a MW country (MS A) wants to access services at a service provider located in a PEPS country (MS B), cf. Step 1. Since the service provider does not support the MW model, similar to the normal PEPS-PEPS model the service provider forwards the authentication request to its corresponding national S-PEPS (Step 2). In this case, the S-PEPS has the middleware installed in its domain where the request is forwarded to (Step 3). Hence, as in the MW-MW model, the middleware directly communicates with the citizen's eID token (Step 4). The middleware installed in the PEPS domain supports all desired eID tokens and manages the MW authentication for the PEPS. Having the citizen successfully authenticated, the identification and authentication information is transmitted to the S-PEPS (Step 5) which in turn forwards these data to the requesting service provider (Step 6). Again, the S-PEPS asserts the SP that the citizen has been successfully authenticated.

4 Extended Architecture

The STORK interoperability framework has been developed to enable secure cross-border identification and authentication in a European context. The main objective of STORK was to develop an interoperability framework by taking existing national eID infrastructures as a basis. The applicability of this framework for cross-border eID authentication has been demonstrated amongst six pilot applications. Details e.g. on the "e-Delivery Pilot" or on the "Safer Chat Pilot" can be found in [11] and [12]. However, the main objective of STORK was to demonstrate cross-border authentication of natural persons only.

Nevertheless, besides unique identification and authentication of natural persons also legal persons play a major role in e-Government or e-Business processes. Unfortunately, legal IdM in electronic processes does not define a trivial task. Across Europe, only a low number of countries have introduced or deployed a legal IdM system within their domain. Examples for such systems have been described in Section 2.

Since delegation and representation of legal persons are valid processes in traditional or paper-based applications, their electronic pendants define also important processes in e-Government or e-Business. However, most electronic representation systems are usually tailored to satisfy domestic and national requirements only. Thus similar to STORK, currently there also exists a gap of cross-border applicability of various heterogeneous legal person or representation systems. To bypass this gap, in our proposed work we took up the STORK interoperability framework to also demonstrate cross-border identification and authentication of legal persons since issues for

transferring data of natural or legal persons across borders are similar. By using our proposed solution, cross-border identification and authentication becomes possible on technical level. To show the feasibility of our solution, we selected one out of the four STORK interoperability scenarios to demonstrate the cross-border transfer of legal person attributes. Therefore, we have set up the STORK infrastructure and connected it to the Austrian national mandate management system (as additional attribute provider) within a laboratory environment. For our demonstration, we took the PEPS-MW model as a basis and coupled the Middleware with this additional attribute provider responsible for national legal person identification. In our extended scenario, legal person identification is based on the name of the legal person and its register number, e.g. the company name and company number. Fig. 5 illustrates the rough and extended architecture of our set up.

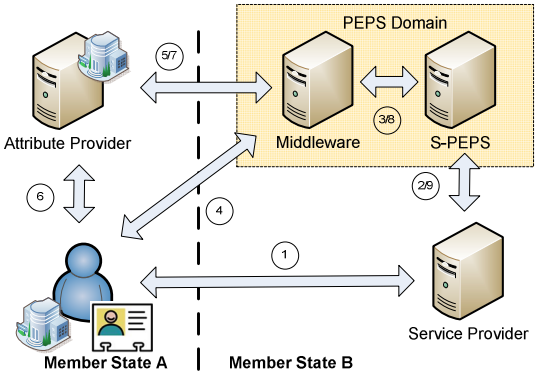

Fig. 5. PEPS – MW Model including legal identity representation

In this proposed scenario, a citizen originating from the middleware MS A wants to access a service provider of the PEPS MS B (Step 1). In contrast to the normal STORK scenario shown and described in Fig. 4, in this case the citizen wants to authenticate and act on behalf of a legal person, e.g. a company, at the service provider. Equally to the normal use case for natural person authentication, after accessing the service provider, the citizen is forwarded to the national S-PEPS (Step 2). However, before being redirected to the S-PEPS the citizen needs to state that she wants to be authenticated as representative for a legal person. This statement can be easily achieved by a simple check box or selection box. By selecting represented authentication, additional attributes are requested from the S-PEPS. Since the citizen originates from a country that relies on the MW approach, the authentication request (including additional requested attributes for legal person representation) is forwarded to the MW component hosted in the PEPS domain (Step 3). In a first step, identification and authentication of the citizen is required (Step 4). Again, this is achieved by direct communication between the MW component and the citizen's eID token. Because the citizen wants to act on behalf of a legal person, after successful citizen authentication

a separate and additional attribute provider needs to be invoked[5] (Step 5). This attribute provider is responsible for trustworthily managing the relationship between the citizen and the represented legal person (Step 6). Moreover, this attribute provider asserts the MW that the citizen is allowed to represent the desired legal person and transmits the corresponding legal persons' name and number (e.g. company name and company's commercial register number) as evidence (Step 7). This information combined with the citizen's identification data is assembled to an authentication token by the MW to be returned to the S-PEPS (Step 8). According to the normal authentication scenario, the identification and authentication data is transferred back to the requesting service provider (Step 9). In addition to the citizen's personal identification data the service provider receives information on the legal person the citizen wants and is allowed to represent within the online service.

Fig. 5 illustrated the cross-border identification and authentication of legal persons using STORK on an abstract level. Fig. 6 digs a little bit deeper into detail and shows all components involved in this scenario using the authentication example of an Austrian citizen representing a legal person. The basic concepts of the Austrian IdM system for legal persons have been introduced in Section 2.1. This section continues and explains the integration of the Austrian legal IdM system into the STORK framework.

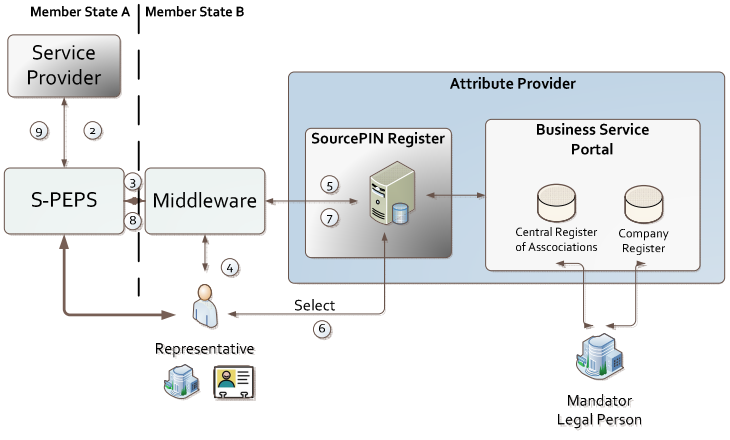

Fig. 6. Cross-border authentication model of an Austrian citizen representing a legal person

Going back to the process flow step where the MW has successfully authenticated the citizen (representative) (Step 4[6]), the MW starts the process to get an electronic mandate for representation. In a first step, the MW submits the representative's identification data to the SourcePIN Register acting as attribute provider (Step 5). This includes the representative's XML identification record (name, date of birth and

[5] In this scenario it is assumed that no representation information is stored on the citizen's eID token.

[6] The numbers of the individual process flow steps are equal in both figures, fig. 5 and fig. 6.

unique national identification number) as well as the representative's signing certificate. The latter is necessary to identify professional representatives like lawyers, notaries or tax consultants representing a particular client. The Austrian IdM system for legal persons provides a particular Object Identifier (OID) in the qualified signature certificate of the citizen card to identify such kind of occupational groups.

The SourcePIN Register uses the representative's identification data to search for all available empowerment information in constitutive registers. This is achieved by querying the so-called Business Service Portal (BSP), which acts as a hub to underlying constitutive registers. Examples of constitutive registers are:

- The Company Register
- The Central Register of Associations
- The Supplementary Register (where e.g. public agencies are registered)

After having retrieved all available empowerment information, the representative is redirected by the MW to the web portal of the SourcePIN Register Authority where all available electronic mandates are presented for selection. The representative now can choose the legal person she wants to represent from a list (Step 6). In case of professional representatives an additional Graphical User Interface (GUI) mask is available where the empowerment data like name and register number of the legal person can be manually entered. This is legally regulated due to their affiliation to a particular occupation group.

Based on the data of the selected mandate the SourcePIN Register creates an XML representation of the mandate, electronically signs it and provides it to the MW (Step 7). The MW can now extract name and register number of the legal person from the XML mandate, create the according STORK attributes and provide them to the S-PEPS (Step 8) and subsequently the SP (Step 9).

The following figures illustrate the single steps of a cross-border authentication process when acting on behalf of a legal person. Fig. 7 illustrates the country selection page of the S-PEPS where the citizen can choose her home country. In addition, a checkbox is shown where the citizen can choose to act as a representative on behalf of a legal person.

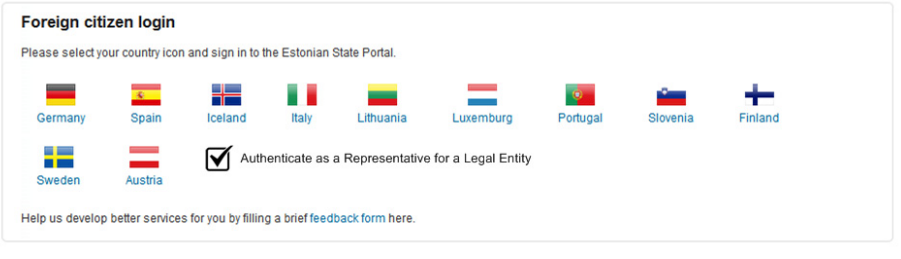

Fig. 7. Country selection and commitment to act on behalf of a legal person

In a next step, the representative is redirected to the MW for authentication. This is shown in Fig. 8 where the representative accesses her eID by entering the signature PIN.

Fig. 8. Authentication dialog of the Middleware to access the representative's eID

After successful authentication, the representative is redirected to the Austrian SourcePIN register to select the legal person she wants to represent (see Fig. 9).

Fig. 9. Selection of the legal person to represent

After selection of the legal person the STORK Middleware forwards the authentication attributes to the S-PEPS, which forwards the data to the service provider. Now the representative can access the service on behalf of the legal person.

5 Conclusions and Open Issues

The present paper has discussed an interoperability framework for the cross-border identification and authentication of legal persons or professional representatives. The proposed solution bases on the findings of the large scale pilot STORK and has been successfully tested within a simulated real life scenario. Nevertheless there exist a few open issues.

Similar to the authentication of citizens, the cross-border authentication framework for legal persons deals with issues such as a missing legal framework, liability, responsibility and accountability. At the moment, there does not exist a similar framework to deal with the new change of handling electronic legal IdM in cross-border scenarios. Other open issues are the evaluation of the necessity of authentication levels for legal identities and a person to person representation, e.g. a natural person is empowered to act in the name of another natural person.

In addition we already presented our solution to the new large scale pilot STORK 2.0[7], which is the follow-up project of STORK. Here, besides enhanced piloting of STORK in various areas (banking, health, etc.) STORK 2.0 will also deal with the identification and authentication of legal persons in a cross-border context.

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Understanding Enterprise Architecture: Perceptions by the Finnish Public Sector

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Abstract. Enterprise architectures (EA) support organizations in managing the complexity of their business environment and facilitate the integration of strategy, personnel, business and IT. In Finland, the use of EA has recently been mandated by the newly passed Act on the Direction of Public IT Governance. This has forced public sector authorities to familiarize themselves with the Finnish EA method. As part of the familiarization process, public sector organizations were given a chance to make statements on the proposed EA. We acquired the statements and conducted a content analysis to find out how the public sector authorities have understood the proposal and its basis, i.e. the EA itself. It turned out that while the statements were diverse and dependent on the level of previous knowledge on EA, several themes frequently appeared. Even though these problems of misunderstanding the EA concept are not new, the themes provide insights into how EA is understood. This helps researchers and practitioners to conduct their EA related works with multiple stakeholders.

Keywords: enterprise architecture, comprehension, public sector, content analysis, legislation.

1 Introduction

Enterprise architecture (EA) is defined as "a complete expression of the enterprise; a master plan which 'acts as a collaboration force' between aspects of business planning such as goals, visions, strategies, and governance principles; aspects of business operations such as business terms, organisation structures, processes and data; aspects of automation such as information systems and databases; and the enabling technological infrastructure of the business such as computers, operating systems, and networks." ([18] p. 13). Enterprise architecture thus provides a holistic view of an organization. Often this view is expanded also to cover current as-is architecture, future to-be architecture, and a transition plan [2].

Despite this promising viewpoint on organizational activities, the interpretation of the EA concept has varied. Even though it has usually been understood to consist of four types of architectures – business, information, systems, and technology, the exact number of architectures and their terminology vary. For example, both [2, 21] define five types of architectures, which, however, mutually differ: goals and initiatives, products and services, data and information, systems and applications, and networks

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 162–173, 2012.

and infrastructures in [2] vs. business model, enterprise model, system model, technology model, and detailed description in [21]. These examples, among the reviews [4, 20, 23], illustrate inconsistent definitions from the literature.

As this non-harmonized view of EA seems to confuse both EA researchers and EA practitioners that are familiar with the field and its varying terms and concepts, it is reasonable to ask whether their customers, i.e. business and IT people who are not experts on EA, understand what EA really is. If their understanding is limited, how can one convince them to adapt EA principles and practices? This issue is concretized in Finland, where an Act has recently been passed that all governmental institutions and municipalities should follow a national version of EA and its principles and practices in their IT development and activities. Even though the Act is warmly welcomed by public sector actors, there is a heated debate on its actual contents and implications. Following the governmental practices, the Ministry of Finance sent out a call for comments related to this new Act. The comments were received from 65 actors in governmental institutions and municipalities.

We took these comments and conducted content analysis on the documents to see *how EA is perceived by the public sector authorities*. We thus shed light on the complexity of the EA phenomenon and its interpretation by EA customers, i.e. non-EA experts. The analysis helps EA researchers to identify appropriate definitions of EA principles and practices (as asked in [23]), and EA practitioners to communicate with and understand their customers. Particularly these findings support EA adoption not only in Finland, but also elsewhere, where similar kinds of attempts to utilize EA in the public sector are taken.

The paper is organized as follows. First, a brief analysis of EA and its current interpretations is provided. Second, a framework for analysis is presented. This is followed by research methods and research settings. Fourth, the findings are listed. The paper ends with discussion and conclusions.

2 Background

Enterprise architectures support organizations in managing the complexity of their structures, information technology and business environments, and facilitating the integration of strategy, personnel, business and IT [5, 11]. EA includes architectural models needed in managing and developing the organization, encompassing the viewpoints of business, information, information systems (IS) and technology [9, 10, 13]. It describes the current architecture of the organization, provides a vision for the future architecture and a transition plan describing how to reach it [1, 13].

Even though the ideas of the above mentioned goals, different types of architectures, and EA practices are commonly shared – as evident from the quotation above – they are shared only on a general level. Stelzer [23] argues that "*no accepted definition of the term enterprise architecture has emerged yet*" (p.16). Usually, different definitions and frameworks emphasize either the business or IT viewpoint, take a process-oriented approach (i.e. present a method) or model or documentation-centric approach (i.e. consider architectural models), and underline the practices of conducting EA work at the expense of explaining or theorizing it (ibid.). This development has resulted in EA research being, to a large extent, practice-driven and practitioner-oriented.

EA research focuses on the planning and development aspect of EA: frameworks [17, 22], planning and developing methods and tools [3, 13] and development processes [1, 17]. Critical success factors and maturity models [18, 24] and the benefits of EA [16] have also been studied. Yet it is common that these studies rarely define what EA is or what its principles are. For instance, [4] and [23] identified only seven articles where EA principles are defined. Also some standards (e.g. [6, 7]) aim at defining EA principles. Again, these are not congruent with each other or with other definitions. Thus, despite a growing number of publications related to EA, it seems that the concept of EA has been taken for granted, without it being explicitly defined, by researchers and practitioners. This vagueness has its impacts also on EA practices. Niemi [15] identified 29 stakeholders of EA, meaning there are (as) many different perceptions of the EA concept. Consequently, the goals and methods of EA, and its principles and practices, are seen, experienced, and assumed differently. For instance, software architectures, a subsection of EA architectural models, are conceived of in four different ways: as blueprint, as literature, as language, and as decision [21]. As the EA concept is broader than software architecture going beyond mere architectural descriptions, it can be assumed that a similar variety is evident also with EA – but on a much larger scale.

Goethals et al. [5] argue that EA work should be a part of the normal way of doing business, and that this work should not only be the responsibility of the ICT department. Yet they have found that business people are rarely willing to cooperate. This is because of different understandings of the concept and its importance.

This motivates our paper. We want to understand how the customers of EA practices, i.e. EA users, comprehend EA. This provides us with a basis for communicating with them, and targeting our message appropriately.

3 Analysis Framework

To study how the EA concept is understood by the customers of EA work, we simply adopt the following basic EA items as the unit of analysis:

- Architectures. These are central in EA research and practice. EA work aims at understanding business planning, business operations, information systems and databases, and technological infrastructures and their relationships. In other words, *Business Architecture*, *Data Architecture*, *Applications Architecture*, and *Technology Architecture* are considered.
- Phases. Often in EA work, the first, current situation is modeled on understanding the processes, data and information, information systems, and technologies. This is then used as a basis to develop a vision for the future, and a plan of how to get there. Hence *as-is* architecture, *to-be* architecture, and a *transition plan* are developed.
- Levels of application. EA can be used as a tool to help strategic planning (which business/technical directions are feasible, what activities the whole organization should do, etc.) and organizational implementation and management (how to apply organizational EA principles in a certain domain, what kind of tactics could and should be used in EA work, what kind of systems should be acquired, etc.), and in routine every day operative activities (what kind of interfaces a certain

system should have, how the data is managed, etc.). The scope and type of EA activities and the purposes for which EA is used differ between the levels of applications of EA. Hence, the adaptation of Mintzberg's [14] *strategic apex*, *middle line* and *operating core* equips us with a usable frame of reference.

4 Research Settings and Methods

The study was motivated by the debate on how to organize IT governance in the public sector in Finland. On February 2010 the Cabinet Committee on Economic Policy supported an initiative from the Ministry of Finance by stating that the corporate governance of the public sector IT should be enforced. The key element in this corporate function is enterprise architecture, which was seen as a tool to achieve strategic goals, for example interoperability and manageability of the public sector IT systems.

In April 2011, the Finnish Government presented a proposal for Finnish National Enterprise Architecture, which will be a part of the Act on the Direction of Public IT Governance. The EA framework, a modified version of TOGAF9 framework, will be part of legislation that eventually forces all public sector authorities to create their own EA descriptions. The EA framework is also accompanied with governance models, application instructions, modified capability maturity models, domain definitions, and other documentation.

Following the governmental practices, immediately after the proposal was presented, the Ministry of Finance sent out a call for comments and statements. This official call was sent to all public sector organizations: ministries, governmental agencies and municipalities, though anyone wanting to comment was allowed to do so. In total 70 statements were made. These statements are publicly available[1].

Table 1 summarizes the data acquired for the study. All the ministries gave their statements (coverage of ministries was 100%). The municipalities were largely represented by the Association of Finnish Local and Regional Authorities. In fact, 20 out of 28 statements from the municipalities only referred to the Association's statement and were left out of the analysis. Private organizations (5 statements) were also excluded from the study even though they had interest in the Act.

The study was conducted with content analysis [12] with the statement documents being the research data. In the first, quantitative, phase the comments that described the EA concept or its applicability with respect to the organization's current structure or processes were identified. In this phase the analysis framework described in Section 3 was utilized. Only the comments that addressed the EA framework itself or one of the architecture areas were analyzed. The comments that focused only on the readability or the structure of the EA documents, or the government's organization structures were left out. In the second phase the comments found in the first phase were subjected to qualitative analysis. The comments were categorized and themes common to many of the statements were identified.

[1] http://www.vm.fi/vm/fi/04_julkaisut_ja_asiakirjat/03_muut_asiakirjat/20110923Kokona/name.jsp (in Finnish)

Table 1. Distribution of statements from different organizations

Answering body	Count	Estimated coverage	Notes
Ministries	12	100%	
Government agencies	7	20%	
Other governmental bodies	8	25%	e.g. government owned companies
Municipalities	8	2%	8 (of 28) statements analyzed
Municipal agencies	10	10%	e.g. hospital districts
TOTAL	45		

5 Findings

The analysis revealed that many statements focused solely on administrative issues, and some statements were only commenting on textual issues and phrasing. Thus, many statements had no elements that could be analyzed.

The findings are presented in two ways. First, the quantitative results are presented. Second, their qualitative analysis is shown.

5.1 Quantitative Analysis

The quantitative analysis provided interesting results. Comments on the same unit of analysis were grouped together. The coverage of different architecture areas of EA is very limited. 32 statements out of 45 discussed the business architecture. Even though also applications and data architectures were mentioned in 11 statements, most often only interoperability requirements and goals were considered. Technology architecture was almost completely absent in the comments, being mentioned only twice.

Similarly, most of the statements discussed strategic level to-be architectures, as seen in Table 2. These were mainly comments about the interoperability and cost efficiency objectives. As-is architectures or transform phase were very rarely addressed.

Table 2. Distribution of statements in phases and in levels of application

	As-is	To-be	Transform
Strategic apex	0	26	1
Middle line	6	8	1
Operating core	3	5	2

It should be noted that in theory one statement could address every unit of analysis, i.e. all types of architectures, their phases, or the levels of applicability. However, the number of units of analysis is quite low (108) in contrast to the number of statements analyzed (45). This means that many statements did not discuss the EA concept

comprehensively. One may thus easily argue that quantitative analysis does not reflect the understanding of EA because the comments might refer to issues which were the most unclear, in need of explanation, or being of most concern to the respondent. Hence, even though quantitative analysis illustrates fragmented awareness of EA, it does not (necessarily) describe how the concept is understood by the respondents. For that reason, we also conducted qualitative analysis of the same data set.

5.2 Qualitative Analysis

In qualitative analysis the findings were categorized according to their focus. Thematic groups were identified and analyzed. This resulted in the following themes.

Terms, Definitions, and Concepts. The proposed EA is an ensemble of several documents. Most documents adopted their own definitions for terminology as there was no meta-document or such a section in any of the documents. This was pointed out by the respondents. "*The concept of enterprise architecture and related terms linked are not very familiar to many. Explaining the key terms and concepts would make the documents much easier to understand.*"[2] (Ministry of Social Affairs and Health)

The use of languages was commented on as "*Ministry of Justice proposes that Finnish terms are used consistently in the documents – not in English or in a mixed language"*. This issue is emphasized since Finnish translations for EA-related terms in general do not necessarily exist.

The inconsistent use of terms was also present in the statements. For example, there were problems with the term EA itself. It was not always clear whether the statement was referring to EA as a development method, as an architectural principle, as an architecture function, or as the final public sector EA that is being created by the use of the method. In many cases, the statement did not address the proposed architecture but the problems of the given target area preventing the creation of the final architecture.

Benefits of Enterprise Architecture. Many statements underlined the importance of EA as a bridge between ICT management and the organization's other functions. Another frequently mentioned benefit was the ability to move from siloes to interoperable information systems. This requires the capabilities of creating requirements for call-for-tenders: "*What would be needed from the enterprise architecture is that we could create nation-wide specifications for interfaces, and at the same time, gain the capability to make them as obligatory requirements for the supplier.*" (Hospital District of Etelä-Pohjanmaa)

Another type of benefit was the description of the current state, and how it could be improved: "The problem has been that the consequences of the decisions made in the development projects are not seen later in the larger scale." (Ministry of Employment and the Economy) Especially the need for inter-organizational harmonization was seen as a benefit in the adoption of EA.

Many respondents stated as a motivation for EA, that the use of EA framework enables the creation of common ICT solutions and unifies the processes within the public sector. For example, "*The motivation of enterprise architecture is to enhance*

[2] Original Finnish transcripts translated by the authors.

interoperability inside the public sector and to reduce the amount of processes and information systems." (Population Register Centre).

A New Function, a New Way to Work, or Something Else. The organizations had various opinions on how EA work should be organized. Some organizations argued that EA development should not be separated from traditional administrative practices, and should not be a new method or tool. This is visible in the comment by Finnish Transport Safety Agency: "*Enterprise architecture has been seen as a tool for implementing the strategy. The main objective of the architectural work is to move from information system centric development to a more process-oriented development*". Another popular view was that EA can bridge the gap between IT management and line management.

Yet EA development should not create a new, separate organizational entity. These fears were manifested in comments such as: "From the individual organization's point of view, it can be seen as a risk that the organization develops an independent EA function which operates in isolation from other management and service production needs" (Association of Finnish Local and Regional Authorities). In one response it was even stated that: "Between management and IT personnel, there must not be such a grey area [actor] with its own secret language, and only those familiar with it can understand what is being prepared". (National Institute for Health and Welfare)

A link between the organization's management system, and EA development and governance was requested: "It is important to start architecture development in all organizational levels, and introduce it as a part of traditional management and development." (Ministry of the Environment).

Resources and Skills. The new EA requirement was seen to require resources from the public sector organizations. This was linked with the question as to whether a separate organizational entity or an EA office should be formed inside the organization – even though its functions were not seen as being separated from the organization's other work. The need for extra resources was stated several times in comments such as "*Developing the architecture will need lots of resources*" (Ministry of Agriculture and Forestry) and/or by quantifying them more precisely: "*Under the Ministry of Justice and its offices, this will mean a yearly input of 6 man years in Enterprise Architecture development alone. It will be difficult to organize this in our sector*".

There were also several comments about the workload distribution: "*In many cases these EA-tasks are understood to be additional tasks to all previous duties*" (Helsinki-Uusimaa Hospital District). This was a frequently restated fear – that EA will increase the workload of already burdened officers. However, some proposed that ""*it should be considered whether a couple of Enterprise Architecture development offices, or even a single (national) Enterprise Architecture Development Office, should be established*" (Ministry of Defence).

Some argued about the motivation of the new workload: "The scarce resources of the Office should be designated to [more] important development projects, not to create a present state Enterprise Architecture specification", since "the goal should be to develop architecture, not only write specifications" (Population Register Centre). In addition to documentation, also the amount of work related to measurable benefits and the scope of EA work were criticized as factors lowering motivation.

The need for new skills and EA knowledge was seen: "We emphasize that new skills needed for the Enterprise Architecture work are taken into account. The training

and education should be coordinated" (Finnish Transport Safety Agency). Some even mentioned that these training, education and practical study materials should be coordinated with the universities, and perhaps new degree programs related to EA should be created.

Problems Seen in the Adoption of Enterprise Architecture. The adoption of EA as the main ICT design and development method was seen as problematic: "*Activities in the health-care sector, as well as in other sectors, are so diverse and multifaceted that Enterprise Architecture is not a sufficient tool to govern it*" (National Institute for Health and Welfare). This issue was seen in various forms. Typically, organizations have adopted their own management systems, and were reluctant to change or modify them. It was frequently seen that the ICT management is pushing itself into the field of traditional management and administration, particularly "*when there are four architecture areas, and three out of four areas are information technology centric, the role and contribution of ICT management is disproportionally emphasized*" (Ministry of Justice).

While several agencies operate in co-operation with their foreign counterparts and other organizations, the international aspect was brought up only once: "*It is of utmost importance that the Finnish Defence Forces continue to use their own Enterprise Architecture Frameworks, governance model, and specification framework*" and not to switch to national practices.

6 Discussion

When analyzing the results, the normative angle of the call for comments cannot be ignored. The call was triggered by the upcoming Act on the Direction of Public IT Governance, where an EA framework is named. This gives public sector organizations a strong motivation to present their statements as they will be affected by EA in the near future. Some organizations had already started their EA work, a fact which was visible in their comments. However, only a few organizations had EA experiences for more than two years, making the topic novel for most organizations.

Also the facts that EA framework is introduced by the Ministry of Finance, and that it is enforced by legislation may have had impact on the viewpoints and stressed some issues related e.g. to resources. Currently, the public sector is under constant cost scrutiny, and the introduction of a new function raises the question of financing.

However, by looking below the surface, another interesting issue arises. While the EA concept is vague and is seen as a tool, its essential features are not questioned. This is strongly related to architectures and architectural concepts, as only very few statements echoed understanding of what those are and how they can be utilized. Consequently, the goal of the original call for comments, to gain views on the chosen EA framework, did not match reality. The statements responded to the call in different levels, focusing on different issues. This was because EA was not thoroughly understood by the public sector authorities. Next, three types of contradictions are discussed.

6.1 Strategic Level and Operative Level

The differences between strategic and operating levels were visible in the comments about the benefits and problems in adopting EA. Most EA benefits were related to the

strategic level, i.e. on goals and objectives. It was seen that interoperability is the main goal of EA, while improved systems management, and sharing and (re-) using IS and their specifications are merely tools for cost reductions and increasing general efficiency and effectiveness. The interoperability issue was emphasized when considering citizens as customers. Currently, the processes within an organization are rather well-documented. However, to get one inter-organizational transaction completed, the customer must communicate with several officials in different organizations.

On the other hand, the majority of the problems were seen on the operative level, being organization-specific. They ranged from international agreements and the number and variety of parties involved to all kinds of commitments having implications to IS. Generally, the statements reflected the view that when any given architecture is introduced by the centralized IS management, there must be some aspects of the architecture that will not fit with the needs of the organizations. Several questions on how to handle this kind of conflict between different architectures were raised.

No matter whether EA was seen as a strategic level benefit or an operative level item, the respondents did not see themselves as agents in the development (transition) process – with two exceptions: the healthcare sector and the Defence Forces. EA was seen as a normative element being introduced to the organizations in a similar way to how legislation is introduced. In other words, EA is seen being something external, with fancy high-level objectives but severe practical problems, making its use almost impossible, particularly if no extra resources or outside consultation are provided.

6.2 As-is and to-be Architectures

The contradiction between as-is and to-be architectures can be seen in the comments concerning the resources. EA development was seen as an extra burden on an already stressed organization. It was not something that would make ICT development easier. In general, EA was not seen as valuable in documenting the as-is architecture. Very few comments stressed the importance of making rigorous decisions taking into account the whole organization or across organizational borders. Although EA benefits were associated on the strategic level, the role of architecture descriptions was not seen as a means of accomplishing the interoperability issues.

The lack of comments on the transition phase gives another view to the issue of agency. To-be architecture seems to be something which is not actively developed inside an organization. Two exceptions shed light on this ignorance. First, the Finnish Defence Forces have used the NAF framework since 2004, and have perhaps the longest history of using EA in the Finnish public sector. Second, EA is a new concept to many actors in the healthcare sector, even they have been developing inter-organizational processes and IS for many years. Thus, the importance and role of to-be architectures and further transition plans seem to be associated with either extensive amount of experiences of EA (the Defence Forces), or endogenous needs for inter-connected processes and systems. External coercion does not raise the need for or understanding about those.

It seems that the meaning of as-is or to-be architectures, or transition plans are not understood unless the organization has gained some experience or realized such a need. Architecture concepts seem to be too abstract to be thoroughly understood by novice, illiterate users of EA. They thus see EA as a framework, given by someone else, being immediately usable in their work.

6.3 The Role of the General Administration and ICT

The conflict between general administration and ICT is visible in comments addressing the adoption of EA and discussing the structure of EA development.

As the initiative for the EA framework came from the Ministry of Finance and its Public ICT function, most respondents interpreted EA to be in the ICT management domain. This initiated inconsistent comments inside the statements. On the one hand, the strategic goals and ICT's role as a driver for improving productivity were accepted. On the other hand, it was found that the use of EA reassigns the decision making power from general management to ICT management. This is perhaps the main reason for emphasizing the role of the business in the statements.

However, the issues in the statements varied according to the respondents' background. The statements written by the ICT management underline the problems in communication between ICT and general management. In other cases it was not clear who has actually written the statement, but if the signing parties were from general management, the role of the business tends to be emphasized. Nevertheless, the gap between general management and ICT management was often apparent. It is unclear whether EA will actually help there – it is impossible to say whether EA will align business and ICT. Under the circumstances, it is unclear whether EA will succeed in facilitating the communication between the actors and integrating their viewpoints.

7 Conclusions

In Finland, EA was introduced to the public sector by means of legislation. EA will thus be *forced* to be adapted and used. This obligation makes the situation significantly different to [8], where the use was voluntary and technology-driven. [8] argued that national EA "*must be viewed more broadly than just a 'city plan'*", meaning that several issues, ranging from policies, actors and governance to architectural models, principles and standards and implementations, should be considered. We agree with these views. Nevertheless, we argue that before reaching the level where those "practical terms" become important, we have to consider different comprehensions of the EA concept. We thus have to understand and make sure that all actors, or authorities in the public sector case, commonly share the same perceptions of what EA really is.

From our content analysis it can be seen that these impressions are diverse. Some see EA only as a new mandatory routine, while others see it as a new tool to achieve strategic goals of interoperability and efficiency. An exact definition how EA is understood cannot thus be made, as the statements reflect different issues. However, the following contradictions provide insights into their views:

- External, fancy high-level strategic objectives vs. severe practical operational problems in the organization
- EA as a tool to be used vs. EA as a directive which needs to be obeyed.
- EA as a common language between ICT and management vs. a secret language for dedicated enterprise architects.
- Architecture concepts too abstract to be usable vs. benefits of documenting the architectures.

We believe these contradictions help researchers in understanding how the EA customers, i.e. the users of EA frameworks, models, and principles, comprehend the

topic. Thus, this is a first step in answering Stelzer's [23] call for a common definition of EA and its principles. On the other hand, EA practitioners benefit from these by being able to communicate with their clientele as they better understand different comprehensions of EA.

The study has its limitations. Content analysis provides only a glimpse of the respondents' understanding. This necessitates broader studies either by quality (e.g. by interviews) or by quantity (e.g. by surveys). Second, the focus on the Finnish public sector obviously has an impact on the generalization. But as the misconceptions were not culture-bound, but related to their organizational goals and structures, the contradictions are well applicable to other nations. However, the nationalities might have had implications, as the terms were not defined in Finnish – or in fact in any language. This might have made it difficult to write the statements and comments as the concepts were unclear. Although that was exactly what we wanted to study, it might have narrowed the scope of statements.

Thus, EA is understood differently by different authorities. It can be a new obligation in not solving the problems but just eating into resources, or it can be a new tool still not solving the problem but still requiring resources, or a new tool to be used in parallel with normal practices, assisting in the tasks which will be done anyway. Or it can be all of these at once, depending on the authority and the moment of time. To promote, enforce, or support EA in the public sector necessitates an unambiguous definition of the EA concept. Currently, its abstractness makes it difficult to explicitly comprehend and understand. A simple action – an explicit definition of the terms, would thus help the development of EA and of e-government ICT in general.

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The Understanding of ICTs in Public Sector and Its Impact on Governance

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Abstract. The visions and goals for the use of ICTs in public sector are huge, both related to efficiency, effectiveness and for strengthening democratic functions. The realisation of such diverse set of goals requires a broad range of means and measures. However, do the managers really understand the many functions and roles ICTs have and how they should be governed? This paper discusses what functions that ICTs have in the public sector, and analyses existing ICT governance approaches in the Norwegian government. Our findings do indicate that there exist a mismatch between the functions implicit in the objectives that are stated for eGovernment and the way ICTs are governed. This mismatch, can, at least partly, be attributed to an inadequate understanding of ICTs and its many functions.

Keywords: eGovernment, ICT Governance, ICT management, organisational functions.

1 Introduction

In the past, computers was conceived as a tool or instrument that could support or replace human work in rather controlled and easy-to-understand ways. To day, we know that the collection of hardware, software and systems that we have labelled ICTs have many dimensions and perspectives and are not at all easy to manage. We have experienced that the way ICTs is governed is not adequate, not least in public sector, see e.g. Heeks (2006), Grönlund (2009), Wimmer (2002).There are many reasons for that; we believe that one reason is a limited knowledge of the very nature of ICTs and how they should be managed in various organisational contexts. More precisely, we argue that there is a mismatch between the goals that are stated for eGovernment and the way it is governed, which can be attributed to an inadequate understanding of the various functions and roles of ICT in government.

While much research has addressed on the relationship between IS development and organisation consequences of ICT, this paper will discuss the relation between the various conceptualisation of ICTs and how they are governed. Following Orlikowski and Robey (1991), we held that ICTs have both material and social properties, being physical and socially constructed by subjective human actions. In a functionalist paradigm, ICTs can be seen as a tool which is used to further some organizational goals.

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 174–186, 2012.

By adopting an interpretative paradigm, we can view ICT in its social setting, seeing the world as a social construct (Hirschheim 1986). Computer-based systems are in this view a form of social organization, which is not at all neutral (Kling 1987). Similarly, Orlikowski and Iacono (2001) argue that ICTs are not just tools, and they suggest a number of different conceptualisations.

Without subscribing to these specific conceptualizations, such analysis illustrate the many functions and roles hat ICTs may have in organisations, not to say in the government. We would expect that such variety should influence the actual ICT management approaches and practices, also in government ministries. However, when e.g. analysing egovernment policy documents, we find that there are stated many different ICT related goals and objectives which build on distinct assumptions about the character of the technologies to be applied (Jansen and Jacobsen 2011). However, the same documents contain few adequate means and measures to help achieving such goals, which we believe can be attributed to a lack of deeper analysis of how the use of ICTs may create the desired effects. Some of the stated goals may even be conflicting if not the underlying assumptions are well understood. The aim of our study is to contribute to a better understanding of how ICTs are conceptualized in government organizations, and how these correspond to current management practises. Our research questions are:

1. What are most typical ICT goals, means and measures in the different ministerial sectors
2. What are the dominating understanding of ICT in terms of stated ICT-functions and roles
3. Are there any relations between ICT management practises and the dominating understanding of ICT in the different ministerial sectors?

1.1 Structure of the Paper

First, we will briefly discuss different perspectives on technologies as well as on organisations, and the possible links between technology and organizational structure, leading to a framework for analysing the functions and roles of ICT in organisations. Next, we present and analyse our empirical data that are collected in a study of governance practises the Norwegian government, concluding by a discussion of what our findings may imply for IT-governance in public sector.

1.2 Research Approach

This study is based on an inductive and explorative research approach, aiming at identifying important factors that may help understanding challenges related to IT governance. A short literature review has been conducted to explore how ICTs are conceptualized in eGovernment documents. The empirical base has been the Norwegian government ministries and their subordinate agencies. We have analyzed their use of ICTs and more specific their ICT governance practices. Our data have been collected from (1) the ministries budget documents and the ministries assignment

letters to selected subordinate agencies, (2) relevant white papers and government reports and (3) interviews with key officers representing the various ministries. The data result from interpreting the budget document and assignment letters, in analysing what goals that are defined and the type of measures that are stated. We have in particular identified texts that describe ICT-related goals, means and measures and what type of management approaches that are applied. When interviewing managers in the ministries, we have discussed our interpretation of the data. Our informants have also been invited to comment upon our analysis.

2 Theoretical Perspectives

Below we will discuss different theoretical perspectives for understanding the link between ICT use and organisational functions, leading to a framework for analysing the relationship between stated goals in eGovernments and how governance is being conducted.

2.1 An Objectivistic Perspective on ICT

In information systems research, the objectivist approach to technology is rather common, but not necessarily accurate. By presuming that technology is an object capable of having an impact on social systems, such research treats both technology and organization structures as objects. Kling (1987) describes the "tool" view of information technology as: "A computing resource that is best conceptualized as a particular piece of equipment, application or technique which provides specifiable information processing capabilities". He argues that such a view conceives information technology independently of the social or organizational arrangements within which it is developed and used. The objectivist approach overstates the importance of technology's material characteristics and ignores the social interpretations and actions that may modify the impact of particular software systems or hardware configurations. By contrast, the subjectivist approach to information technology is typified by those assuming a "social action" perspective on information technology and that the same technical solution may have various effects in different organisations (Orlikowski and Robey 1991). In a traditional, objectivistic way (Ritchie and Brindley 2005) define ICT as "the array of primarily digital technologies designed to collect, organise, store, process and communicate information within and external to an organisation". They points to that ICT can fulfil a number of business needs, such as strategic, operational or marketing needs, or a combination of all of them.

2.2 Interpretative Approaches to Understanding ICT

Kling and Scacchi (1982) in opposing the traditional "tool-perspective", developed the concept of "web models" of computing in contrast to what they saw as the dominant "discrete-entity" model of computing. In addition to functional capabilities, computers are also social objects which may be highly charged with meaning. They

thus held that computer-based systems are a form of social organization, which is not at all neutral. From their perspective, information technology is more than just the tools deployed on the desktop or the factory floor.

Zuboff (1988) make an important distinction is the difference between *automation* and *informating*. The term *informating* was coined in her book "In the Age of the Smart Machine", where she points to that it is the process that translates descriptions and measurements of activities, events and objects into information. By doing so, these activities become visible to the organization. Informating has both an empowering and oppressing influence. On the one hand, as information processes become more powerful, the access to information is pushed to ever lower levels of the organization. Conversely, information processes can be used to monitor what Zuboff calls human agency. She thus illustrates how same technical solution may be understood in different ways, depending on e.g. where you are in an organization.

In the last 15-20 years, we have seen lasting importance of networks and in particular Internet as a mean for communication and collaboration between humans, as is symbolized by concepts like groupware and Computer Supported Cooperative Work (CSCW), which emerged as separate fields in the early 90'thies. Interestingly, Orlikowski (2000) shows through her study of the use of a specific computer application in a large organisation, how the same technical solution (a groupware system) was interpreted very differently by different groups of employees in the same organisation. By identifying four different technologies-in practises, she show how we better can understand how and why people are likely to use their technologies and with what (intended and unintended) consequences in different organizational and technological conditions.

Another approach to understand the multidimensional character of ICT is presented by Orlikowski and Iacono (2001). Based on their coding of a number of research articles, they identified 14 specific conceptualizations of information technology. It may be disputed whether their specific conceptualizations, being extracted from how researchers have conceptualised ICT in research, really reflect how ICTs actually are used and understood in organisations. Their analysis does, however, nicely illustrate that ICTs and their application can be interpreted in different ways, and we acknowledge their insightful contribution to a better understanding of the IT artefact. This type of analysis is even more important when we are studying the increasingly use of social media, which often have different functions and fulfil distinct roles in various organisational settings. This clearly shows how the same or very similar technologies are being understood very differently across organisations and in society at large; underscoring that also interpretative approaches are necessary.

2.3 Theories on the Link between Organisational Functions and Use of Technology

These few examples on different interpretation of ICT use outlined above illustrate that a restricted functional perspective only represent one dimension of ICT, while e.g. a informating or a technology-in-practise perspective show that one technology has potentials for many organisational functions and roles, some of them not

necessarily clearly understood and predicted beforehand. Thus, different perspectives of ICT usage are closely related to the understanding of the functioning and structure of an organisation. Crowston and Malone (1988) are suggesting four different perspectives on organisations: *rationalist, information processing, motivational and political,* which can be used to interpret organisation structure. While the rationalist perspective assumes that organizations are composed of rational agents, operating towards some defined goals, e.g. efficiency. The information processing view shares many of these characteristics, but focuses instead on the organizational processes and communications patterns of the firm. The motivational perspective recognizes that workers may have different interests than the management of an organization, but typically assumes that these goals can be matched by properly designing the jobs of individual workers. The political view assumes that different groups within, the organization may have conflicting goals that can not be reconciled. Power determines which group achieves its goals, and IT may be used as a means to increase power.

Similar perspectives are presented by Dahlbom and Mathiassen (1992), claiming that there are (at least) three approached to understand develop and use systems in organisations; *hard, soft and dialectic* system thinking. "Hard" system is conceived as a hierarchically organised set of element, usually developed through a functional analysis, emphasizing ordering, stability, consistency and completeness etc. At the contrary, "soft" system thinking emphasizes that systems and organisations are shaped by our experiences from using them. We see different things, have different perspectives and structure the world differently. Interpretation then becomes important to understand how systems and organisations should be conceived and designed. Their third, "dialectic" thinking departs from the soft thinking in emphasizing that multiple view and perspectives do exist at the same time. However, it differs in that it emphasize that different perspectives are expressions of irreconcilable conflicts and power struggles. The claim of this approach is that we need to think in terms of contradictions in order to understand, explain and control change, implying that we have to identify interests, roles, structures, and processes in organisations. These perspectives are not mutual exclusive, but rather coexist in an organisation and imply varying and partly confliction conceptions of ICT functions and their governance.

2.4 Different Functions and Roles of ICTs in Public Sector

The discussions above, which shows that there are many different understandings of what functions and roles how in organisations, have not addressed the role of ICT in public sector in particular. Even if public organisations do resemble a number of similarities to other organisations, there are some specific characteristics of the public sector that may influence they way they use ICT, which we will discuss below. Government agencies have a large variety of functions. One overall responsibility is to ensure the fundamental right as democracy, openness and transparency, privacy and to improve citizen's quality of life.

By reviewing a selection of documents on eGovernment, we have identified a number of ICT functions and roles that are typical in the literature. For the purpose of this paper we have grouped them into the following metagroups: i) *tool, ii) control*

and management, iii)service, iv)information and knowledge management, v) interaction and collaboration, and iv) information infrastructures. Below we describe these metagroups in more detail

The *tool* function, as e.g. the traditional office automation and case handling functions. ICTs are here usually regarded as value-neutral artefacts, expected to do what its designers intended them to do, corresponding to Orlikowski and Iacono (2001). A tool, therefore, has no value beyond its capability to support the necessary production or administrative processes. In this perspective, the technology is primarily understood as a technical matter that is separate from, but controlled by human actors (Kling 1987). Tools are usually neither complex nor very flexible, and require limited, or mostly moderate organizational integration.

Somewhat related to this category is the control and management function, where ICTs are used for reporting, supervision, monitoring and controlling purposes, i.e. in collection of data on performance of the individual public agencies. Such uses of ICTs are normally characterized by moderate complexity, implying limited need for flexibility and organizational integration. It has in that way similarity with the tool function, but support specific management approaches.

Both functions represent primarily a rational and functional perspective on technology, and hard system thinking. They can often, but not always be linked to an organisational imperative, in that they need not lead to substantial organisational changes. Such functions will be used in all parts of an organisation, but mostly for administrative and management tasks and will in particularly linked to efficiency objectives.

Our next category is the *service function*, where ICTs are integrated in the core production, which in the public sector mainly implies activities related to the provision of information services. An essential characteristic is that service provision involves ICT-based communication with actors outside the organisation, and includes both technical and organizational elements. ICT-based services will imply a significant level of complexity and flexibility, and organizational reorganisation is crucial (Ritchie and Brindley 2005).

Further, we find that ICT is being used extensively in information and knowledge *management*, which comprises a range of strategies and practices used in an organization to identify, collect, manage, distribute data and enable adoption of insights and experiences by facilitating the sharing of knowledge. Examples in public sector are data collection and analysis in resource management, GIS systems, data on climate change, pollution, petroleum reservoirs, etc. This perspective differs from the tool function in even if it include data handling processes that can be automated, it involves intellectual activities based on insights and experiences either embodied in individuals or embedded in organizations as processes or practices. We see that both can be associated with an information processing perspective, and a motivational perspective, too.

Out next category include systems that support *interaction and collaboration.* ICTs are increasingly being used for communication, interaction and cooperation, both

internally and externally. Typical examples are groupware systems and computer supported cooperative work, which implies changes in division of tasks and organisation of work. This use of ICTs is less structured and it requires significant organizational flexibility (Bratteteig 2004). It is also seen as a way that citizens and organisations can interact with and influence on public sector. The development and use of *social media/web2.0* represent a further development of these functions, and offers quite new ways of using ICTs for collaboration and co-creation. Even though these types of use have similarities with CSCW applications, they differ in that such systems are open to many and its use open is not controlled by any organisation.

As *[information] infrastructure*, ICTs comprise the basic technical and organization capabilities necessary for supporting application systems and solutions across organisations and society at large. In addition to the technical systems and networks, it includes basic data resources that many public agencies rely on in its daily work. An information infrastructure must be open, standardized and flexible in order to support the large variety of systems and services that run on top of it (Hanseth and Lyytinen 2010). In particular, infrastructures are "sunk into" the organisation (Star and Ruhleder 1996) and shall be used by a large variety users and fulfil many different, partly conflicting functions and roles, Thus, ICTs as infrastructure implies a high degree of complexity and a need for organizational adaptation.

Table 1. Different categories of ICT functions and roles and associated perspectives on ICT

Metagroup	Typical Fuctions and roles	Perspectives on ICT
Tool	Office Automation , Case handling, etc.	Rationalistic and mostly hard systems thinking
Control and management	Supervision , Auditing, Inspection	
Service provision	ICT s integrated in products and services	Includes also information processing, and soft systems thinking
Information & Knowledge Management	E.g. data collection and analysis related to resource management, GIS systems, etc.	
Interaction & collaboration	Groupware, CSCW-systems, Social media,	Includes various perspectives and many way of thinking
Information Infrastructure	Networks, support services, management of shared facilities etc.	

These different metacategories and their respectively perspectives are, however not mutually exclusive in an organisation (rather the opposite), but we argue that they require different management approaches in planning and development as well as in implementation and operations.

How do these ICT functions relate to goals and objectives that are stated for eGovernments? When reviewing different national policy documents, we find rather ambitious visions and goals. E.g. Norway has defied these values and goals: i) democratic values, ii) efficiency, iii) rule of law and proper case administration and iv) quality and integrity, v)innovation in private sector. Thus, by using the overall eGEP Measurement Framework Analytical Model (EU 2006), but including innovation as a fourth goal, we may illustrate these relationships between goals, indicators and ICT functions and roles as in table 2:

Table 2. Relation between objectives, indicators, effects and ICT perspectives in eGovernment

Overall goals	Indicators (examples)	Public value	Dominating ICT functions and roles*)
Efficiency	Financial gains Better organisational structures	Financial & Organisational value;	Tool Control and management
Effectiveness:	More inclusive public services increased user value & satisfaction	Constituency Value	Service provision Knowledge management
Democracy	Openness, Transparency Participation, citizens empowerment	Political Value.	Interaction and collaboration Service provision
Innovation	Better access to information	Value creation in society	Knowledge management Service provision

*) Information infrastructures are important for all type of goals

We may then assume that governance structures will be influenced by the type of organisations and in particular the managers understanding of ICTs functions and roles. This type of influence will not be uniform, but rather having great variation, also being influenced by other factors.

3 Management of ICTs in Norwegian Government

The Norway is a highly computerized country, and so is the public sector. However, the management structure of the public sector is not particularly influenced by ICT, as our public administrative policy is still characterized by rather strict sectorization and line responsibility (Jansen 2008). This means that each ministry is responsible for their specific choice of governance approach. Thus, the organizational and management structures resemble a silo; vertical integration within and horizontal separation across ministerial areas of responsibility. The Minister for Administration and reform coordinates public sector reform and is responsible for the government's administrative policy, including ICT policy. One directorate has the mandate to act as an initiating agency, promoting coordination and cooperation. This implies that there are only few overarching principles and methods for the governance of ICTs and each ministry has a large degree of freedom when it comes to the choice of IT governance approach. We may assume that there is significant variation of management approaches across the different sectors and areas of responsibility, implying that they are utilizing ICTs in different ways.

3.1 Current ICT Management Practises in Norwegian Ministries

During 2010 and 2011, we have collected data on how ICTs is being managed in the various ministerial sectors in Norway, focusing on how each ministry carry out their individual ICT management. We have identified ICT-related goals and accompanying means and measures that are defined in steering documents (assignment letters etc.), complemented by interviews in each ministry and some subordinate agencies. Below we present some of our finings.

Table 3 shows the ICT goals in the different ministerial sectors (column 2), and their ICT focus in management (column 3) and the primary ICT functions and roles (column 4). The identification of ICT related management approached has been done

by i) surveying ICT usage within the different areas of responsibilities, ii) assessing the specification of ICT means and measures that are found in the budget documents and assignment letter to subordinate agencies, iii) how the ministry representatives in interviews describe how they control their subordinate agencies. The categorization of ICT functions and roles are according to how ICT goals are specified, supplemented by analysing the various core activities and the role ICTs have in such activities.

Table 3. ICT goals, means and dominating ICT functions in Norwegian government (selected)

Ministry	Primary ICT goals in the sector	ICT-management focus	Dominating ICT functions and roles
Labour and Welfare	Increase quality and efficiency in case handling and control functions.	Limited ICT focus, no specific goals or means	Office aut. & case handling Control and management Service provision
Government Administration, Reform	Strengthen infrastructure functions and ICT-based collaboration. Quality in service provision.	Well-defined ICT-goals, infrastructure focus, ICT agency and strategy	Information infrastructure Interaction and Cooperation Service provision
Finance	Increase quality and efficiency in service provision, case handling, Strengthen infrastructure function	Well-defined ICT-goals, infrastructure focus, ICT agency	Service provision Control and management Information Infrastructures
Health and Care Services	Strengthen CT-based interaction& collaboration. Improve infrastructure Increase control.	ICT goal and strategy for interaction, with private actor	Interaction and Cooperation Information infrastructure Control and management
Justice	Increase quality and efficiency in case handling. Strengthen collaboration,	Significant ICT and interaction focus, ICT goals/strategy	Interaction and cooperation Office Aut. & case handling Control and Management
Education and Research	Increase quality in service provision. Strengthen infrastructure functions. Better control	High ICT service and infrastructure focus, ICT agency	Service provision Information infrastructure Control and management
Culture	Increase quality in service provision Stimulate cooperation. Improve infrastructure functions	ICT goals and strategy. Service and infrastructure focus, ICT agency	Service provision Information infrastructure Interaction and Cooperation
Environment	Increase quality in infrastructure functions and service provision Stimulate information sharing	Significant ICT and infrastructure focus, ICT strategy and ICT agency	Infrastructure Service provision Knowledge management
Trade and Industry	Strengthen infrastructure and services. Better control	ICT goals, infrastructure and service, ICT agency	Information Infrastructure Service provision Control and management
Transport and Communication	Strengthen infrastructure support and cooperation. Better supervision and control	Some ICT focus, ICT strategy in the transport sector	Control and management Interaction and Cooperation Information infrastructure

Our first research question is: *What are most typical ICT goals, means and measures in the different ministerial sectors?*

Column 2 and 3 in table 3 describe the main ICT goals and -means in each sector. We found that these goals and measures are to a large extent integrated in their general policies. Few ministries explicitly mention ICT in their budget document, and ICT-related goals or means are vague and usually not operationalized to any significant extent in their assignment letters. Less than half of the ministries specify measurement indicators for the use of ICTs, and such indicators are for the most part qualitative and vague.

We see furthermore that less than half of the ministries have defined a general ICT-plan or strategy that affect the whole sector. Those ministries that have a coordinating

ICT-body do also stimulate sector-wide cooperation and coordination. This illustrates important differences between the ministries regarding their IT governance styles. However, other ministries argue that a sector-wide strategy is not considered relevant because the individual subordinate agencies have defined their own strategies which the ministries would follow up and monitor. Some ministries have adopted a softer management approach through more informal forums or coordinating mechanisms, where the subordinate agencies can congregate and discuss issues of mutual interest, i.e. the interoperability of different ICT-systems.

Our second research question is: *How are the stated goals and objectives understood in terms of ICT functions and roles?*

Column 4 in table III shows our assessment of the 3 most important ICT functions and roles within the individual ministerial sectors, based on how they have described ICT goals, means and measures. We find that there is a large variation across the ministries. Office automation along with control and management functions seem to be important/most important for 11 ministries. This is not surprising, as we would expect that ICTs primarily are used for supporting administrative and management processes. It is more interesting that the cooperation and interaction functions as well as infrastructure are explicitly mentioned as important by 9 ministries, while the service function are mentioned by 7 ministries. Knowledge management is listed as important in only 5 ministries. Interestingly, the use of social media is not mentioned by any ministry, contrasting the overall goals where ICT is seen as an important mean to strengthen democracy and citizen participation.

Our third research question is*: Are there any relations between ICT management practises and the dominating understanding of ICT in the different ministerial sectors?*

Our data show that the different ministry's ICT governance approaches, in terms of defining goals, implementing strategies and means have significant variance. Our interpretations indicate that their understanding of ICT functions and roles may explain at least parts of this diversity. As there are a lot of similarities between *tool* and *management and control* functions, we will below cluster these functions into a larger *tool+* meta-category. Furthermore, as we may assume that knowledge management imply the same perspective as that of information infrastructure in collecting and sharing data, we will merge these two into another meta-category.

Table 4. The correspondence between ICT management focus and most important ICT functions

Dominating ICT functions / ICT-focus in management	TOOL: Office Aut. and control	Interaction and cooperation	ICT-based Service provision	Information infrastructure & K M
No or low ICT focus	**6**	**6**	**1**	**1**
Strong ICT focus	**2**	**3**	**5**	**6**

Table 4 shows that in those sectors where the tool perspective are dominating, many of the ministries appear as having a low ICT focus in their management approach. Contrary, in those sectors where ICT-services and information infrastructures

perspectives seem important for their ICT–use, the respective ministries do have a strong ICT-focus.

When analysing the use of overall management instruments in detail (Jansen and Berg-Jacobsen 2011) we find that those ministries who emphasize a tool perspective, also practise a rationalistic management approach. On the contrary; in the sectors where the service and interaction functions dominate, these ministries' management approaches are mostly in accordance with an information processing perspective. Similarly, the knowledge management and information infrastructure functions correspond with political perspectives, where one accept that there are many, partly conflicting interests and goals that have to be handled in constructive ways.

Thus, returning to our initial claim that there is a mismatch between the goals that are stated for eGovernment and the way it is governed, which can be attributed to an inadequate understanding of the various functions and roles of ICT in government. Table 5 below shows the relation between overall goals and the specific ICT functions mentioned by the different ministries. We see that in those ministries where efficiency is the primary ICT goal, the tool perspective is dominating, while in ministries where effectiveness and citizens' needs are the primary focus, service and infrastructure functions are dominating. However, few ministries focus on democracy or innovation as specific goals for their use of ICTs.

Table 5. The relation between states objectives and the conceptualization of ICT functions

ICT functions / Overall goals	Tool	Interaction and co-operation	ICT-based Service provision	Information infrastructure & K M
Efficiency	8	3	1	2
Effectiveness	3	5	4	4
Democracy	0	0	0	0
Innovation	0	1	1	1

Thus, we find some correlation between the ICT goals that are stated in the individual ministries and their understanding of ICT functions. However, when considering the government in its entirety, we find a weak connection. The overall policy documents states that ICTs should help improving the quality and accessibility of services through sharing of resources and stimulate more efficient cooperation and division of tasks. We would expect that ICT governance should focus on service provision, information management and infrastructure functions and not primarily on efficient use of ICTs for case handling, control and management purposes. But our data strongly indicate that less than half of the ministries do have such focus in their ICT governance approaches. Our conclusion is thus that the Norwegian government lacks an overall ICT policy including efficient means and measures that can strengthen more strategic uses of ICTs.

This may be illustrated by The Norwegian Population register, which in the past was designed and has been used by one agency. It is now being regarded as an infrastructure component, being used by a growing number of both public agencies and private organisations. Its data quality and availability are not at all adequate. But so far, no adequate governance model based on a more holistic and interactionist

perspective has been implemented. There is, however a growing understanding of the existing management challenges, and changes both in its organisation and management structure are being considered. We believe that political and dialectical approaches is becoming more important, as the degree of interaction and information exchange is increasing, along with that traditionally individual information systems are increasingly becoming part of a common information infrastructure.

4 Conclusions

Our findings reveal a diversity regarding how ICTs are understood and governed in the Norwegian government, but at the same time they show that few ministries focus on other goals than internal efficiency and quality in their management approaches. This picture can be attributed to several reasons. Firstly, many ministries do have a limited understanding of how to realise other values from ICT investments that efficiency. Secondly, such other goals require that adequate means and measures are implemented across ministries, which is difficult to achieve.

There are, however other factors than the ministries' lack of ICT maturity that can explain their IT governance approach, not least that the specific characteristics of the individual sectors and their use of ICTs may imply different governance approaches. Furthermore, their history of traditions and norms related to management principles do vary significant; some ministries have been rather unchanged for more than 100 years, while other are less than 10 years old. Lastly, this picture is rather dynamic, and our data represent only the present state, which most likely will change over years, such that the different ministries may gradually adopt new governance approaches accommodating the increasing importance of ICT in society.

Finally, we have to admit that the assessments of the dominating ICT functions and roles are not ambiguous, as one ministry may define different goals and apply varying measures and instruments due to that their subordinate agencies may require different management styles. Thus, there is a need for more research which can improve our analytical framework.

We will, however fully agree with the conclusions of Orlikowski and Iacono (2001) in claiming that ICT artefacts are by no mean natural, neutral, universal or given, as they are always embedded in some time, place, discourse, and community. Furthermore, ICT artefacts are neither fixed nor independent, but they emerge from ongoing social and economic practices in dynamic ways. Our overall conclusion is however that the top level management (and the politicians) in Norway lack an understanding of the many functions and roles ICTs have in the government, and what means and measures that are required to make the most of these potentials.

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Investigating Outcomes of T-Government Using a Public Value Management Approach

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Abstract. A main objective of transformational government (t-government) is to realize public sector reform. Initiatives of public sector reform, commonly referred to as New Public Management (NPM), often failed to achieve the desired results and led to undesired outcomes. Hence, a new reform approach, referred to as Public Value Management (PVM), emerged to overcome these negative effects and to which the use of information technology (IT) is central. This paper investigates a t-government effort in the Netherlands to find whether it realizes the objectives of PVM. The findings of the case study show that t-government does not achieve these objectives. Instead of realizing a transformed organizational structure, t-government is found to be concerned with setting up governance among the different parties in a in network to allow for collaboration. Furthermore, the case study results show that to realize the outcomes of PVM, t-government needs to be accompanied by a professionalization of the work force and by making government processes more transparent to ensure public accountability.

Keywords: Transformational government, T-Government, E-Government, Public Value Management, New Public Management, Public Sector Reform.

1 Introduction

Transformational government (t-government) efforts aim to move beyond the e-government efforts of creating better service delivery for citizens and businesses, and realize public sector reform [1-3]. The link between e-government and public sector change was first made in the mid-1990's, when "ICTs began to be viewed as strategic assets for government with the potential to help policy makers and program managers redesign and integrate services to support critical stakeholder relationships and overarching policy goals" [2, p. S89]. More specifically, "e-Government is very often conceived as a powerful instrument to achieve the objectives envisaged by the new public management (NPM) ideology" [3, p. 53]. The NPM paradigm aimed to introduce private sector practices in the public sector to make government operations more cost-effective and customer-centered [4-7]. T-government efforts employ IT to radically change the public sector [8] and aim to make governments more effective.

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 187–197, 2012.

Both e-government and NPM are criticized for their failure to achieve many of the desired outcomes [4,5,7-10]. Rather than transforming public administration, e-government efforts were found to reinforce the existing structure within government [9]. Many barriers still exist that inhibit the changes that are considered necessary to realize transformation [11]. As a response t-government was introduced concerning the use of IT to transform governments [8] and to capture a broader range of pubic values like accountability and transparency. A new approach to public sector reform emerged aiming to achieve more responsive and effective public administrations [4,5,10,12-14]. This reform approach is commonly referred to as Public Value Management (PVM) [5,12]. PVM refers to the continuous assessment of the actions that the public sector undertakes to ensure that public value is created [12]. Central to the paradigm is the use of IT to create public value for the customers of the government as well as to strengthen the role of government itself [15], through collaboration in networks [5].

The objective of this paper is to see whether t-government efforts realize the outcomes envisioned by PVM. By looking at an effort of t-government in the Netherlands, the outcomes are investigated to see whether they are in line with the objectives of PVM. T-government efforts aim for a process orientation, breaking down the barriers of the vertical bureaucracies [16]. Leveraging information technology (IT), they aim to make governments more effective and realize an overhaul of the public sector [8]. In this paper, t-government is investigated by looking at a case study in the Netherlands using a PVM approach. The next section introduces PVM and its objectives. In the third section the case methodology is presented, followed by the case study description. Subsequently, the findings from the case study are presented and discussed. Finally, the last section presents conclusions and recommendations for further research.

2 Theoretic Background on Public Value Management (PVM)

PVM aims to realize public sector reform [5,12]. Public sector reform "is usually thought of as a means to an end, not to an end in itself. […] [Its objectives] include making *savings* (economies) in public expenditure, improving the *quality* of public services, making the operation of government more *efficient*, and increasing the chances that the policies which are chosen and implemented will be *effective*" [17, p. 6; emphases in original]. The objectives that are referred to, thus, span the width of governments' activities and purposes; including cost savings, outcomes that are to be achieved by the government and the values that are considered. Such change, however, is expected to take a long time: "The full benefits of major changes in the processes and structures of public agencies normally cannot be harvested until three, four, five, or even more years after a reform program has been launched" [17, p. 7].

PVM emerged as a reaction to its predecessor paradigm NPM as well as to the traditional Weberian bureaucracy to overcome the negative effects of both, such as the inefficiency and red-tape of bureaucracy and the fragmentation of government [4,5,7,10]. Traditionally, public administrations are characterized as hierarchical

organizations with public officials carrying out predefined tasks: bureaucracies [18]. To understand the central notions of PVM, it is thus useful to compare it to both bureaucracy and NPM. The agendas of public sector reform can be seen to differ in a number of dimensions (see Table 1). Although these reform agendas clearly have a normative character [19], the purpose of this section is to describe their ideal type. An ideal type is a description of a specific phenomenon, not referring to an ideal situation seen from a normative standpoint. Traces of the ideal types of public organizations presented in this section are still found in today's public administrations [4].

Table 1. Comparison of the three public sector reform agendas [based on 4,5,10,12-14]

	Bureaucracy	**NPM**	**PVM**
Main purpose of public sector	Realizing political goals	Mitigating market failure	Creating public value
Role of the government	Policy-making and implementation	Catalyst for actions of private parties	Serving and empowering
Public sector ethos	Public sector monopoly	Customer satisfaction	Dialogue and collaboration
Formulation of public value	Politicians formulate laws, consult experts	Aggregation of individual preferences	Complex process of interactions; result of dialogue
Role of the public	Clients and electorate	Customers	Citizens
Role of public officials	Following procedures	Attaining output targets	Coordinating networks
Discretion of administrators	Limited; standardization of tasks	Room for attaining entrepreneurial goals	Discretion necessary; limited by political accountability
Motivation of administrators	Wages and status; protected and privileged profession	Entrepreneurial spirit; ideal of smaller government	Public service; contributing to society
Mechanisms for achieving policy objectives	Implementing government programs	Realizing policy objectives by private parties	Networks of public and private organizations
Accountability	Hierarchical: administrators are accountable to elected politicians	Market-driven: aggregation of preferences leads to desired output for large groups of customers, via public-private contacts	Pluriform: administrators have to follow the law, societal values, political norms, professional standards and citizens' interests
Organizational structure; service delivery	Hierarchical	Private sector / public agencies put at a distance	Networks / pluriform

The three reform agendas differ on a range of characteristics. A first group of characteristics is concerned with the fundamentals of public administration: the purpose, role, and ethos of the public sector, and the way in which public value is

formulated. In the bureaucratic ideal type public administrations have a monopoly on realizing political goals by policy-making and implementation [4,5,13,20]. Public value is thus formulated by politicians in consultation with experts [20]. Within NPM the purpose of the public sector is to mitigate market failure by coordinating the actions of private parties in order to satisfy the customers of the public sector [4-7,13,14]. Public sector is defined using economic theory to aggregate the individual wishes of these customers [14]. In the PVM approach, public administrations aim for creating public value directly for citizens or by strengthening the role of the government [5,12,15], thereby shifting their role to serving and empowering citizens and business to create public value [13]. Governments operating according to the PVM agenda thus focus on collaborating and creating a dialogue with citizens in order to determine what constitutes public value [5].

A second group of characteristics is related to the role of the public and public officials. While the public used to be seen by public administrations as having a passive role (clients, electorate) in a bureaucracy [19], their role was redefined as customers under the NPM paradigm [6,21]. Under the PVM paradigm they get the status of citizens that can also participate in government action [5]. This requires, in turn, a different role of public officials. Rather than professional bureaucrats executing predefined tasks and procedures, public officials under the NPM paradigm were expected to become entrepreneurial and more customer-friendly by achieving predefined output targets [5,7,10]. Within PVM, public value is realized when an adaptable, learning-based approach is taken on by public managers [12]. In order to realize public value, they coordinate the actions of both public and private parties within networks [5,12]. This can only be achieved when public officials have sufficient discretion to carry out their tasks [5,12].

The last group of characteristics is the organizational structure and the way in which the objectives of the public sector are realized. In the bureaucracy, actions are performed by a top-down division and aggregation of predefined tasks [18]. Subsequently, accountability is organized by administrators reporting to elected leaders, while the administrators themselves are expected to remain impartial [5]. This form of accountability is often called 'procedure accountability', in which administrators are mainly responsible for following the right procedures [22]. Accountability shifted from procedure accountability towards clearly defined goals to assure their delivery in the NPM paradigm [22]. Public officials now were not only responsible for following the right procedure, but they also had to ensure a favorable outcome of their actions [22] as well as attaining specific performance incentives [7,10]. Within PVM public value is realized through collaboration in networks of public and private parties [5, 23]. Public accountability is thus pluriform: public officials need to perform according to the law, societal values, political norms, professional standards, and citizens' wishes – requiring a new way of working [12]. Hence, the emphasis on transparency of public processes within PVM [24,25].

PVM has a different view on what constitutes governments and how public value is formulated compared to the bureaucratic and NPM paradigms. It emphasizes that public value creation happens as a process of continuous assessment determining whether the actions of public officials will lead to public value – either directly to

citizens or by strengthening the role of the public sector [15]. PVM is thus an attempt of creating an integrated and holistic vision on value for society by collaboration of public and private parties in networks [5,12]. Hence, IT is considered central to PVM in order to coordinate these actions [10]. It is, therefore, often emphasized that within the public value framework, *outcome*, rather than *output* is realized [19,26]. Three characteristics of PVM can thus be distinguished: the definition of public value by through dialogue, the continuous assessment of their actions by public officials determining whether public value is attained, and the coordination of actions within networks of public and private parties supported by the use of IT.

3 Research Method

To investigate t-government efforts to find whether they lead to the outcomes of transformation outlined in the PVM paradigm, a case study from the Netherland is examined. This case study concerns the adoption of the international financial reporting standard XBRL (acronym of eXtensible Business Reporting Language) for financial reporting, based on a uniform taxonomy NT (Dutch taxonomy) and a process infrastructure that can be used to exchange information between businesses and the government. Financial reporting comprises all legally required information provisioning of businesses to the government. It is considered an appropriate case for investigating t-government, as it captures the use of information technology to realize public sector transformation. Furthermore, it is a very long-term project, as it started in 2004 and it is expected to continue at least into 2013, when the use of the XBRL standard for specific reporting processes will become obligatory.

A retrospective view on the case was created by carrying out fifteen semi-structured interviews over the course of January and February 2010, which were complemented by three interviews in September 2011 to update the case study. The group of fifteen interviewees comprised three project managers of government organizations involved in implementing and maintaining the government infrastructure and systems for XBRL, five representatives of businesses from different sectors and varying size for understanding the user perspective, three accountants of various intermediaries, two representatives of software companies developing software packages for financial reporting, and two bank managers that are currently implementing XBRL in their organizations. The validating interviews were held with a project manager responsible for XBRL implementation and two researchers that have been involved in disseminating knowledge about XBRL. All interviews lasted between one hour and an hour and half. Most interviews were conducted by two researchers comparing results afterwards; some were conducted by one interviewer.

The interviewees were asked questions on the changes that were made in all aspects of government – and on the side of businesses and intermediaries. To determine in which ways transformation takes place, inquiries were made into all aspects of the PVM paradigm. Firstly, the objectives of the case study were determined, followed by the outcomes that were achieved. Secondly, the operational changes in the processes within government and the private sector were looked at to

see whether any major changes or transformations could be observed. Thirdly, the organizational structure was looked at to find out how actions are coordinated and how accountability is organized. The purpose of these inquiries is to find out to what extent the objectives of PVM are achieved by this t-government effort.

4 Case Study

The introduction of the Dutch Taxonomy (NT) based on the international XBRL standard set out to standardize the process of legally required financial reporting by businesses in 2004. Instead of all government agencies defining their own requirements for financial reports, a taxonomy was created to harmonize definitions used by the Dutch government in the financial domain. Furthermore, a common process infrastructure is developed that is to be used for submitting all financial reports. Although the XBRL standard can be used for financial reporting across many sectors, the current project set-up includes a few specific reports: (profit) tax filing at the Inland Revenue Service (IRS), the submission of financial year reports at the Chamber of Commerce and the submission of data to the national bureau for statistics (CBS). In the private sector, a consortium of banks is developing a Banking Taxonomy (BT) to allow for automatic handling of credit applications using XBRL.

The process infrastructure developed to facilitate data exchange consists of a unified gateway for bulk data to government information systems. While the current structure of organizations concerned with financial reporting can be defined as a hierarchical command-and-control situation in which the government agencies enforce their standards onto the market, XBRL implementation is expected to allow for the creation of value chains across a network of organizations. As generating financial reports will be done using an open standard, organizations are able to innovate and new applications may emerge as well as new organizations developing new services. This likely results in a new situation in which government agencies remain in control of the interpretation of financial data and the decision-making process, but the process of creating reports will take place within a networked structure that enables innovation.

In 2006, to support the development of the NT a generic infrastructure project was started drawing up requirements for the functionalities necessary for a new process infrastructure for financial reporting based on XBRL. When the first version of the NT was ready and the plans for the process infrastructure were published, the three public agencies (IRS, Chambers of Commerce and CBS) signed an agreement to implement XBRL. This agreement was also signed by representatives of businesses, accountants and software vendors to stimulate the use of XBRL for financial reporting. Simultaneously, in line with political priorities at that time, the project was appointed to contribute to the central government agenda to achieve an administrative burden reduction of businesses. In 2007, the central government estimates that around 350 million euro's worth of administrative tasks of businesses can be cut and around a million tax filings using XBRL will be achieved yearly by 2008.

However, the agreements of 2006 were not achieved. Therefore, in 2010 changes were made in the governance structure of the implementation program. A strong focus on the implementation was adopted by the organization guiding the changes, which also involved private parties. The process infrastructure developed for exchanging data based on XBRL was to be developed and maintained by the central government IT maintenance agency (Logius). Furthermore, the IRS decided to use the program to implement system-based control to improve compliance management. System-based control allows for checking the physical processes of organizations. By tapping into process information of companies it automatically checking whether these processes comply with regulations. Furthermore, to increase the quality of the financial reporting processes, the IRS started to phase out its old reporting processes. To spur developments, the use of the XBRL standard will become obligatory for specific streams of financial reporting in 2013.

5 Findings

The SBR case was investigated to determine whether any transformation is taking place by looking at the characteristics of PVM. The case study findings are summarized in table 2.

Table 2. Characteristics of PVM identified in the case study

Main purpose of the government	The improvement of financial reporting can be seen as creating public value.
Role of the government	XBRL set out to steer private parties to carry out public goals in NPM style by creating output targets. After Logius took over, the role of the government turned into serving and empowering, ensuring that the parties involved will benefit from the implementation.
Public sector ethos	Rather than creating a law upfront that businesses will have to follow by implementing XBRL, a joint agreement was made that allows for collaboration between the public and the private sector.
Formulation of public value	XBRL implementation set out as a project to create value for all parties involved: administrative burden reduction for businesses and by advancing compliance controls for government organizations.
Role of the public	Businesses are involved in policy formulation and implementation.
Role of public officials	While public officials keep having to follow procedures, and deliver cost-effective services, they will also have to attune their actions with those performed by officials in other organizations to create value.
Discretion and motivation of administrators	Both NPM and PVM characteristics can be observed: the creation of innovative services can be considered entrepreneurial, and by implementing horizontal control public officials will have more discretionary room to attain their objectives.

Table 2. (*continued*)

Mechanisms for achieving policy objectives	The XBRL standard is not implemented hierarchically, although it is spurred by making it obligatory by 2013. Until then, implementation depends on public and private parties implementing XBRL to serve their own needs, through governance performed by Logius.
Accountability	Public officials remain accountable to elected politicians, but at the same time a pluriform form of accountability emerges, in which they are accountable not only to the law, but also to the political norms of administrative burden reduction, professional standards of compliance control, and business interests of making compliance easier.
Organizational structure; service delivery	What remains hierarchical is the relation between government and businesses: businesses will have to comply with government regulations. At the same time, through the horizontal control, a networked structure will emerge in which businesses become partners of the government to comply with reporting regulations.

Regarding the first characteristic of PVM – the definition of public value through dialogue – the implementation of XBRL aims to create value by introducing a standardized process for reporting. Rather than being a political objective, the implementation of XBRL, the NT and the process infrastructure are meant to be beneficial for both the public and the private organizations involved. Through the common agreement in 2006 the government set out to empower businesses and government organizations rather than being only involved in policy-making and implementation. Furthermore, Logius aimed to achieve implementation by involving private parties rather than by enforcing implementation. Thus, public value was defined and created in a collaborative manner rather than that it was enforced by the government.

The second characteristic is the introduction of the continuous assessment of whether public value is attained for citizens directly or by strengthening the public sector by public officials. XBRL implementation aims to do both. On the side of the government, system-based control will lead to a continuous assessment of whether businesses are compliant. At the same time delivering public value directly to businesses by realizing administrative burden reduction through standardized reporting also strengthens the role of the government in the network. While businesses are no longer merely customers, they also influence the governance process. Furthermore, system-based control requires more room for discretionary power for public officials that, instead of following fixed procedures use IT to tap into process information of businesses and perform compliance control based on risk profiles. Among the factors that determine the risk profile is the trust generated by the businesses by complying with the regulations. If they comply for a longer period of time, their risk profile will be given a status in which fewer checks are performed by the IRS.

The coordination of actions within networks of public and private parties is the third characteristic of PVM. It includes the shift from hierarchically oriented public administrations to a networked structure in which public and private parties collaborate. While policy formulation indeed takes place through a process of governance, the other two characteristics cannot be seen to in place. Firstly, the nature of the relation between the government and businesses regarding financial reporting does not lead to a fully networked structure as governments remain in control of checking compliance of businesses. Secondly, regarding accountability, this still takes place large in the bureaucratic style of following procedures. Although public officials are responsive to more than just the procedures when performing horizontal control, it remains important. An important reason is that procedure accountability is a means to ensure equity. Thus, while the first and the second set of characteristics of PVM are in place in the case study, this is not the case for the third set of characteristics related to the organizational structure and accountability.

6 Discussion

From the case study it becomes clear that many characteristics of PVM are likely to be achieved by t-government. However, it cannot be concluded that a transformed organization will now be in place as a fully developed networked structure is not in place, nor is accountability transformed. Instead, it is still mainly vertically oriented and focused on following procedures. Thus, t-government in this case is not seen to be the realization of a fully transformed organizational structure (as government and businesses essentially keep the same roles as before), but rather to a process of governance by Logius, ensuring that the desired quality of the processes within the network is realized. This governance focuses on involving different – also private – parties in order to implement the desired changes.

Furthermore, realizing accountability in the way it is defined by PVM is expected to lead to problems for three reasons. Firstly, it will become much more difficult for public officials to be accountable if they have to adhere to multiple procedures, demands, and standards. Secondly, as the new forms of compliance control by the IRS (horizontal control) are expected to lead to the continuous assessment of whether public value is created, it requires that public officials are much better trained than before to be able to make decisions within this complex set of requirements. One of the interviewees already indicated that this represents a challenge for the IRS as they expect that will have to hire more highly educated officials performing the compliance controls. Thirdly, an issue that may become problematic is the realization of equity. The main reason for bureaucracies to use procedure accountability is to ensure that public officials remain neutral (as they are able to do their work in different political realities), but also to not be able to favor individual citizens. Creating more discretionary room thus enables public value creation, but it also requires additional actions to ensure equity.

A main limitation of this study is that this case study is an innovative example of t-government. Other examples may give very different results. Therefore, to be able to

generalize these findings, other cases in and outside of the Netherlands may need to be looked into. Especially as the XBRL implementation is considered an innovative case in the Netherlands, it is important to see whether the objectives of PVM are also observed in other cases of t-government.

7 Conclusion

T-government has the purpose of transforming the public sector. While e-government mainly focused on realizing the objectives of New Public Management (NPM), t-government aims to achieve the objectives of Public Value Management (PVM). PVM is concerned with the formulation of public value through a dialogue between public organizations as well as citizens and businesses. Furthermore, it aims to create public value through a continuous assessment of which value is being created either for citizens directly or to strengthen the role of the government. Finally, it aims to create public value by coordinating actions within networks of public and private organizations, supported by IT. This paper set out to find whether t-government achieves the objectives of PVM by looking at a case study from the Netherlands: the implementation of the XBRL standard for financial reporting.

The case study shows that public value is being created both by creating value for businesses as well as to strengthen the role of the government. Furthermore, public officials will get more discretionary room to assess whether businesses are compliant. However, a networked structure and a pluriform form of accountability are not observed. Rather than being a mechanism for creating transformed organizations, t-government is thus an instrument for setting up governance in networks in order to realize the desired changes. To fully realize PVM professionalization of public officials is necessary as well as to make public processes more transparent. Further research should focus on whether professionalization and transparency contribute to realizing the objectives of PVM through t-government. Furthermore, other cases of t-government should be investigated to find whether PVM is also observed in less innovative cases.

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E-government in Tanzania: Current Status and Future Challenges

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Abstract. The public sector plays an important role in the economic growth and development of developing countries. The application of modern Information and Communication Technologies (ICT) may help improve the public sector by contributing to new services and processes that address citizens as well as government-to-government services, involve citizens more directly in decisions being made, and contribute to streamlining work processes and standardizations needed to develop a well-functioning public sector. Research focusing on E-government in developing countries is still dominated by case studies and conceptual pieces of work. Thus, more empirical-oriented work is needed to expand our knowledge on current status, challenges and future plans.

The reported study has been initiated to address such needs. The objective is to investigate, from a broad perspective, on-going E-government initiatives in the public sector in Tanzania. The contribution of this work is twofold. First, the descriptive findings are important to gain insight into the current status of E-government projects in Tanzania. Second, the study reported here could guide the way forward for practice as well as research. We firmly believe that both practice and research should be based on the current situation and identified challenges and aim to describe such issues to guide future work.

Keywords: E-government, Developing Countries, Tanzania.

1 Introduction

E-government, the use of information and communication technologies to improve the activities of public sector organizations to improve the services offered to the public [1], has been advocated by governments globally as a means to acquire efficiency, accountability, and transparency in governance [2]. ICT has been used by developing countries for many years to automate internal work and process data. By introducing E-government, more emphasis is placed on how to support and transform external work, and to develop communication and transaction devices to address external stakeholders [3] by focusing on applying information and information technology to all aspects of government business [4].

Tanzania is one of many developing countries where multiple E-government initiatives are being introduced to support poverty reduction and sustain good governance, demonstrated by recent technology implementations and government strategy documents. Such initiatives are driven by the promise of efficiency and

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 198–209, 2012.

transparency in governance to leapfrog the slow process of development [5], and are exemplified by Tanzania's ICT policy, dating back to 2003, where E-government was introduced as a major driving force to:

> "*Enhance sustainable socio-economic development and accelerated poverty reduction both nationally and globally"* [6].

More work is needed to evaluate initiatives to develop cumulative knowledge of E-government services and to explore how these services have led to more effective government services. Since no comprehensive evaluation has been made of E-government projects in Tanzania beyond learning from isolated projects and stand-alone case studies, we conducted a baseline study to map the current status and identify future challenges, which are reported here.

The paper is organized as follows: next we present E-government in developing countries as our theoretical premise. Then we introduce the research context and explain our research design and data analysis approach. Thereafter the findings are reported, focusing on challenges and future plans. Based on the findings the discussion section focuses on identifying current needs, challenges, inhibitors and enablers of E-government in Tanzania. Finally, we summarize by discussing sustainability issues and implications for practice and research.

2 E-government in Developing Countries

E-government as an area of research and practice has been around for roughly a decade and a half. Recent reflections based on rigorous examinations of the intellectual development of the field have revealed that the field is gradually maturing [7, 8, 9] but is still under-theorized [8] and with only few attempts at either theory testing or theory building [7]. Implementing E-government initiatives in developing countries is complex and faces many hurdles [10], and more research endeavours are needed to develop cumulative knowledge [11]. Current knowledge in E-government is mainly based on research done in developed countries. Since institutional, cultural and administrative contexts must be considered when introducing E-government initiatives, knowledge cannot simply be transferred from developed to developing countries [10]. Thus, research on E-government in developing countries should not be oversimplified by assuming that learning could be drawn from stand-alone, isolated projects in others without considering the surrounding context.

The potential for improvement by introducing E-government in developing countries relates to several areas [10], various levels of impact [12], and sustainability issues [5]. These theoretical premises guided our study.

Focusing on the various areas of improvement, E-government in developing countries is firstly a matter of setting up processes and services necessary for state activities [10]. A major challenge is the lack of necessary data and poor data quality on issues such as land registers and lack of birth certificates. E-government offers the opportunity to improve these services, also in areas with a low literacy rate [10]. Secondly, access to information on different fields of activity, such as data on economic activities, medical data, or information on processes in public

administration, is of critical importance to develop policies and consistent development planning [10]. Thirdly, E-government is not only about delivering services to citizens, but also about improving government-to-government services. Hence, E-government could also help improve (internal) state efficiency by an improved amount and quality of government information retrieval, which could be used to develop policies. Fourthly, E-government could help to improve the finance and taxation systems and reduce corruption by introducing more effective and transparent systems. E-government systems can make public administration more democratic and responsible [10] by allowing citizens to participate in government processes, and offering better control mechanisms by providing citizens with more and better government information. Finally, E-government could act as a mechanism to impose formalization to facilitate administrative work. Incomprehensive administrative behaviours without proper controls contribute to unequal treatment and corruption [10].

E-government projects are introduced to improve government efficiency. Sein and Harindranath [12] discuss various impacts, identifying three levels of effects. First-order impacts substitute old technology with new technology. The same kind of work is conducted by using new technology. Second-order impacts relate to an increase in the phenomenon enabled by technology, where governments are capable of doing more after introducing E-government services. Finally, third-order impacts are the generation of new processes and new ways of working by introducing the E-government services. Governments are now able to work differently and, hopefully, smarter than before by introducing E-government services.

Identifying potential areas for improvements [10] and levels of effects [12] provide us with dimensions to understand E-government projects in Tanzania and their potential effects on society. Concerning sustainability the question remains: How sustainable are current E-government projects in Tanzania? Sustainability parameters of E-government initiatives relate to various stakeholders [5]. Sustainability parameters for government include a high degree of awareness of the project and interest in utilising citizens´ services. Furthermore, the project must result in cost saving for citizens and governments, and should be scalable and replicable [5]. Multi-stakeholder platforms should include a mixture of government and private services to be able to deliver services in the local language, reaching out to the poor. Local service providers could be included, for instance, by delivering E-government services through Internet kiosk operators. Finally, sustainable parameters for citizens include the provision of cost-effective services, reducing red tape and corruption, for instance, by providing one-stop citizen services and services being available regardless of technology issues [5].

Despite huge potential and significant investments in such projects [5, 12], there are few examples of highly successfully and sustainable E-government implementations in developing countries. E-government is not a “silver bullet” that automatically results in some kind of positive development. It runs the risk of achieving unintended, and maybe counterproductive, consequences, such as increased control and concentration of power [10].

3 Introducing the Research Context

Contextual understanding and awareness are needed to successfully design and implement E-government services [2]. Thus, successful experiences from one context cannot automatically be successfully transformed into another. That is, learning and knowledge from the western world may not easily be transformed into guidelines on how to manage and design E-government projects in Tanzania. We need to understand the contextual issues to better understand the current status of and future challenges for E-government implementations in Tanzania.

Tanzania is characterized by a low per capita income, widespread poverty and a great challenge to meet the National Strategy for Growth and Reduction of Poverty (NSGRP) and Millennium Development Goals (MDGs) in 2010 and 2015 respectively [13]. The estimated per capita income was US$290 in 2004, leaving Tanzania among the most underdeveloped countries in the world. Among the development challenges Tanzania has faced for many years are national economic growth, a reduction of poverty and enhanced good governance [14]. With foreign debt in excess of 80% of GDP in the late 90s, Tanzania was one of the so-called Heavily Indebted Poor Countries. Because of macroeconomic objectives, the major focus of Tanzanian government policies during 2003/2004 as set out in the Poverty Reduction Strategy was to promote growth and strengthen poverty reduction policies while consolidating and maintaining macroeconomic stability. During 2000, agriculture accounted for nearly two-thirds of GDP and over 80% of the workforce and export earnings (predominantly crops, fishing and livestock). Manufacturing contributes less than 10% to GDP, but growth is quite high relative to other sectors, mainly due to a rapid programme of privatization of state assets under the direction of the Parastatal Sector Reform Commission of Tanzania [15]. Tanzania's national ICT policy stated the mission to benefit from ICT already back in 2003:

> *"To enhance nation-wide economic growth and social progress by encouraging beneficial ICT activities in all sectors through providing a conducive framework for investments in capacity building and in promoting multi-layered co-operation and knowledge sharing locally as well as globally"* [6]

Deploying ICT in government is seen as a major driving force to achieve this mission to enable the government to become a driving force for sustainable progress in the national ICT arena: the development of coherent strategies, the mapping of on-going projects, and the coordination and implementation of E-government services where needed to ensure progress in the E-government area.

4 Data Collection and Analysis

The data collection took place for eleven months from initiation to the final interviews. Data collection was structured in different phases. Six interviews were conducted in this first phase of the data gathering activities. In the next phase 23 interviews were conducted and 21 questionnaires distributed to ministries, departments and agencies (MDA). Based on the results from this phase, a new round

of interviews took place, focusing on "best practices" to identify critical success factors for E-government implementation.

The major data source was obtained from interviews with major stakeholders. Other sources included questionnaires, project documents, e-mail correspondence, strategy documents and minutes from project meetings and workshops. Twenty-nine people were interviewed. These people held key positions related to E-government projects in the government sector and MDAs in Tanzania. The conversations lasted about 45 minutes, focusing on existing practices, experiences and challenges related to the design, implementation and management of E-government projects in Tanzania. The same issues were addressed by the questionnaire, which was returned by 18 of the 21 MDAs addressed.

5 Findings

A major task of E-government projects is to collect and store data on various issues related to various censuses and economic data. Data collection exercises are initiated to collect relevant data from various locations around the country. The data is transferred online to the National Bureau of Statistics (NBS) headquarters for analysis and storage before dissemination. NBS also receives data from other MDAs, like the ministry of industry, trade and marketing, whereby the marketing directorate of the ministry collects data on the prices of crops and livestock from various places and inform the citizens. Such data may also be transferred by mobile phones, using a system developed in collaboration with Vodacom Company, where data from mobile phones is transferred to computer systems for analysis and storage. Thus, information on prices of crops and livestock is easily accessible to citizens or businesses.

Institutions like the Tanzania Revenue Authority and the Tanzania Electricity Supplying Company are responsible for collecting tax and utility bills from all revenue earners (both employees and employers). The bills are processed electronically to improve efficiency and avoid miscalculations. With the current development, such bills can be paid directly through banks, and reconciliation is done online. Several others MDAs also use IT systems to bill their customers.

The land ownership system (MOLIS) obtains data and information from a geographic information system of a particular area and uses it to allocate plots from the surveyed area. The system helps to avoid multiple allocations of plots and hence aims to solve complaints about plot allocations. The produced information is then sent to a database of the surveyed area. Another environmental planning system uses GIS technologies to inform stakeholders of the nature of the environment of a given area and suggests activities to be undertaken in that area in order to conserve the environment.

Petrol station owners are informed of the quality and price of petrol products through a petrol managing system owned by EWURA. Depending on the distance from Dar es Salaam, EWURA sets the prices by regions so that customers know the range of prices of petrol products. With access to this information, customers are well informed and able to protest in case petrol station owners violate the price range provided by EWURA.

Almost all MDAs have their own website, but the information available online is rarely updated. The websites are mainly used for one-way information distribution from MDAs to the citizens to inform the public. It is common to post announcements for interested people to get hold of and react accordingly. Announcements are made on tenders, employment opportunities, examination results, new tariffs, conferences and seminars, and are done online to address a larger (online) audience than those who are physically visiting the office.

On some occasions the websites are used to offer services as well as to download applications or forms without being able to visit the office to get the forms. A common structure is a system where you may download the forms, print them, fill them in and then submit them. There are a few examples where forms may be filled in online and where decisions are being communicated through e-mails. This is considered important to improve service provision and hence efficiency.

Despite the availability of websites where information and services are distributed, we found that a major challenge is to convince employees who are still reluctant to change the way they work. Sharing information online is often considered awkward, and many employees are afraid of sharing information with others without being able to fully control who is able to gain access to the information.

5.1 Challenges of Implementing E-government in Tanzania

A major challenge is the lack of awareness of the opportunities and potential impact of introducing E-government systems in the public sector. Without an awareness of potential benefits, the resistance to change remains strong. A majority of the respondents reported that mind-set and behaviour, missing awareness, poor acceptance and the traditional paper-work culture hinder the adaptation and use of ICT in workplaces, and thus represent huge setbacks for the use of ICT in the public sector. Talking about mind-set changing and the use of ICT in Tanzania, one of the respondents commented:

> *"Changing the minds and behaviour of the users from the manual documents to electronic sharing and working on these documents is a big challenge… this is due to the fact that they have been used to a manual system for a long time"*

Lack of funding is a major challenge which does not only imply a lack of resources as such, but also a lack of current structures and mechanisms to make funding available, to organize budgets and to distribute resources. The structure of the MDAs influences the establishment and management of IT departments or units. In almost all ministries, IT units either fall under the departments of planning or the department of finance. Hence, the IT units do not have their own budgets, and they run the risk of being more or less invisible in the organization. Consequently, planning and implementing IT systems are difficult since the IT units are not responsible for strategic decisions or budgets, as an interviewee commented:

> *"Availability of resources is a challenge, for example systems like TFDA* (Tanzania Food and Drugs Authority) *MIS don't have some of the hardware because of a lack of funds; we are fighting the same general fund we have here.*

> *Once we propose our budget for IT, management looks on the individual and short-term impact of the investment in IT instead of looking at benefits to the organisation in the longer term… this is a big problem in the public sector"*

Lack of influence on how to prioritize is further challenged by the fact that the financing of equipment, Internet subscriptions and the procurement of software depend heavily on donors. Such dependency may be more or less direct where the E-government systems are established by the assistance of donors and receive direct support throughout the project period, or they depend on government units, which are also donor-dependent. Very few MDAs, especially agencies, are able to fully finance the systems from their own budgets, which makes it difficult to plan and prioritize relevant eGovernment systems. Projects are therefore often prioritized as a response to the donors' interests and priorities, more than the MDA's internal needs and plans for further development.

Most of our respondents find the lack of funding, insufficient or poor budget processes and lack of other resources among the hindering factors in the promotion and use of E-government systems in the MDAs. In this account one of the interviewee said:

> *"There is no budget for IT…I usually have to ask managers for money from their respective department budgets if there is an IT- related problem to solve"*

There is a need to increase the knowledge and skills of the end-user on the use of ICT. The lack of training opportunities and the fact that trained IT personnel are better paid in the private sector further hinders the use of E-government projects. One of the respondents argued that:

> *"Most of the end-user are ICT illiterate…without email accounts, they don't communicate with other via email…they do not use standard applications like excel, which is still a problem"*

Lack of IT-skilled staff is a striking challenge. There is a lack of skilled ICT personnel all over the government sector in Tanzania. Poor service schemes for IT professionals and the positioning of IT units or sections within the MDAs are two of the common problems. Most MDAs have just one key staff member with IT knowledge skills, while other staff members in the units are, at best, semi-skilled. Thus, there is a frequent need for training and recruiting, since IT skills are very fluid. IT personnel are poorly paid compared to those who work in private firms or other disciplines like accounting and human resources. Consequently, the turnover of IT personnel is very high, especially for those have already acquired IT experience and skills, who may earn a far better salary in the private sector than in the government sector.

Human resources to make the system run are the central issue. One of the respondents highlighted this perspective by arguing that:

> *"We propose and defend our facts but the managers are still reluctant in supporting investing in human capital in the IT sector"*

In making her point on the lack of or inadequate IT-skilled staff, one of the respondents said:

> *"One of the biggest challenges is that I am alone as a staff member in the IT unit; there are no subordinates…the capacity is very low, we have a hiring programme, sometimes we hire for one year from the University of Dar es Salaam"*

There is a reported need for more training in basic computer applications, and to have a plan for the continuous training of both the IT personnel as well as other staff is important.

5.2 Future Plans

The further development of strategies and policies is important to guide coherent development and implementation of E-government services in the future, progressing towards full adoption and utilization of ICT investment, as argued by one of the respondents:

> *"After developing internal policy guidelines on the use of ICT, we are developing strategies, which could guide the decisions makers and help them understand clearly that initial investment in ICT is expensive"*

Development and/or improvements of the websites are considered an important step forward for the public sector in Tanzania. These websites used to contain information on and services in regions. Evidencing that aspect, one of the respondents said that:

> *"We are planning our website to contain comprehensive information and to allow an exchange and posting of information to external stakeholders…the use of WIKIS-KILIMO (agriculture) matters that are researchable should be linked provided we get funds… we will be adding services, documents and software for people to use, we don't want physical notes* (hard copies*)"*

Still, many remote offices are not connected to any network. Thus, the question of improving, increasing and purchasing new infrastructure to connect more offices to the Internet and intranet is seen as an important future goal to increase information display and service provision in the public sector. Moreover, it will also increase the use of intranet and email in communication in favour of sending physical letters or reports. An interviewee from one of the ministries had this to say on the matter:

> *"We have good plans to improve the ministry's services by increasing the number of computers, improving the network and Internet infrastructure, equipping staff with current knowledge on ICT. Despite being frustrated by a small budget…we are strategically planning to expand the ICT services"*

6 Discussion

The public sector in Tanzania faces many challenges and barriers to implement and fully integrate E-government services. It is clearly a need to focus on infrastructure and broadband connections to the various offices in Tanzania. Still few computers are available, the Internet connections are unreliable (or non-existent), the network structure is often poorly designed, and the software might not be updated. All the more advanced systems are to be found in the offices where computers are available and the Internet connections reliable. As a first next step, Tanzania may focus on improving infrastructure and access to hardware and software.

Availability of technology and networks may not change anything if there is a lack of understanding and skills on how to utilise technology. Developing competence among the officers and managers and recruiting IT-skilled personnel are needed to disseminate knowledge internally as well as externally on how and why to use E-government services in Tanzania.

There are three main challenges related to this issue. First, it is clearly a need to hire more IT-skilled personnel in the public sector in Tanzania. The universities, which provide graduating candidates for the public sector, need to focus on how E-government systems may be used to transform the public sector and increase the effectiveness and efficiency of the public sector in Tanzania. Second, the lack of IT-skilled personnel is clearly a question of costs and priorities. The reported lack of top-management support may hinder the allocation of resources to support ICT. Third, the ICT department is still mainly considered as a service department in the MDAs, focusing more on fixing computers than managing more efficient work processes internally and externally by using E-government services. Thus, IT skills are considered important for the very few officers working in the IT department, and skills everyone needs to manage their work as efficiently as possible are not considered as important. To be able to further utilize ICT to work as efficiently as possible, it is important to increase awareness and skill of not only the few IT personnel, but of all public servants working in the sector.

A similar important challenge is to develop good E-government examples. The examples identified are often stand-alone examples including only one or very few offices. To bring the government sector forward, the authorities might consider bringing together several of the ministries, departments and agencies to design some services that are needed by several offices, where there are also some quick wins for the users to further increase understanding of the importance of implementing more E-government solutions.

The need for integrating services brings us to another main challenge, which is the organization and responsibility of ICT in the MDAs. The IT departments are seen as service departments in each office, without anyone being responsible for designing, developing and implementing E-government services from a holistic point of view. It is necessary to increase awareness of the importance of EGovernment in the MDA´s. Several studies in the last decades have informed us that top-management support is critical to the success of developing and implementing information systems, which is clearly missing in Tanzania. Further work is needed to get ICT on the agenda in the decision-making organizations in Tanzania. By doing so, the strategy and priorities may be more dependent on Tanzania's' needs than the donors' interests and focus areas.

The above-mentioned challenges are difficult to solve and might be difficult to influence by researchers and practitioners in the short run. Based on our study, we would argue for the importance of focusing on some quick wins, which might be within reach in smaller-scale projects.

Firstly, it seems important to identify internal champions to propel projects forward. These champions are often able to get the colleagues interested, and to explain the value of introducing E-government services in the organizations internally and externally. Thus, the champions are important for bottom-up initiated projects, where the initiatives are taken locally, where the main value of the initiated project is.

Clearly identified value is the second enabling factor for the success of locally initiated projects. It might be easier to identify value if the projects and services are initiated from the local offices, compared to initiatives from central governments and donors, even though the overall value for the government sector might be higher for the latter projects, as discussed earlier. Independent on project type, it is necessary to identify the value for the offices and other stakeholders involved to increase commitment.

Finally it is necessary to start where competence is available. The competence level varies from one office to another. It is sensible to start at identifying the current competence level to identify whom to invite to participate in designing new E-government services. During the interviews we identified highly skilled ICT personnel who spent their working hours on basic technical issues like installing software and cabling networks. These workers had very clear ideas on what could be done and how to do it, but realized that the basic needs occupied their full attention, hindering any activities related to work smarter by introducing E-government services.

The identified E-government services focus mainly on access to information and data quality. Databases are developed and data stored from various sources to improve data quality. Improved data quality is a prerequisite to develop well-functioning E-government services [10]. Currently, the identified initiatives focus less on providing services to citizens based on the improved data quality. As such, the potential is not transformed into services, which are utilizing collected government data. Furthermore, E-government initiatives focus more on government-to-government services than government-to-citizen services. Our findings also include examples of E-government services focusing on the improvement of finance and taxation projects. More efforts are needed to disseminate learning from one project into sector-wide E-government solutions including a larger part of the government sector, addressing various stakeholders´ needs.

The impacts identified relate, at best, to the first and second order impact [12]. Impact does not seem to be very important at this stage. It seems more important to get systems up and running than to consider the potential impact on government, citizens and other stakeholders. Most systems are designed to substitute older systems, providing the same kind of functionality implemented in an ICT-based system. Such initiatives may be important and useful, for instance by increasing the data quality on the data being processed. Second order effects are exemplified by the use of the land ownership and petrol managing systems. By collecting data from various sources, independent of time and space, these initiatives increase the capability of government institutions to do more work. Third-order effects, where E-

government systems alter the way the government sector is organized, and the business processes are yet to be identified. Lack of awareness, lack of competence and lack of responsibility may hinder altered work processes, which might utilize technological opportunities to re-organize to work smarter.

Sustainability is a major challenge for E-government projects in Tanzania. Sustainability parameters for government and citizens, introduced by De´ [6], include a high awareness of various stakeholders, cost saving for all participants, scalability and replicability. As discussed above, such issues are clearly not addressed by current E-government services. Thus, E-government projects in Tanzania may end up with several non-sustainable projects with only a very limited influence on a specific context and/or for a limited time horizon.

7 Conclusion

This study has been initiated to increase our knowledge of the current status of E-government initiatives in ministries, agencies and departments in Tanzania. Moreover, we aimed at investigating the perceived challenges for further development and use of E-government systems, and, based on the findings, to be able to discuss the way forward, both in the long as well as short run, on how to proceed by implementing E-government systems in Tanzania.

Our findings could guide both practitioners and researchers´ future work in this area. In the long run, we argue for the importance of centralised initiatives with a clear value for several MDAs. Such projects should focus on problem areas with identified needs. One area where there is clearly a need for more robust, transparent and cross-sectors solutions, is the tax registration area. Thus, this could be one focus area for further development. In the short run, we argue for the need of identifying IT-skilled personnel and competence, which is presently available at the MDAs. The competent personnel could be invited to design and develop bottom-up solutions based on the local needs where they are situated. Thus, the competence could be utilised in a better way, and local needs identified and addressed. The main challenges for such bottom-up initiatives in the long run are to develop common services for the whole sector based on the needs and experiences from small-scale pilot studies.

The main hindrances to further developments are, from our point of view, the lack of equipment and lack of IT competence in organizations. Before hardware, software and networks are generally available, Tanzania will not be able to fulfil the objectives presented in its IT policy. We would argue for the importance of investing in equipment to overcome the main hindrance to further development. Even more challenging is the lack of competence. First, more IT-skilled personnel need to be hired to strengthen the IT departments in the MDAs. In the long run, it might also be necessary to increase the competence of ICT's transformation of the government sector among all officers working in the public sector in Tanzania. To succeed, it seems necessary to focus on internal training. Success may depend on the competence level of newly recruited employees in the public sector, which means that the role of the universities is of critical importance. The universities should include teaching on the role of technology in the future development of Tanzania´s government sector as a core competence for all their candidates.

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A Model to Assess Open Government Data in Public Agencies

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Abstract. In this article a maturity model is proposed, named OD-MM (Open Data Maturity Model) to assess the commitment and capabilities of public agencies in pursuing the principles and practices of open data. The OD-MM model has a three level hierarchical structure, called **domains**, **sub-domains** and **critical variables**. Four capacity levels are defined for each of the 33 critical variables distributed in nine sub-domains in order to determine the organization maturity level. The model is a very valuable diagnosis tool for public services, given it shows all weaknesses and the way (a roadmap) to progress in the implementation of open data.

1 Introduction

The Electronic Government (e-Gov) development has been implemented from its beginnings with a model focused on services that the government provides. In recent years a change of model has been defined towards one focused on the citizen. This citizen-centric model is a new way of governing, and generates two implications in terms of public policies design and development of the digital strategy of the governments [1]:

- **New Services Model:** the services offered by the government must be designed and implemented focused on citizens (individuals or legal entities) as recipients of services rather than the government as a producer, who must incorporate essential attributes in the design with this new approach, such as: single window, multiple service channels, high usability standards, interoperability, and service levels defined as ex ante.
- **Open Government:** this concept includes participation, transparency and cooperation of citizens in public policies. In this area, *Open Government Data* (OGD) plays a significant role and has become a way to operationalize this approach.

The OGD concept is a work philosophy to empower citizens and provide them access and license to use the data generated by public entities, so that they can use, store, redistribute and integrate them with other data sources. This data opening is justified

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 210–221, 2012.

both by encouraging citizen participation, strengthening democracy, as for being an innovation driving force by enabling the creation of new companies with these data.

The OGD concept is intertwined with the *Open Data* concept and *Linked Data* (linkeddata.org): *Linked Data* is a way of publishing data in such a way that it can facilitate the interaction between different data sources, while the concept of *Open Data* is oriented to a freely accessible data and without any restrictions at all to the people [2].

The *Open Data* approach attemps to put data at the disposal of all citizens, which has proven to generate an important public value. The authors of *Open Government* book [3] bring up three fundamental concepts for a better understanding of the *Open Data* impact:

- Public information is a kind of infrastructure, with the same importance level as other infrastructures (water, electricity, roads).
- Public value must be maximized as of existing data held by government.
- The open data magic is that it enables transparency and innovation.

Some countries have progressed beyond the mere access to data, where the Open Data Model has shown that it not only produces significant changes in the public sector, but it generates synergies in innovation and entrepreneurship. This is the case of the United Kingdom (UK) that through the organization The *National Archives* [4] has defined a data licenses model that allows the use and reuse of the information that is under the granted license. Citizens can access to public data, and can use it in commercial terms; this model allows the generation of entrepreneur in relation to these data.

Public Services (PS) of the government collect and produce large data volumes involving data as climatological, energy, economic, health, environment, agriculture, defense, public safety, social, cultural, budgets, among many others [5]. Unfortunately, these data may have restricted accesses, perhaps its existence is unknown, or can be in standardized or private formats, which brings into question some aspects like, why should I identify me to get public data? Why should the request for public data be justified? Why is it that a software sometimes expensive to be processed (such as SPSS), or private as Excel must be bought? How to make citizens and civil society to taking full advantage of this data? What kind of services should governments provide so as to increase citizen's participation in OGD initiatives?

Considering the importance and relevance of implementing Open Data in PS, a proposal of the model for diagnosing PS capabilities is presented in this paper to develop Open Data. The model, called Open Data Maturity Model (OD-MM) is based on the principal elements found in literature, described in next section. The elements of the model are described in section 3, and development methodology and validation in conceptual terms is presented in section 4. Conclusions can be found in last section.

2 Alternatives for Diagnosing Open Data Implementation

Although it was not dully made official, a classification proposal exists about how open and usable are the data that a public agency can provide. Sir Tim Berners-Lee or

TimBL (www.w3.org/DesignIssues/LinkedData.html) proposed the well known "five stars" test for the data publication.

In December 2007 a group of researchers in Sebastopol, California, developed the 8 principles for OGD's, designed for a better understanding of these concepts and to define why OGD is essential for democracy. One of the key concepts for the development of these principles was to establish that the information becomes more appreciated if shared, because it not only benefits the end user which is civil society, but it also makes more efficient the use of public resources. The 8 principles established for considering government data as open are found in www.opengovdata.org/home/8principles.

Reggy in [6] defines a model with 4 levels for each of the 8 principles above mentioned, based principally on the W3C guidelines and the COI of the UK. For each principle a score is assigned according to the following: Level 0 = 0%; Level 1 = 33%; Level 2 = 66%; and Level 3 = 100%. A compounded indicator allows measuring the overall quality of each program evaluated by simply calculating the media of the score associated to the 8 principles.

MELODA (MEthodology for reLeasing Open Data) is a tool to accelerate releasing of information to society. It was not designed exclusively for public agencies, but it also included the private sphere, weakening its proposal as a tool of diagnosis for the public sector (gobernamos.com). MELODA evaluates available information from a data source (the same information that anyone could reach, including commercial uses mixed with private sources). This requirement restricts the number of analysis dimensions, which currently covers three dimensions: Legal Frame, Technical Standards for data releasing, and Accessibility to information. Five maturity levels are considered for each dimension. Levels from 1 through 5 for each dimension are marked as 0%, 25%, 50%, 75% and 100%. Each dimension is weighted the same as the others, so the global assessment for a single data source is composed by one third of each assessment. The global assessment of a PS that releases data is the average of each data source assessment released by the institution.

The *Carter Center* (www.cartercenter.org/documents/2012.pdf), in its 2008 Action Plan, provides policies focused on access to information as a human right in all cultures and government systems. It recommends that governments and international organizations must ensure this right by providing: fair exercise of the access rights, training of public officials in the practice and application of access rights, public education to empower such a use of the law, among others.

The stage model for OGD proposed in [7] has two main dimensions, namely organizational and technological complexity and added value for data consumers.

According to literature, OGD presents challenges in several fronts, the most relevant are:

- Experience in different countries shows that it is necessary to train those who will be responsible for OGD in each public agency, which takes time.
- Not all data have the same quality; how reliable they are, how they are represented, and so on. It is necessary to establish a set of metrics that could help consumers of these data.

- It requires a strong political support and to considering an OGD as a fundamental policy to improve the government transparency. Without an appraisal from the political world, every effort will remain in good intentions. Moreover, this support should be reflected in a resources allocation, since as any other public policy, implementing OGD requires time and money in order to make it possible to managers to carry it out (as described in [8]).

Important elements that can be identified in literature and that should be considered when diagnosing the implementation of Open Data at PS level are those that stand out in successful cases described in literature. Among these perspectives the following are important to be considered:

- The **establishment** of a PS, given that the importance of leadership and strategy in OGD initiatives is highlighted in literature.
- The **legal aspect**, allows to having a legal frame when implementing *Open Data*.
- The **technological perspective** as for the accomplishment of *Open Data* principles, such as access to data, data quality and its availability.
- The **citizen perspective** as from participation and collaboration point of view.
- And **developers** and entrepreneurs in the reuse of data.

All these elements are considered in the maturity model proposal to assess the capabilities and maturity of public institutions in the *Open Data* implementation. We merge the first two perspectives (establishment and legal aspects) into a single domain, as well as the last two above mentioned (citizen and developers perspective), so that the proposed model has three perspectives that are detailed in next section.

3 Basis of the OD-MM Model

It is important to clarify that the proposed model is intended to be a reference to diagnose the capacity to face the OGD in Public Services (PS). It does not intend to be a model to establish specific processes required for better services delivery but a reference for the design, management, monitoring and performance control of these processes adapted to the reality of each organization and the particularities of the public administration.

The model is based on the definition of a set of 3 elements organized in a hierarchical structure. Their key elements are the "**Domains**", "**Sub-domains**" (**SD**) and "**Critical Variables**", which can be evaluated with respect to OGD. The "domains" are SDs logical associations which in practice have to mature and therefore, are subject to evaluation.

Domains are the heart of the model because they are set on different Capacity Levels (CL's) that contrast with those available in a specific organization. Three domains and 9 SDs were defined in total (3 per domain). In total there are 33 critical variables distributed in the 9 SDs. They are hereunder listed.

3.1 ELP Domain: Establishment and Legal Perspective

This domain determines the organization's ability to articulate a consistent vision of OGD. That is, the existence of an IT strategy aligned with a business strategy and that

explicitly considers a decision and vision of the organization to be incorporated to open government. It involves high-level activities that allow to managing all resources according to the business vision and strategy and its priorities, including alignment with the guidelines of the national e-Gov, in particular OGD; includes the level of existence and confirmation of internal laws and regulations that facilitate the implementation of OGD policies and activities, and the ability of an entity to accurately perform organization, management and training activities as planned. Its SDs are hereunder described.

Subdomain ELP-1: Strategy, Leadership and Establishment
Includes high-level activities that allow managing all resources according to the business vision and strategy, and its priorities; it includes the alignment with the OGD guidelines at a national level. Its CL is determined by the following **variables:**

- *Strategy:* There is an OGD strategy aligned with the central level strategy.
- *Leadership:* Capabilities are available to successfully lead an OGD process.
- *Establishment:* Ability to have an organization to properly managing OGD programs with all necessary coordinations with other agencies.

Subdomain ELP-2: Laws and Regulations
It comprises the existence and verification level of internal laws and regulations that facilitate the implementation of the OGD policies and activities. Its CL is determined by the **variables**:

- *External Regulations:* Ability to comply with external regulations.
- *Internal Regulations:* Ability to comply with internal regulations.
- *Licenses:* Ability to accomplish the general regulation on licensings and generate eventual specific licensings of data sets generated by the entity without breaking with open data principles.

Subdomain ELP-3: Management
This subdomain includes the ability of an entity to appropriately perform organization, training and management activities as planned. Its CL is determined by the following **variables**:

- *Training:* Ability to provide staff trained in OGD suitable skills.
- *Project Management:* Ability to managing OGD projects, according to standard procedures and incorporate Open Data principles on related projects.
- *Performance Assessment:* Includes the development of metrics and measurement of periodical results about the initiatives and programs associated to OGD and ensure an appropriate internal and external coordination.

3.2 TPE Domain: Technological Perspective

This domain establishes the technological capacity of the organization to articulate a consistent vision of open government. That is, the existence of a technological strategy aligned with the strategy that explicitly considers the OGD best practices in the organization to be incorporated to the open government. Its SDs are hereunder described.

Subdomain TPE-1: Safety and Availability
Involves those activities related to ensuring the existence of protocols and mechanisms to protect data infrastructure from external and internal attacks; the idea is to ensure the availability of data at all times. Its CL is determined by the **variables:**

- *Safety Systems:* The organization has safety systems that protect data integrity in the context of a systematic implementation plan.
- *Data Availability*: Data should be available in time where their access can provide them an added value, i.e., in a timely manner.
- *Data Updating:* Updating protocols, manual or automatic.
- *Tools for Measuring the Level of Use:* Control of the data use level, i.e., the existence of data collecting mechanisms of data use level.

Subdomain TPE-2: Access
Involves the activities related to the portals enabling, the existence of *Data Sets*, etc. Its CL is determined by the following **variables**:

- *Automated Data Reading:* Information is accessible through database language or other ways of access.
- *Metadata:* Existence of metadata and a type of them.
- *Categorization and Discovery Facilities:* Easiness in searching within the Web portal; and creation and maintenance of taxonomies.
- *Use of Semantic Technologies:* The Web portal provides support for the semantic enrichment of data sets.

Subdomain TPE-3: Data Quality
Involves the activities related to maintaining and managing the organization's data quality, in terms of Open Data existing definitions and level of interoperability of the organization's data. Its CL is determined by the following **variables:**

- *Data Format*: Use of non-proprietary formats that facilitate interoperability.
- *Free Data*: The data are not restricted by copyright or other legal restrictions that could limit their reuse.
- *Primary Data:* It should be primary data, avoiding secondary processed data.
- *Data Completeness:* Data must be complete (all the aspects are given).

3.3 CEP Domain: Citizen and Entrepreneurial Perspective

This domain establishes the organization's ability to listen to public opinion, to involve citizens and collaborate with developers of applications that improve the transparency of the organization. Its SDs are hereunder described.

Subdomain CEP-1: Data Re-use
Open data publication status. Its CL is determined by means of **variables**:

- *Open Data Developed Initiatives:* Number of Open Data projects completed or in progress, and status of them.

- *Number of Open Data Available:* Volume (ratio) of OD data sets published by the entity in relation to the global information provided by various means.
- *Single Access Point*: Availability of access catalogs to data sets.
- *Data Access Measurement:* Existence and management of access indicators and/or downloading of data sets, analysis of results and proposal of improvement measures (selection criteria, promotion, etc.).

Subdomain CEP-2: Developers
Degree of involvement in the encouragement and assistance to the work of reusers agents (PSI: Public Sector Information). Its CL is determined by the **variables**:

- *Data Gratuitousness*: Free data access and/or data downloading.
- *Reuse Encouragement:* Existence of aid resources (documents and material published or promoted by the institution) as well as promoting, formative and networing activities, conducted or promoted by the entity.
- *Complains and Conflicts Resolution:* Reception, recording and resolution of complains and conflicts in re-using matters.
- *PSI-related Project Financing:* Use of available fundings for the development of reusing applications, whether it is financing offered or promoted by the entity itself or others, but advertised/processed by it.

Subdomain CEP-3: Participation and Collaboration
It includes a certain level of listening-in and adaptation to citizen's demands, as well as to dialogue. Its CL is determined by the following **variables:**

- *Participation and Collaboration Means:* Communication channels exist between citizens and the entity about PSI matters, and type of collaboration developed.
- *Participative Transparency:* Management and advertising of citizen's participation.
- *Active Listening:* Implication's degree of entities in public participation and reaction when facing the improvement to data publication and reuse.
- *Data Use Measurement*: Presence and management of indicators of PSI re-users' demand and/or use of applications.

3.4 Capacity and Maturity Model

Capacity is a property of each SD. The ability of a SD is determined based on the Capacity Level (CL) of its Critical Variables, i.e. what is actually measured is the ability of Critical Variables to meet certain requirements, then these capacities are weighted according to their importance and the result of this weighting is the final CL of the SD.

The Maturity Level (ML) instead, is a property of the organization as a whole. Each ML will correspond to a SD default setting in predefined CL. The ML prescribes a "roadmap" or path of improvement for the organization.

One of the important objectives of the developed model is that it can produce progressive evolution alternatives of capabilities and maturity. In order to achieve this,

the generic model to be used to define the CL characteristics for each model variable is here described. Then, the relationship between the variables' capacities and their respective SD is as well described, and finally how to determine the maturity of the organization once their SD capacity is known.

For each SD an incremental measurement scale exists based on a score from 1 to 4. This scale is associated with a generic qualitative capacity model described below.

Level 1: Inexistent Capacities

- Capabilities do not exist or the SD is approached in an ad-hoc and reactive manner, tends to be applied on an individual case by case way.
- There is evidence that the SD's were recognized and need to be approached.

Level 2: Emerging Capacities (unformal)

- An intuitive regular pattern to approach the SD's is followed. Different people follow similar procedures to approach the same task.
- There is no formal training or divulgation of procedures, and responsibility to follow them up rests on each individual.

Level 3: Existent Capacities

- The procedures related to the SD's were defined, documented and communicated.
- There is a formal training to support specific initiatives related to SD.
- Procedures are not sophisticated; they rather are the formalization of existing practices.
- Monitoring and measuring of compliance with procedures is possible, as well as taking actions when the apparent SD's do not effectively work.
- Standards and guidelines established apply throughout the whole organization.

Level 4: Advanced Capacities

- Procedures have reached the level of best practices and continuous improvement is applied.
- The use of market standard or world-class tools helps to optimizing the SD's.

Relation of Variables, Capacities and SD

Capacity is a property of each SD and is obtained by measuring the CL of its critical Variables (V_i). Whereas there should be a direct relationship between both capacities it has been chosen as a calculating mechanism the arithmetic average of the SD constituent variables capacities. However, considering that for a given *Open Data* strategy or that for a level of development for a given country there are more relevant variables than others, a set of ponderers for each group of variables has been defined. Thus the CL of a SD turns out to be a weighted sum (w_i) of their constituent CL variables (Eq. 1). Table 1 show weighting values initially defined to be used in the pilot stage of the model.

$$CL_{SD} = \sum_{i=1}^{n} (CL(V_i) \times w_i) \quad \text{(Eq. 1)}$$

Table 1. SD set of variables on each domain

Domain	Subdomain	Variables	Weight
Establishment and Legal Perspective	Strategy, Leadership and Establishment	*Strategy*	*30%*
		Leadership	*40%*
		Establishment	*30%*
	Laws and Regulations	*External Regulations*	*20%*
		Internal Regulations	*40%*
		Licenses	*40%*
	Management	*Training*	*30%*
		Project Management	*30%*
		Performance Assessment	*40%*
Technological Perspective	Safety and Availability	*Safety Systems*	*20%*
		Data Availability	*30%*
		Data Updating	*30%*
		Tools for Measuring the Level of Use	*20%*
	Access	*Automated Data Reading*	*30%*
		Metadata	*30%*
		Categorization and Discovery Facilities	*20%*
		Use of Semantic Technologies	*20%*
	Data Quality	*Data Format*	*30%*
		Free Data	*25%*
		Primary Data	*25%*
		Data Completeness	*20%*
Citizen and Entrepreneurial Perspective	Data Reuse	*Open Data Developed Initiatives*	*30%*
		Number of Open Data Available	*30%*
		Single Access Point	*20%*
		Data Access Measurement	*20%*
	Developers	*Data Gratuitousness*	*20%*
		Reuse Encouragement	*40%*
		Complains and Conflicts Resolution	*20%*
		RISP Project Financing	*20%*
	Participation and Collaboration	*Participation and Collaboration Means*	*30%*
		Participative Transparency	*20%*
		Active Listening	*30%*
		Data Use Measurement (Applications)	*20%*

The ML is determined by a set of values for the SD model, as shown in Table 2. The advantage of this scheme is its flexibility since it only establishes a minimum set of SDs, important in a given ML. The remaining SDs are left to the PS criterion.

Table 2. Template of organizational maturity based on a set of priority SDs

Domain	SD	ML 1	ML 2	ML 3	ML 4
Establishment and Legal Perspective	Strategy, Leadership and Establishment			2	3
	Laws and Regulations			3	4
	Management		2	3	4
Technological Perspective	Safety and Availability			2	3
	Access		2	3	4
	Data Quality			2	3
Citizen and Entrepreneurial Perspective	Data Reuse		2	3	4
	Developers		2	3	4
	Participation and Collaboration		2	3	4

4 OD-MM Model Development and Validation Methodology

The design methodology included to studying papers and published articles, study committee reports, evaluations and gray literature (see references), as well as telephone interviews, *skype* meetings and teleconferences.

The work team contacted various groups of principal stakeholders in *Open Data* for interviewing and using them as primary sources of information.

Interviews were conducted in two rounds. The first round was focused on 9 experts that had been directly or indirectly involved in the development of the Open Data projects, in the Government of Chile, Colombia and in the state of NSW in Australia. Information collected in this process was gathered, and from literature review, questions were structured for the second round of interviews. The second round of interviews was focused on 4 experts with a more extensive domain and including people with experience in the region, Latin American governments and representatives of foundations and civil society defenders of the Open Data movement.

4.1 Determination of the Weight of Variables by SD

Determination of the weight of variables must follow a methodology in which at least three experts should be involved: a government representative, a citizen representative and/or *Open Data* applications developers, and at least one *Open Data* expert independent of the first ones. The methodology used in this study consisted of 3 rounds:

- **First round**: Each expert assigns independently a weight to the variables according to their criterion within the SD. In each SD the 100% is distributed among the variables that comprise the SD.
- **Second round**: the weight of each variable proposed given by each expert in all three domains is compared. To those variables proposed by the experts with equal weight, that weight is assigned.
- **Third round**: in cases where any difference exists between proposed weights, a negotiation starts, and is repeated for each SD. For weights with no big difference between the proposed ones, the intention is to come to a consensus value. If there is no consensus, each expert justifies his proposal and relative importance in SD. Finally, if no consensus is reached, it is submitted to the opinion of an external expert whose last word will be accepted without discussion.

4.2 Validation of OD-MM Model

To validate the OD-MM model, this was sent to various experts related with the OGD topic in Latin America. Representatives of the Government of Chile and Colombia, civil society and developers of Open Data applications made their comments which after being analyzed lead to modifying those that allowed to improving the proposal of model design to validate it.

With the validated model, in conceptual terms, a Web tool was implemented which allowed the data colletion required by the model for its validation by means of a pilot

in-situ. For this reason, a methodology was established to apply this pilot. The URL of the Web tool is http://odmm.inf.santiago.usm.cl/ (interface in Spanish).

For application of the pilot, experts from Chile, Colombia, Dominican Republic and El Salvador were contacted. In these countries a sample of 10 public institutions were selected, based on previously defined criteria. Results of the pilot will be reported in a future publication, which for space availability reasons are not possible to describe in this article.

5 Conclusions

A model was designed to properly meet specificities of the public sector at a regional level, being a frame of reference to identify the areas that support the OGD strategy, based on OGD international best practices.

The resulting model incorporates a hierarchical structure according to the relevance of the analyzed domain. The structure includes 3 domains, 9 sub-domains and 33 variables. This structure helps to a better adjusting to the diverse reality of PS in their preparation for joining the Open Government.

This model distinguishes between capacity, as a characteristic of a SD, and maturity as the organization's property as a whole. The capacities of variables contribute in a weighted manner to the SD capacity generating another adaptability element.

Domains on which the ML of capabilities in each PS is established, enables a continuous improvement and, therefore, a continuous progress towards higher levels of maturity of each organization. For space limitations, it was not possible to show the roadmap generation in this article.

Consequently, given the adjustability attributes and incorporation of a cycle of continuous improvement to which the grounds of the model are closely related to elements considered as the best international practices, we believe that the implementation of the model at a regional level will be a powerful diagnosis tool for Open Data.

Acknowledgement. The authors would like to thank Cristian Torres and Gonzalo Valdés for their work in the project. This work was partially supported by the grants DGIP 241142, International Development Research Center (IRDC/CDRI) with the collaboration of Inter-american Organization for Higher Education (OUI).

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Comparing Private and Public Sector on Information Systems Development and Maintenance Efficiency

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Abstract. This paper provides a comparison between public and private organizations on key figures relative to the information systems support activities. Many have claimed that public sector has a less satisfactory conduct of information system support than private sector. In this article we present selected data from survey investigations performed among Norwegian organizations on how they conduct information systems development and maintenance. This investigation has earlier been compared with similar investigations of this sort. A major finding from the previous comparisons is that even if we witness large changes in the underlying implementation technology and approaches used, a number of aspects such as the overall percentage of time used for maintaining and evolving systems in production compared to time used for development is remarkably stable. When we compare public and private organizations in the last survey, we find a small difference on some variables, but these are not statistically significant, thus cannot be used to conclude that IT development and evolutions is conducted more poorly in public sector than in private sector.

Keywords: e-government, information systems development and maintenance, public vs. private sector.

1 Introduction

According to Heeks [13] “Most eGovernment systems fail. They are either total failures, in which the system is never implemented or is implemented, but immediately abandoned; or they are partial failures, in which major goals for the system are not attained and/or there are significant undesirable outcomes”. Also many other authors report on what appears to be more problems in the public than the private sector IT-development. In [24] it is reported that "Public projects had an average effort overrun of 67%, as opposed to the 21% average in private projects. This observed difference appears to be caused by systematic differences between private and public organizations found at 1) the political level, 2) the organizational level, and 3) and the individual level". A number of reports indicate that this is a challenge experienced internationally [8] in OECD countries, USA and in the UK [30]. A reason these failures get so well-known though, is actually because they are public, thus information about success and failure is also public information, something which is not the case in the private sector. Failure is happening both in public and private sector, and usually, the failures are only partial; most

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 222–233, 2012.

systems get delivered and are used in some way. Since most work on IT is not on developing new systems, but on maintenance, operation and user-support [6], an alternative way to compare IT efficiency than only looking at the development efficiency, is looking upon how work is distributed in the IT-organization, and the amount being done on value-adding work. Application systems are valuable when they provide information in a manner that enables people to meet their objectives more effectively [2]. An application system is part of an encompassing organizational system, which in turn is part of a broader business environment. This environment of change that an organization must address implies that the supporting information systems also must be easily adaptable. As stated already in [3], it is one of the essential difficulties with application systems that they are under a constant pressure of change. Given the intrinsic evolutionary nature of the sources of system needs as described above, it should come as no surprise that specifications and the related information system must evolve as well [2,26].

The goal of both development activities and maintenance activities is to keep the overall information system support of the organization relevant to the organization, meaning that it supports the fulfillment of organizational goals. A lot of the activities usually labeled 'maintenance', are in this light value-adding activates, enabling the users of the systems to do new task. On the other hand, a large proportion of the 'new' systems being developed are so-called replacement systems, mostly replacing the existing systems without adding much to what end-users can do with the overall application systems portfolio of the organization. Based on this argumentation we have earlier developed the concept application portfolio upkeep as a high-level measure to evaluate important aspects of to what extent an organization is able to evolve their application system portfolio efficiently. How application portfolio upkeep is different from maintenance is described further below.

In this paper, we present results from a survey-investigation performed in Norwegian organizations in this area during the end of 2008. We have earlier compared the overall results with similar investigations done in 2003, 1998 and 1993 [6, 7], finding a stable overall pattern of distribution of work from the last three investigations. We will in this paper look more closely at the results from the last investigation, comparing figures from public and private organizations. Norway has quite a number of companies which are defined as private, but yet having substantial public ownership, the state being a major shareholder. Also, a lot of previous public organizations have recently been transformed to private companies or state owned limited companies or other kinds of organizations with varying degrees of freedom being run more according to private business principles than what was usual some decades ago. On the other hand we find certain important traits among public organizations e.g. that they all have to abide to the same non-optimal rule of procurement and development of IT-solutions when external companies are involved in developing the requirements to a system, they are not allowed to be involved in the implementation of the system [9] making such a dichotomy between private and public companies meaningful. Thus our core research question is: *Is information systems development support conducted in a less optimal way in the public sector, compared to the private sector in Norway.*

We will first give definitions of some of the main terms used within information systems evolution. We describe the research method, including a number of more detailed hypotheses spawned from the field detailing the above research question, before the main results from our investigation are presented. Then a closer investigation on the differences between private and public sector respondents are presented. The last section summarizes our results and presents ideas for further work.

2 Definition of Core Concepts

Maintenance has traditionally been divided into three types: corrective, adaptive and perfective [15] inspired by, e.g. Swanson [35]. Maintenance is defined as the process of modifying a software system after delivery to production.

1. Corrective maintenance is performed to correct faults in hardware and software.
2. Adaptive maintenance is performed to make the computer program usable in a changed environment
3. Perfective maintenance is performed to improve the performance, maintainability, or other attributes of a computer program. Perfective maintenance has been divided into enhancive maintenance [4] and non-functional perfective maintenance. Enhancive maintenance implies changes and additions to the functionality offered to the users by the system which is also included as part of perfective maintenance [28]. Non-functional perfective maintenance implies improvements to the quality and other features being important for the developer and maintainer of the system, such as modifiability. Non-functional perfective maintenance thus includes what is often termed preventive maintenance, but also such things as improving the performance and security of the system.

In addition to the temporal distinction between development and maintenance, we have introduced the concepts application portfolio evolution and application portfolio upkeep.

1. Application portfolio evolution: Development or maintenance where changes in the application increase the functionality provided by the total application systems portfolio of the organization. This includes:
   - Development of new systems that support new areas
   - Enhancive maintenance
4. Application portfolio upkeep: Work made to keep up the functionality provided by the information system portfolio of the organization. This includes:
   - Corrective maintenance
   - Adaptive maintenance
   - Non-functional perfective maintenance
   - Development of replacement systems.

Some writers provide more detailed overview of maintenance tasks [5, 16]. Jones [16] has in total 21 categories, also including user-support as part of maintenance; an area looked upon as belonging to 'additional work' in most other investigations.

3 Research Method

The investigation was a continuation of a longitudinal study on information systems development and maintenance in Norwegian organizations. The original reason for doing a survey investigation was to get a better overview of the general problems that organizations seemed to face on providing information systems support. Since the situation in individual organizations differs very much from year to year, a survey method was preferred instead of a case study method to get an aggregated view. Such investigations had at that time not been done in Norway, and it was a natural choice to do a survey similar to what had been done in other countries like USA [18, 29, 36].

Our survey form was implemented in the SurveyMonkey web-tool and invitations were distributed by e-mail to 300 Norwegian organizations. The organizations were randomly selected from the list of member organizations of The Norwegian Computer Society – NCS. (NCS has currently around 1000 member organizations).

Some of the selected respondents had marked that they did not want to receive request from SurveyMonkey or had changed their e-mail address. Thus only 278 of the invitations were delivered to the selected organizations (although we do not know if they were submitted further to the appropriate recipient within the organization).

The survey form contained 48 questions including demographic data. The contents of the form were based on previous investigations within this area; especially those described in [14, 19, 22, 27, 29, 36].

According to Galtung [9], the minimum sample size that is meaningful in a survey is 40 units. Earlier survey-investigations in the area of development of application systems toward a comparable population had given a response rate of about 22% [14,19,22] and the response rate of similar surveys has been around 20-25% (e.g., [27,29]. Thus an answer ratio of approximately 20% was expected also in this investigation. 79 responses were returned, giving a response rate of 28%. Out of these, 67 responses could be used for the analysis since the additional 12 responses were incomplete. 20 of these 67 responses were from organizations in the public sector.

The forms were filled in by people with long experience with IT-related work (average 17.5 years), most being the IT director in the organization. Of the respondents, 57 out of 67 (85%) indicated that IT was of extremely (5) to large (4) strategic importance for the organization (on a Likert scale from 5 to 1). This indicates that application systems support including own development and maintenance is an area of importance for the majority of respondents.

3.1 Previous Investigations

We have earlier compared some of the results of the last investigation with the results of similar investigations [6, 7, 23]. A number of later investigations on the distributions of work have been done, but they typically focus on the distribution of maintenance tasks only [12, 25, 33], many only looking on the situation in one organization.

The data was exported from SurveyMonkey as Excel-files, and these were imported into SPSS. Statistical significance of some of the results is determined using

the two-tailed Student t-test for normally distributed data and the Mann-Whitney non-parametric test when the data to be compared where not normally distributed. To decide what type of test to perform the variables used in the comparisons were tested for normality. Where either the Shapiro-Wilks (S-W Sign) and/or the Kolmogorov-Smirnov (Lilliefors-Sign) significance levels were less than 0.05, we used the non-parametric Mann-Whitney test. Statistically significant results are highlighted in the result section using boldface font using a significance level of 0.05.

3.2 Potential Threats to Validity

The results of our study should be interpreted cautiously as there are several potential threats to validity. This discussion is based on recommendations given in [17, 18].

Population. The sample of our study was initially intended to represent the population of Norwegian organizations with own development and maintenance work. Since a substantial number of the major Norwegian organizations of this type are members of NCS we chose the around 1000 member companies of NCS as our population. This includes in addition to all large organizations in Norway, also organizations within the IT-industry. We emphasized that it was the organizations own IT-activity we were asking about. Some of the responses that we had to dismiss were from IT-companies not having substantial own IT-activities. As described above, we distributed our survey forms to a random selection of 300 NCS member-companies. Other studies also use member lists as a source of subjects, e.g. [28]. In particular, the same source of subjects was used in the Norwegian studies in 2003, 1998 and 1993.

Respondents. Most of the persons who responded were IT managers. They may have different views of the reality than developers, maintainers and users. For example, [17, 33] found that manager estimates of the proportion of effort spent on corrective maintenance were too high. Since the respondents from both public and private sector were IT managers, we would not expect this to influence the comparisons.

Response Rate and Number of Respondents. The response rate of 28% can be argued to be low, although it is higher than in the previous investigations. According to [32], it is common for Internet and e-mail surveys with a response rate of 11 % or lower. Still, a problem with a low response rate is that the respondents may not be representative of the population.

Quality of Data. On some of the questions, we were particularly interested in the quality of the answers, recognizing that some of the information called for might not be easily obtainable. Answers to the quantitative questions were checked relative to each other for control, and where there were discrepancies the respondents were contacted. The remarks made on the questions gave more insight into the answers. We qualified for instance all data regarding distribution of work both in our study and in the earlier studies without finding significant differences on the variables we have

used in the hypothesis testing between those reporting having good data and those coming with qualified guesses.

Interpretation of Terms. Achieving consistent answers requires that the respondents have a common understanding of the terms used in the survey form. This may be difficult to achieve in practice. For example, Jørgensen [17] found that the respondents used their own definition of, for example, "software maintenance". We conducted a pilot study followed by interviews in a few companies to detect unclear questions. We also got comments from several colleagues including experts in cognitive psychology concerning clarity of questions. In particular the cognitive psychologist was helpful relative to pointing out badly or ambiguously formed questions. For many questions, there was space available to issue comments. This possibility together with the possibility to crosscheck numbers between different questions was the mechanisms used to identify possible misunderstandings among the respondents for follow-up. We also built upon earlier surveys that had undergone similar pilot and full use.

3.3 Hypothesis

To detail the main research question presented in the first section the following hypotheses were formulated to investigate the development of the different measures for distribution of work between private and public sector. Since we are looking for differences (and would expect to find something in disfavor of public sector based on earlier reports), we have formulated the hypothesis as if private and public sector are equal (to potentially refute this).

H1: There is no difference between the breakdown of maintenance work (in corrective, adaptive, enhancive and perfective maintenance) in public and private organizations. Rationale: Whereas perfective (in particular enhancive maintenance) provides more value than other types of maintenance, it is interesting to look into this breakdown. Investigations reporting on the distribution of time among maintenance tasks [1, 11] report very different numbers. On the other hand these investigations vary greatly. Whereas some look on single systems of numerous organizations and the whole portfolio of numerous organizations, other look only at one or a few (important) applications in one organization. Since this distribution naturally will differ according to where the system is in the lifecycle (development, evolution, servicing, phase-out, closed [31]), this difference between the maintenance work on individual systems should be expected. When averaging across a large number of application portfolios on the other hand, we have found a more stable distribution.

H2: There is no difference between the percentage of time used for development in private and public sector Rationale: When comparing the percentage of time used for development activities in organizations earlier, we have found this to be decreasing, but not so much between the three last investigations. Thus is interesting to see if this is equal also between private and public sector.

H3: There is no difference between the percentage of time used for maintenance in private and public sector Rationale: When comparing the percentage of time used for

maintenance activities in organizations earlier, we have found this to be stable on around 40 percent of the overall time in investigations both in the seventies, eighties, and nineties in both USA and Norway. It is interesting to see if this is different between private and public sector.

H4: There is no difference between the distribution of work among maintenance and development between private and public sector when disregarding other work than development and maintenance. Rationale: Since the amount of other work than development and maintenance is taking up more time now than 10-15 years ago, we found it beneficial also in the surveys in 1993, 1998, and 2003 to look at the proportion between development and maintenance time only. The proportion of time used for maintenance has earlier shown to be stable on around 60% (i.e., 40% for development) in all investigations, across countries. When a larger percentage of maintenance is claimed, this often includes, e.g. user support [16].

H5: There is no difference between the distribution of application portfolio upkeep in private and public sector. Rationale: These numbers were on the same level in 2008 and 2003 as in 1998, and it interesting to see if it would be equal also across private and public sector. A high percentage on application portfolio upkeep would in particular signal poor IT support practice cf. the discussion in the introduction.

4 Results

42% of the organizations had a yearly data processing budget above 10 mill NKr (approx. 1.5 mill USD), and the average number of employees among the responding organizations was 1115 (1333 in private, 604 in public). Around a third of the IT-activity was outsourced (32.9% in private, 24.1 in public). Whereas only two of the respondents reported to have outsourced all the IT-activities, as many as 84% of the organizations had outsourced parts of their IT-activity. Whereas the public organizations have outsourced more of the development (40% in public, 29% in private) and maintenance (34% in public, 30% in private) work than the private organizations, they have outsourced less of the operations (31% in public, 41% in private) and user support (21% in public, 29% in private). 94 new systems were currently being developed; 60 of these systems (64 %) were regarded as replacement systems. The average age of systems to be replaced was 7 years (6.35 years private, 8.76 years public).

Work on application systems was in the survey divided into the six categories presented in section 2. We also asked for the time used for user-support and for systems operations which took up the additional time for the work in the IS departments. Basic management activities are kept out.

In earlier investigation of this sort between 50% and 60% of the effort is done to enhance systems in operation (maintenance) when disregarding other work than development and maintenance [6]. An exception from this was our study in 1998 that was influenced particularly by the amount of Y2K-oriented maintenance. Table 1 summarizes the descriptive results on the distribution of work in the categories in our investigation, comparing to our previous investigations.

Table 1. Distribution of the work done by IS-departments in percentage

Category	2008	2003	1998	1993
Corrective	8.2	8.8	12.7	10.4
Adaptive	6.2	7.3	8.2	4
Enhancive	11.3	12.9	15.2	20.4
Non-functional perfective	9.1	7.6	5.4	5.2
Total maintenance	**34.9**	**36.7**	**41,4**	**40**
Replacement	9.7	9.9	7.7	11,2
New development	11.4	12.6	9.5	18,4
Total development	**21.1**	**22.5**	**17.1**	**29.6**
Technical operation	23.7	23.8	23	NA
User support	20.1	17.1	18.6	NA
Total other	**44.0**	**40.8**	**41.6**	**30.4**

34.9% of the total work among the responding organizations is maintenance activities, and 21.1% is development activities. When disregarding other work than development and maintenance of application systems, the percentages are as follows: maintenance activities: 65.7%, development activities: 34.3%. This is at the same level as in 2003. 63% of development and maintenance work was application portfolio upkeep, and 37% was application portfolio evolution. This is almost the same as in 2003 and 1998, which in turn was significantly different from the situation in 1993 where application portfolio upkeep- and application portfolio evolution respectively amounted to 44% and 56% of the work.

Fig. 1 summarizes the results from our investigations where we look upon the complete portfolio of the responding organizations. Most interesting for comparison with other surveys is looking at corrective, adaptive, and perfective maintenance, which appears to be much more stable than the numbers reported from others above. We do note though that the enhancive maintenance part of perfective maintenance appears to be declining.

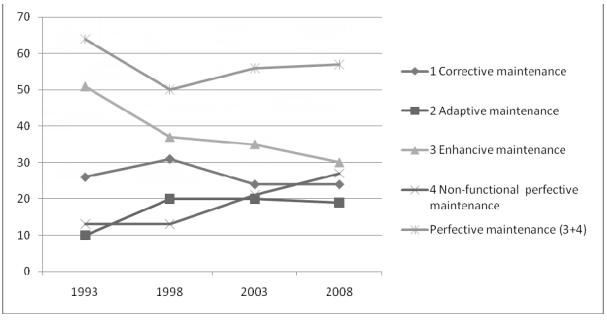

Fig. 1. Comparisons of distribution on maintenance tasks, percentage

Further comparisons of descriptive results between different studies are presented in Fig. 2. In Fig. 3 we track the development when disregarding other work, both looking at maintenance and development in the traditional way, and on application portfolio upkeep and evolution

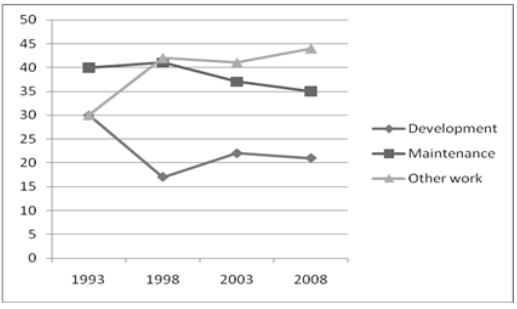

Fig. 2. Comparisons of maintenance figures across investigations, percentage

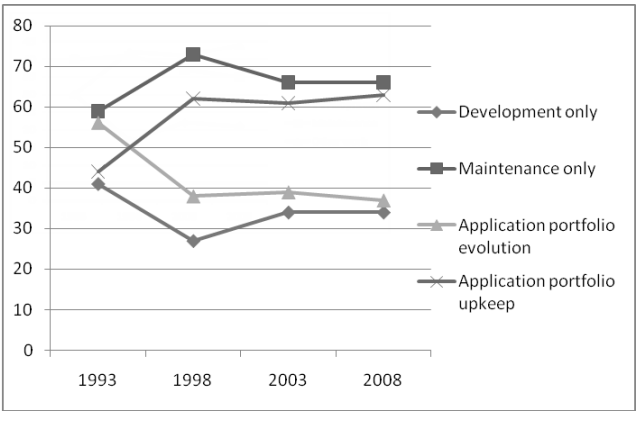

Fig. 3. Comparisons of maintenance figures disregarding other work, percentage

In the light of this stability of figures, we have divided the population to test H1-H5 comparing private and public organizations. Before looking for significant relationships, the variables used in the comparisons were tested for normality. A number of variables cannot be investigated as if they where normally distributed. On some variables we could use the assumption of normal distribution, using t-tests. For the others we have used non-parametric tests as described in section 3.

We tested H1-H5 by comparing the numbers from private and public sector as summarized in Table 2. We list the number of cases, the mean and the standard deviation for all relevant figures to test the eight hypotheses (for H1, there are four test, for the difference in corrective, adaptive, perfective and enhancive maintenance respectively). Δ is the absolute difference in the mean between private and public sector, and p is the probability for erroneously rejecting the equality of means. None of H1 to H5 are rejected. On the other hand, we do see a slight tendency of worse practice in public sector, i.e. more resources used on application portfolio upkeep, and more resources used for other tasks than development and maintenance, but again, these differences are not statistically significant. Especially taking into account the pattern of outsourcing reported above, there seems to be small overall differences in these regards.

Table 2. Test of hypothesis

	Sector	N	Mean	SD	Δ	P
Corrective maintenance, percentage of all work (vs. H1a)	Private Public	44 19	23.6 24.4	15.5 19.9	-0.8	.314
Adaptive maintenance, percentage of all work (vs. H1b)	Private Public	44 19	17.5 22.8	13.5 15.0	-5,3	.163
Perfective maintenance, percentage of all work (vs. H1c)	Private Public	44 19	58.9 52.8	21.1 16.2	6.1	.163
Enhancive maintenance, percentage of all work (vs. H1d)	Private Public	41 18	31,5 26,0	18,5 20.9	5,5	.319
Maintenance, percentage of all work (vs. H2)	Private Public	44 19	37.2 29.8	17.4 17.5	7.4	.130
Development, percentage of all work (vs. H3)	Private Public	44 19	21.9 19.4	16.3 17.1	2.5	.519
Maintenance, disregarding other work (vs. H4)	Private Public	43 18	64.9 67.8	22.2 20.0	-2.9	.621
Application portfolio upkeep (vs. H5)	Private Public	43 18	61.4 66.4	20.8 21.6	-5.0	.411

5 Discussion and Conclusion

Overall percentage of time used for evolving systems in production compared to time used for development is remarkably stable over time, and also relatively equal across private and public sector. The small differences found are not statistically significant. The same applies to the rate of replacement, only here it might appear that public sector is better off than private sector. Since more complex infrastructures are supporting the information systems serving a larger number of in particular external users, more and more of the resources are used for other tasks such as operations and user-support, less and less time is available for providing new information systems support in organization, although it seems to have plateau on 20% of the overall time, a level reached already ten years ago in Norway (i.e. even earlier than indicated in [16]). The small differences between private and public sector is contrary to the image often painted on the poor state of public sector IT relative to the private sector. On the other hand, the efficiency of the time used for development and maintenance tasks are not captured in these investigations, i.e. the amount of new functionality provided through the development of new systems or enhancive maintenance.

The main investigation aimed at providing a longitudinal study of IT practice in general. In this light the comparison between private and public sector is an exploratory investigation. Several of our results have spurred new areas that could be interesting to follow up on in further investigations, and we have it addition to the survey performed several detailed case studies in different public sector IT-departments. To come up with more detailed empirical data on to what extent the application systems support in an organization is efficient, demands another type of investigation, surveying the whole portfolio of the individual organizations, and getting more detailed data

on the amount of the work that is looked upon as giving the end-user improved support, and how efficient this improved support was provided. This should include the views of the users of the application systems portfolio in addition to those of the IT-managers and developers. It would be hard to get such data through a survey though, thus calling for additional case studies, with the problems of generalization of results.

A long-term plan is to do a similar investigation in 2013 following up the 5 year cycle of investigations, but here also ensure a support for investigating results relative to the private/public sector dichotomy.

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Analysis of the Methodologies for Evaluation of E-Government Policies

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Abstract. Methodologies for evaluation of e-government policies do not provide enough valuable information to policy makers in conducting quality planning of e-government initiatives. Consequently, user acceptance of e-government services is below government anticipations, while the expected effects in terms of reducing costs and increasing the effectiveness of public administration are still in early stages. Paper presents an overview of existing methodologies for evaluation of e-government policies, identifies characteristics of recent evaluations and conceptualizes a theoretical framework for their comparative analysis. Analysis of more than 50 evaluation methodologies offers an insight into the current evaluation practice, enables detection of its deficiencies as well as their mitigation and could facilitate a significant contribution to more evidence-based evaluation of e-government policies.

Keywords: e-government policy, evaluation methodology, evaluation and development level, comparative analysis.

1 Introduction

Despite extensive research in the recent years [1-3] and considerable investments in the field; EU countries are investing approximately 2.2% of GDP in public sector ICT [4-6], the phenomenon of e-government remains ambiguous and still lacks a unified definition. OECD studies indicate that further e-government development is one of the most important factors of public sector rationalization, as well as faster countries' development [7-9]. E-government development so far has been marked by a large gap between supply and demand of public e-services in most countries, which can be prevailingly attributed to "politically driven" development rather than evidence-based evaluation and selection of e-government policies [10-12]. Some countries (e.g. Estonia) [13-15] have been accomplishing much better results in evaluation and implementation of e-government policies compared to several other countries with much higher investments. Past experience in the field and public finance trends evidently require the development of methodologies[1] for evaluation of e-government policies

[1] The collective term "methodologies" will be used hereinafter, denoting approaches, indicator models, measurement frameworks and similar undertakings for evaluation of e-government policies.

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 234–245, 2012.

which could enable e-government decision-makers to conduct more qualified and quantified preparation, execution and evaluation of e-government policies – be it before or after their implementation (ex-ante or ex-post).

Despite the increasing number of evaluation methodologies, the numerous aspects of their study and comparison have largely been disregarded. They are basically too diverse and lack a unified and clear theoretical framework [12], [16-17], which would allow a comparison of differences between them. The latter arise from various reasons: different (EU, UN, Brown University, EIU etc.) and heterogeneous promoters (international, national, consulting, research institutions etc.) [12], diverse environments [18-19], various rationales and contextual background as well as the number and selection of indicators [18-19]. Significant differences between evaluation methodologies are reflected within their main evaluation focus and evolving stage as well.

The paper is trying to overcome these limitations and establish the rudiments for theoretical framework which could facilitate a comparative analysis of existing methodologies in the field. Deriving from the aforementioned research objectives the paper is focusing primarily on the following interrelated research questions:

1. Overview of the existing methodologies for evaluation of e-government policies.
2. Identification and characterization of the key evaluation levels within e-government policies.
3. Analysis of existing methodologies for evaluation of e-government policies according to identified evaluation levels and development levels.

The research is based on the study of abundant literature, relatively scarce research reports available from the field, and an in-depth analysis of the methodologies which have been already implemented in practice. Paper essentially represents a review and comparative analysis of the methodologies for evaluation of e-government policies. The research was conducted within the research project aiming to determine which methodologies could be applied for evaluation of e-government policies in Slovenia.

2 Methodologies for Evaluation of E-government Policies – State of the Art

According to the subject of evaluation, methodologies could be classified in typical groups presented below.

2.1 Front-Office Maturity and Readiness

The best-known benchmark measurements in EU have been conducted by Capgemini [4-6], while the most renowned benchmarkings on the global scale have been carried out by the UN [14], [20], Accenture [21] and Brown University [22]. While focusing primarily on web site analysis (front office), all these methodologies used completely different indicators, hardly ensuring comprehensive evaluation of e-government policies on the national level [12], [16], [23]. While other important benchmark measurements converging on e-readiness and information society in general are: The

Global Information Technology Report [24], Digital economy rankings [25] and United Nations e-Government Survey [14], [20].

2.2 Effects and Impacts of E-government Policies

Ex-ante and ex-post evaluations of e-government policies are subject of numerous methodologies, among which we could highlight: MAREVA [26], eGEP [19], WiBe 4.0 [27] and Australian AGIMO [18]. MAREVA and WiBe 4.0 are dealing with ex-ante and ex-post evaluations of e-government policies on the basis of parameters such as profitability, risks, benefits to external users and civil servants, services and project necessity. eGEP and AGIMO similarly analyze costs, related risks, provision and maintenance of e-services, as well as evaluate their performance and impacts.

Implementation of e-government policies requires revision of the sourcing issues [28], careful scrutiny of the complex outsourcing implications [29], [30] and provision of indicators for objective evaluation of outsourcing process [31].

Given the complex effects of e-government policies on public sector organizations, research is engaged in analysis of joined-up e-government model [32], organizational changes in the direction of network government [33], management and external factors which affect e-government development [34], business process change, information management capacity, organizational capabilities and culture [28], [35], [36].

2.3 National-Level Development

National-level development is partially discussed in United Nations e-Government Survey [14], [20] through indicators such as e-participation, e-inclusion and e-consultation. Martin and Byrne [37] focused on critical factors of information society development providing a set of indicators for evaluation of e-government such as accessibility, digital divide, human rights, social inclusion, economic sustainability and life-long learning. Economic activities on national level could significantly affect e-government development in individual country. Scarce research [11], [38], [39] is specifically emphasizing correlation between national economic indicators (GDP per capita, competitiveness, use of ICT in the private sector, innovation index and internet access) and e-government development on the national level and on the EU level [38].

2.4 Evaluation of E-government Policies – Issues and Barriers

Evaluation of e-government policies is generally difficult [5], [9], [16], [23], given the frequent lack of clarity of objectives owing to the different and often competing views held by different stakeholders. Effective evaluation requires good metrics, regular monitoring and reporting, disciplined use of robust evaluation frameworks and long-term evaluation practice largely depending on overall evaluation culture [40], [41].

3 Key Evaluation Levels within E-government Policies

Overview of evaluation methodologies revealed they are focused predominantly on service level, while there are only a few methodologies, which could be actually

applied for evaluation of e-government policies and decision-making at higher levels. Methodologies are generally partial and mostly focused on evaluating changes that occur in the "front-office" operation, while "back-office" changes caused by ICT have largely failed to gain significant attention. Existing research facilitates extraction and synthesis of the key evaluation levels (Fig. 1) which are described below. Pyramid structure of the model indicates the direction of policy-making process and assumes hierarchical relationships between individual levels.

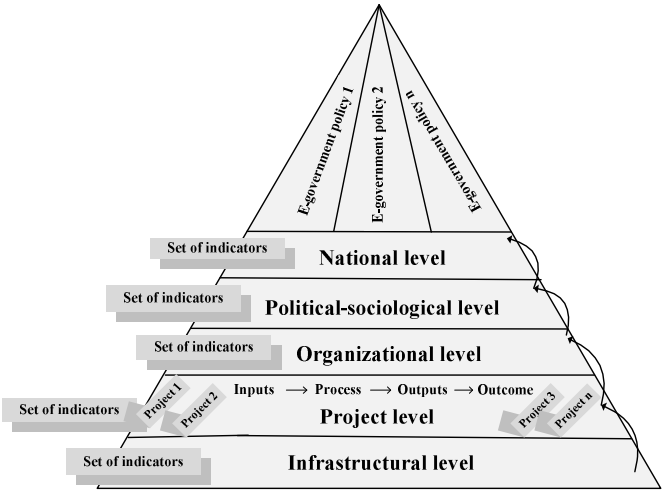

Fig. 1. Five-level model for evaluation of e-government policies

3.1 Infrastructural Level

Infrastructural level primarily refers to maturity or environmental readiness for e-government and e-commerce. Research in this area is focused either on the internal or external aspect of e-government. Internal aspect research is primarily engaged in [42-43]: development strategies, policies and action plans, legal frameworks, the existence and use of appropriate information infrastructure, training of human resources, knowledge management, financial issues, motives and obstacles for the development of e-government. Research on the external aspect of the environment maturity is particularly concerned with [42-43]: ownership, user interest and degree of e-government service usage and issues related to the general development of e-government.

3.2 Project Level

Research at project level is primarily engaged in: 1) ex-ante evaluations of projects aiming to establish priorities for further development, 2) ex-post evaluations of projects aiming to evaluate the effects of projects and 3) decisions on the insourcing and/or outsourcing of projects. Regarding the first two points, a review shows that methodologies of this type often underestimate public benefits (public value) and

hidden costs, such as costs of organizational change. Research implies significant advances in outsourcing of ICT projects. Studies [31], [44-45] often reveal the hidden costs, vendor-lock in and loss of competencies as the most problematic issues, rarely dealing with the other potential negative consequences of outsourcing [30], [46-47].

3.3 Organizational Level

Studies dealing with changes in the organizational structure are focusing on the reduction of hierarchical levels, decentralization, standardization, coordination and transformation of the existing organizational relations [32], [48-49]. Research dealing with business process reengineering is analyzing horizontal integration of functions and services, vertical integration of organizations, information exchange, changes in time and place of operation [35], [50-51]. Research exploring the changes in organizational culture is primarily dealing with: changes in the organizational philosophy and strengthening the sense of affiliation and confidence [34], [52]. Changes in human resources refer to the new skills, knowledge and specific managerial abilities [36].

3.4 Political-Sociological Level

Proliferation of ICT and development of e-government have changed the social structure and political-sociological paradigm of the social community [14], [53]. Complex political-sociological effects of ICT and e-government have a significant impact on the social environment; they are affecting old and creating new forms of work and changing perception of the world and social relations [54-57]. Accordingly, existing methodologies are converging on the following aspects of e-government evaluation: accessibility [7], [20], [52], citizens' trust and confidence [21], [58-59], digital divide [7], [40], [24], [53], social stratification and cohesion, human rights and democratic participation [8], [15], [37], openness, transparency and corruption [6], [14], [20].

3.5 National Level

Research reveals that economic activities on the national level significantly affect e-government development, exposing GDP per capita as the most influential economic indicator [38-39]. Sing et al. [39] assume that GDP plays a crucial role in the development of e-government via three influential factors (technological infrastructure, human capital and management index). Other prospective indicators occasionally overlapping with political-sociological indicators are [60-61]: competitiveness, use of ICT in the private sector, innovation index [38], education and urbanization [11].

4 Analysis of Existing Methodologies for Evaluation of E-government Policies

The review of existing methodologies was conducted in the second half of 2011. During that time the research team scanned journals and conference proceedings, books,

reports of international organizations and other institutions, policy papers, development strategies and other related documents containing e-government related research. Focusing particularly on measurement, assessment and evaluation of e-government policies and their effects we identified more than 50 relevant references. The frequency of references is becoming much higher in the second half of the last decade, proving the field is evolving rapidly and attracting more interest. Taking into account development level of evaluation methodologies, we have identified basically three types of references: 1) purely theoretical papers aiming to develop some kind of conceptual framework for evaluation of e-government policies, 2) research efforts developed up to the degree of pilot application and 3) methodologies developed in the practice for the practice (practical application). Further on, evaluation methodologies have been classified according to the identified evaluation levels, using the serial number of methodologies from the list of references (Fig. 2).

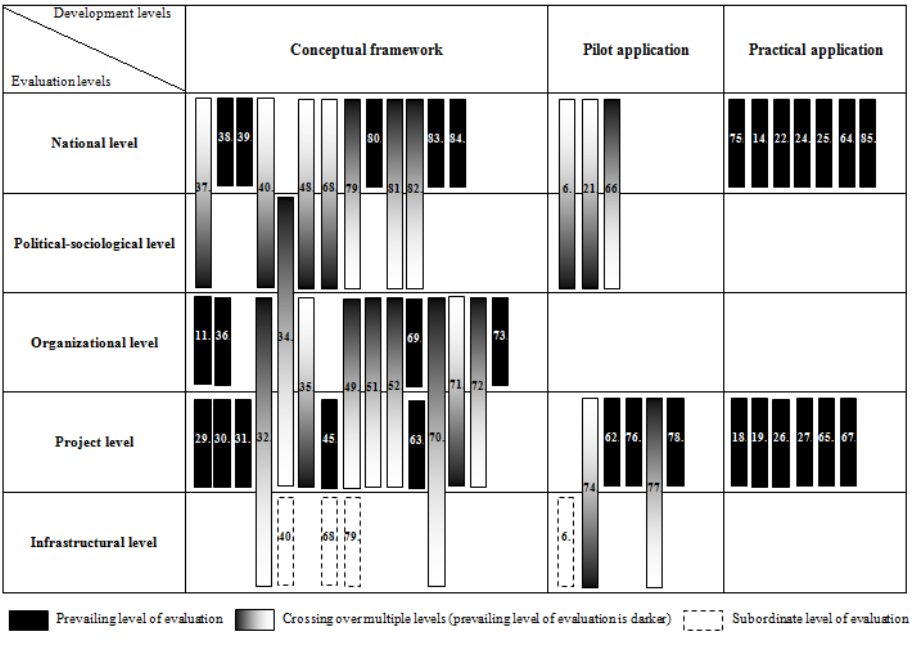

Fig. 2. Classification of methodologies according to the evaluation levels and development levels

Analysing the diverse variety of evaluation methodologies identified in this area, certain general characteristics were identified and summarised below:

- Majority of the identified methodologies for evaluation of e-government policies are presented in scholarly papers and books.
- Small number of methodologies is appearing in the form of specific handbooks, some of which include a tool for evaluation of e-government policies, for example WiBe 4.0 or VAST (software packages, Excel spreadsheets etc.).

- Certain methodologies are rather abstract containing speculatively selected indicators often encompassing non evidence-based theoretical platforms, while their utilization does not facilitate the acquirement of quantifiable evaluation results.
- Methodologies are to a large extent narrowly focused assessing predominantly one of the evaluation levels presented in the five-level model.
- Mature methodologies are consisted of a large number of indicators, normally aligned for evaluation of e-government policies in the originating countries.
- Methodologies generally do not provide a comprehensive evaluation of complex e-government policies impacts and their potential long-term public benefits.
- Various groups of indicators evaluating the itemized evaluation levels are appearing in dozens of different methodologies, including a large number of overlapping. Definitions of indicators vary widely, while evaluations are based on completely different methodological platforms, their results are very difficult to compare.

Particular features of methodologies evaluating individual levels are outlined hereinafter:

- Methodologies evaluating infrastructural level are mainly focused on ICT infrastructure and interoperability, human resources, legal framework and standards, policies and strategies, horizontal building blocks and other, often technical aspects. While generally focusing on only some of the itemized aspects (evaluation of particular technical aspects is very complex, e.g. interoperability) and allowing only a narrow insight into the context of e-government, they fail to provide a credible picture of the overall state of e-government.
- Methodologies evaluating project level are generally very exhaustive in terms of the large number of indicators; however they rarely address the concept of public benefits comprehensively, while the vast amount of data needed for applied indicators considerably complicates their utilization and transfer to other environments.
- Methodologies evaluating organizational level often address various organizational dimensions at least indirectly; failing to provide a full insight into the matter, consensus and clear rationalization of e-government induced organizational changes.
- Methodologies evaluating political-sociological level are mostly partial, focusing usually on policy aspect, accessibility and digital divide. Other methodologies in the area addressing particularly social aspect contain general and intangible indicators, since the concepts such as trust, confidence, social cohesion, social relations etc. are difficult to define unequivocally, while their understanding differs according to the cultural and institutional environment.
- Methodologies evaluating national level mainly explore the national-economic categories and their relations with the various aspects of development and implementation of e-government. They hardly formulate a clear research framework, while interdependence, direction and way of influence between economic indicators and e-government are not sufficiently explored and adequately elaborated.

After general systemization of identified methodologies (Fig. 2), we focused more closely on methodologies which have already achieved practical implementation. Based on these criteria we analysed 13 methodologies [14], [18], [19], [22], [24],

[25], [26], [27], [64], [65], [67], [75], [85] which have been enumerated in category "Practical application" (Fig. 2). Analysis revealed substantial limitations and deficiencies. Although they have achieved a high level of maturity, and are used for evaluation of e-government policies in practice, they fail to address the evaluation of e-government policies in an all-encompassing manner. Most of the outlined methodologies are focused on only one level within the presented five-level model, preventing the comprehensive and quality evaluation of e-government policies.

Development of a comprehensive and practically applicable methodology for evaluation of e-government policies is obviously a difficult task. This is demonstrated in Fig. 2, confirming that methodologies which have tried to cover several evaluation levels are developed only up to conceptual framework or maximum pilot application. The latter shows that covering larger number of evaluation levels usually means a lower development level and consequently reduces the potential of methodologies for their practical application. This is not unexpected, since the focus on several evaluation levels means more complex methodology structure and a larger number of indicators, which exacerbates the transparency and complicates the use of methodology.

Research results indicate that achievement of the highest development level and practical application of methodologies for evaluation of e-government policies is largely dependent on the number of evaluation levels the methodology is focused on, and vice versa, meaning that the comprehensiveness of evaluation methodologies is to a large extent conversely related to their development level.

5 Conclusion and Future Work

Growing number of evaluation methodologies and their substantial diversity regarding the evaluation focus and level of maturity significantly complicate the establishment of a theoretical framework that would allow a wide-ranging comparison and analysis of the differences between methodologies. Numerous difficulties were encountered trying to delineate the evaluation levels covered by particular methodology, since the contained indicators are not clearly defined, enabling their speculative use on different evaluation levels. Various dilemmas emerged in determining which evaluation methodology achieved higher development level, as well. Although, the development level of methodologies was defined primarily on the criterion of their use in practice, objective definition of development level raises some very important questions of principle. These issues should be properly resolved in further research and succeeding experiments trying to establish a balanced theoretical framework for comparative analysis of evaluation methodologies.

Despite aforementioned limitations, conducted analysis provides a valuable insight into the current e-government evaluation practice and facilitates exposure of inadequately evaluated areas in the domain of e-government policies. The analysis results represent an advance in research of evaluation metrics and may eventually provide a solid platform for establishment of comprehensive methodology for evaluation of e-government policies and consequently initiate more user oriented, cost effective and performance-based development of e-government. Evidently, the problems in the

development of e-government are strongly interrelated with the low quality and underdeveloped methodologies for evaluation of e-government policies and their effects. Extensive research and existing methodologies reveal that the past development of e-government, and particularly e-services was based primarily on political preferences and only exceptionally on professionally verifiable and measurable impacts of these services. Addressed shortcomings will have to be resolved, in order to ensure quality evaluation and implementation of e-government policies and ultimately accelerate the development of appropriate e-services with added value for all stakeholders.

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Assessing Effects of eGovernment Initiatives Based on a Public Value Framework

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Abstract. Assessing effects of eGovernment initiatives is considered an important but challenging endeavor. Assessments are, among other things, important to justify e-government investments. They are challenging because they are complex, often based on locally defined indicators, many times over-emphasizing financial effects, imprecise, faced with a number of contingencies and very seldom validated. Consequently, effect assessments can be seen as imprecise and difficult to compare across different initiatives. This paper addresses some of the challenges by attempting to assess effects based on a public value framework through an action design study with a Norwegian government agency. Based on our findings, we suggest 5 design principles for adapting and using performance indicators for assessing effects from eGovernment initiatives.

Keywords: e-government, performance indicators, public value, interpretive evaluation of IS, eGEP measurement framework, action design research.

1 Introduction

In spite of the massive focus on technology fuelled public sector reforms, accurate documentation of effects is scarce [1, 2]. This is problematic, as further investments need justification to in order for new technology to be developed and implemented. Further, eGovernment investments are often justified based on locally defined indicators that make aggregation of effects almost impossible as effects are likely to be inconsistent and too diverse to compare. Hence, there is a need for a shared effect model allowing different organizations and projects to adopt the same indicators and thereby facilitate development of comparable data.

Challenges of assessing and measuring effects of IT/IS is well documented in the general IS literature [3-5]. Consequently, traditional or analytical evaluations of these effects have focused on summative financial descriptions based on conventional accountancy frameworks [6-8]. Measurement techniques in this approach often include Return on Investment, Internal Rate of Return, Net Present Value and Payback. These traditional evaluation techniques tend to focus rather narrowly on monetary effects and profit. The focus on profitability in existing methods makes direct transfer across sectors problematic and resulting in a need for custom models for the public sector [8].

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 246–259, 2012.

The public sector is characterized by a more complex value structure than the private sector [9, 10]. Where private sector organizations are primarily occupied with ensuring and increasing profitability, public sector organizations need to balance their focus between e.g. transparency and accountability, equal treatment of all service recipients, promoting democratic participation – all in a cost efficient and legal manner.

These fundamental differences between the sectors have spurred initiatives to establish public and even eGovernment effect models that can be used both in planning (justification) and evaluation of eGovernment investments. Examples of such models are the eGovernment Economics Project (eGep) measurement framework [11] and to some extent OECD´s model for core data for public efficiency [12]. Of these, eGep appears to be the most comprehensive with 92 performance indicators organized in three high-level value categories. However, eGep has received little validation and it´s practical applicability is therefore uncertain.

This paper reports from an effort to apply eGep in a practical eGovernment setting. Our research objective has been to gain experience with readily available public value based indicator set(s) in practical use.

The remainder of the paper is organized as follows. First we present the eGep model and discuss the model in relation to public value and recent developments in the IS evaluation literature. Then we present Action Design Research and show how we used this approach to support our research objective. Finally, we present and discuss results and draw conclusions and implications.

2 Background

Our normative stance is that eGovernment effect measures should be aligned with the ideals of public value as discussed in the public administration literature. In this section we briefly present the theoretical ideals of public value, and discuss how the eGep measurement framework encompasses key elements of public value.

2.1 Public Value

Public value has been subject for many scholarly articles over many years. Public value discussions originate from the public administration literature [13, 14], but are starting appear also within the eGovernment community [15]. A recent study summarizes the discussions from both public administration and eGovernment fields and proposes that public value can be understood in the form of four value drivers; administrative efficiency, service improvement, citizen engagement and foundational values [16].

According to Rose and Persson [16], administrative efficiency can be described as positive cost benefit and can be expressed by three E values; efficiency, effectiveness and economy. Service improvement represents customer orientation in various forms, e.g. cost savings for citizens, better access to information and shorter response times. Citizen engagement is in part a democratic value as it promotes issues such as

participatory policymaking and dialogue, but extends the democratic value to also include issues such citizen participation in the design and use of services. The foundational value represents traditional bureaucratic values such as rule of law, transparency, accountability, objectivity that would translate into digital infrastructure issues in the context of eGovernment.

2.2 eGep

The eGep measurement framework was presented in 2006 to assess the impact of eGovernment services [11]. The framework is heavily influenced by five existing national methodologies (e.g. the UK business case model and the Danish signpost-methodology) and considered to be sufficiently general to fit governments across Europe.

The measurement framework is organized around three high level value drivers as shown in Fig. 1.

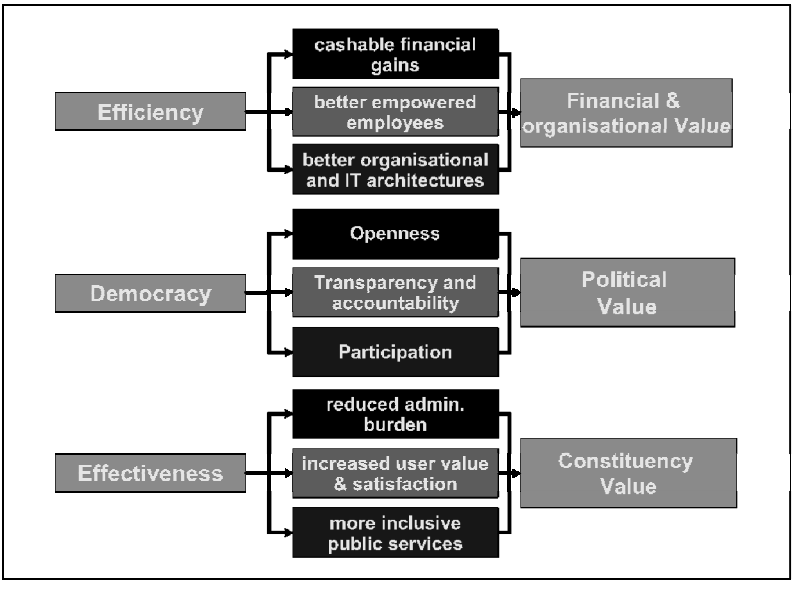

Fig. 1. eGep Measurement framework analytical model [11] p. 15

At this level of conceptualization we find the framework to have obvious similarities with public value as discussed by Rose and Persson [16]. Efficiency (eGep) corresponds to administrative efficiency [16], Democracy (eGep) corresponds to citizen engagement (Rose and Persson) and Effectiveness (eGep) translates to Service improvement (Rose and Persson). The values of Rose and Persson´s fourth category, foundational values, are distributed over the democracy and effectiveness categories in eGep. We therefore find eGep to be consistent with a theoretical understanding of public value and consider eGep a public value framework.

3 Action Design Research Method

Our study was carried out as an Action Design Research (ADR) effort [17] as this approach is consistent with our ambition of influencing practice directly by trying out a public value based indicator set in a practical setting. ADR consists of four stages with seven principles (Fig. 2) that have guided our research and framed our discussion later. This participatory design research incorporates intervention through instantiations of a design artifact into organizational contexts. The information technology artifact in ADR is viewed as an ensemble artifact. ADR emphasizes the need to integrate intervention and evaluation in the organization when building the design artifact in an iterative cycle of Building, Intervention, and Evaluation (BIE).

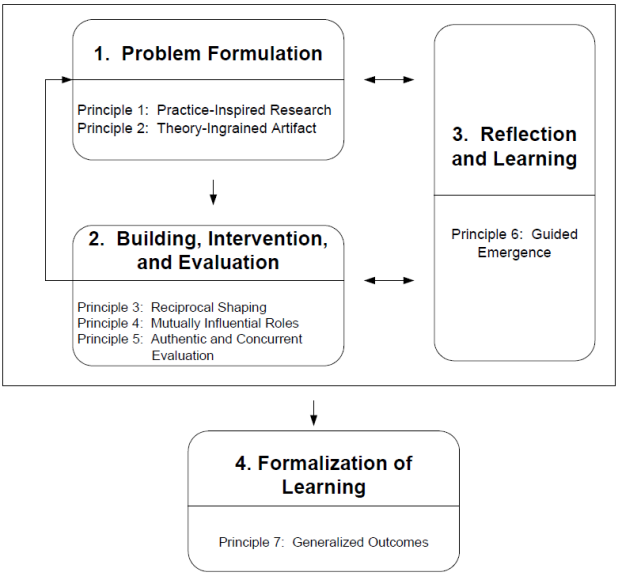

Fig. 2. ADR method: Stages and Principles [17] pp. 41

Action Design Research incorporates the guided emergence of the artifact from interventions inspired by Action Research, without separating the actions of designing and intervening in different stages [17].

3.1 A Theory-Ingrained Artifact

The measured the state of, or the estimated future state of, any aspects of an organization's value creation (e.g. processes, services, business units) can be described by performance indicators. Our empirical research is centered on an ensemble artifact of performance indicators (content), description of the eGovernment initiative (context), and their use in the assessment (process) of effects from eGovernment initiative [18].

eGovernment indicator sets are viewed as ensemble design artifacts incorporating material and organizational features [17, 19]. They are not required to be purely technology-based designs, but can have organizational intervention as the source of innovation where performance indicators and their influence on public organizations, policies and work practices are viewed as an ensemble design artifact [17, 20-22].Following the principles of ADR we emphasize the importance of practice-ingrained research for the research's relevance to practice, and also the ingraining of theory in the artifact which is the basis for distinguishing ADR from traditional design efforts. Our research is motivated by the expressed need from practitioners to measure the effects of eGovernment initiatives. We argue that the eGep measurement framework can be seen as a theory ingrained artifact as it is seen as consistent with the public value framework proposed by Rose and Persson [16].

3.2 Organizational Dominant BIE

The nature of the ensemble artifact, and need to instantiate the artifact in the context of the problem domain, lead us to choose an organizational dominant (Fig. 3) iterative process of BIE, where the primary source of innovation is the organizational intervention (Sein et al. 2011).

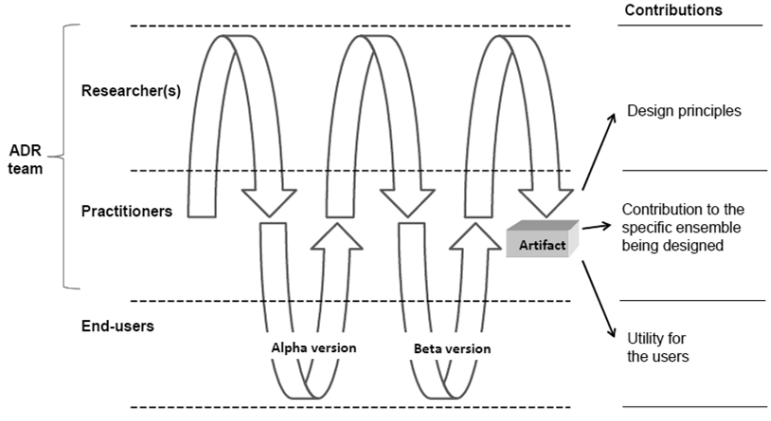

Fig. 3. The Generic Schema for Organization-Dominant BIE [17] pp. 43

Eventual problems are addressed by the iterative instantiations of different versions of the artifact. Generalized outcomes from the evaluation and reflection from the BIE iterations are formed from casting the problems in this specific context into a class of problems, and the specific solutions into a class of solutions. Yet, the main goal of the design effort is to formulate design principles from the specific solutions in this context. Design principles are statements reflecting the knowledge gained from the process of building these solutions, or other instances belonging to this class of solutions [17].

4 ADR Case

Different digital solutions for receiving written correspondence from citizens and businesses have existed for several years, and some public organizations have also developed solutions for digital replies. The Norwegian government wanted to evaluate whether or not a shared digital solution supporting such to-way communication would be more socio-economically sound.

The Agency for Public Management and eGovernment (Difi) was in 2010 tasked by the Ministry of Government Administration, Reform and Church Affairs (FAD) to provide a business case comparing different alternatives for two-way digital communication between public organizations and citizens/businesses. The next section describes the case as it unfolded from 2010-2011 based on the ADR stages (Fig. 2).

5 ADR Stages – Assessing Effects of Public Digital communication

This ADR effort followed the stages with related principles outlined by the ADR method, that capture the underlying assumptions, beliefs, and values that have guided our research.

5.1 Stage 1 Problem Formulation

Difi wanted a methodical approach, including recommended performance indicators, to find and estimate the socio-economic effects of different alternatives for public digital communication. Research Council Norway has funded a project on the use of technology supporting interoperability in the public sector called Semicolon. One result from this project was a method for eGovernment socio-economic analyses including an adaptation of the eGep measurement framework to fit a Norwegian context, such as the Norwegian quality assurance approach [23] and general method for socio-economic analyses [24, 25]. This paper focuses on this performance indicator set and its use in this case as the original version of the ensemble design artifact.

Table 1. ADR team members and end-users, roles and activities

ADR team members and end-users	Roles	Activities
Two practitioners from Difi	Represent the project owners	choose participating public organizations, lead problem definition workshops, assess performance indicator sets
One supporting staff member from the project Semicolon	Communication, support and reporting	organize and attend problem definition workshops, coordinate and contribute to efforts in the ADR team, report status and results
Two researchers from the University of Agder	Design and redesign of performance indicators	attend problem formulation workshops, design and redesign performance indicators, pilot evaluation and implement questionnaire
10 end-user public organizations	Use performance indicator sets	provide input in problem formulation workshops, participate in pilot evaluation and questionnaire

Researchers and practitioners in this project were asked by Difi to use this adapted method and performance indicator set in a combined effort to create the necessary decision support documents requested by the ministry. An ADR team was formed (Table 1) consisting of two practitioners from Difi together with one supporting staff member from Semicolon, in addition to the authors.

The goal of the first stage was to determine the needs and possibilities regarding communication between public organizations and citizens/businesses. This was performed through a small set of survey questions to citizens and ten workshops covering eight state level agencies and two municipalities. One result from this investigation was the initial definition of three alternatives for public digital communications:

1. Message Hub: the government developing a new shared infrastructure
2. Private service: outsourcing similar functionality to private service providers
3. Status Quo: leave agencies and municipalities to develop their own solutions

This investigation into the needs and possibilities for public digital communications also identified benefits that the public organizations, and to some extent citizens and businesses wanted to see. The ADR team decided to use insights from the investigation to evaluate the performance indicators in the original Semicolon set.

The original Semicolon performance indicator set was based on a sub-set of the 92 indicators described in the eGep measurement framework. This adaptation of the eGep performance indicator set into 39 indicators still covered all three value drivers of the effect model and thus also still consistent with the public value framework proposed by Rose and Persson [16].

5.2 Stage 2 Building, Intervention, and Evaluation

Based on the evaluation of the findings in the Problem Formulation stage the ADR team chose to refine the original performance indicator set. The starting point of this stage was the original version 1 of the Semicolon performance indicator set, which was developed instantiated and evaluated in two iterations, resulting in an Alpha and a Beta version of the artifact (see Fig. 4).

1. Iteration: Alpha Version. The first BIE iteration started with the researchers in the ADR team evaluating the performance indicators compared to the eGovernment initiative, and the team's understanding of the context from the problem formulation stage. Some changes were suggested based on the indicators relevance to the eGovernment initiative in the case, such as very specific indicators (e.g. indicators narrowly focused on chemical wastes). Five indicators were removed and five indicators had changes made to their description/definition. Difi provided an additional list over indicators compiled based on their earlier experience. The ADR team compared and in part accommodated this list with the coverage of performance indicators in the artifact.

At the same time the ADR team supported Difi's work on detailing the alternatives for public digital communication, so that the end-users could relate better to the implications of the different alternatives. These activities helped the team to create a shared understanding of the different possible types of effects from the alternatives. The resulting Alpha version of the artifact, now with 35 performance indicators, needed to be instantiated with end-users to enhance the formative evaluation of the artifact. Consequently, a pilot in one municipality was carried out.

Difi provided a document describing the details in the three alternatives for public digital communication based on the input from the investigation in the Problem Formulation stage and inputs from the ADR team. This was sent together with the Alpha version of the performance indicator set in the format of a table in a spreadsheet and instructions on creating estimates for each indicator to one municipality.

This first instantiation of the Alpha version of the artifact (Fig. 4) was observed and transcribed by the ADR team. Three public communication professionals (ICT consultant, head of archives and vice-chief administrative officer) used a half-day workshop to discuss and attempt to create estimates in light of the three alternatives presented in the documents. This instantiation showed issues regarding unclear descriptions of the indicators, and issues concerning the amount of effort needed to create estimates even when only estimating a few service areas of the municipality. Both the number of indicators and the complexity of estimating effects were contributing to the end-users frustration. Even simple impacts of the alternatives for digital public communication on the daily mail handling routines led the participants to do simplified process analyses with a number of assumptions that were not covered by the detailed alternatives (e.g. security issues and non-repudiation). The end-users wanted more details on the changes that their organization would experience. "*This is an aspect where the proposed alternatives have been simplified. This is unacceptable for us! We need to know how they expect us to solve this little part of the system*." – ICT consultant commented on integration with the local case handling system

The ADR team discussed the feedback from the end-users, which addressed these main points:

- Too many indicators
- Unclear descriptions of indicators
- Confusing table format and content in the description of the alternatives

The ADR team decided to refine the performance indicator set based on the evaluation during this first instantiation. The experiences from the pilot lead to a reassessment of the structure of the artifact, such as the scope of effects, the number of indicators, descriptions of indicators, and the existing table-based presentation format.

2. Iteration: Beta Version. Due to the complexity of the proposed alternatives for two-way public digital communication, the scope of the estimates was reduced to encompass only out-going messages from public organizations to citizens and

businesses. The number of indicators was reduced to 13 indicators for expected effects for the public organizations and an additional 17 indicators for expected external effects for citizens and businesses. For this first large scale instantiation of the indicator sett, one indicator was obligatory and required an estimate. This main indicator was the number of out-going messages the agencies had today, and which communication channels were used for these messages.

This clear-cut and scoped selection of indicators had an emphasis on more easily measurable quantitative indicators was intended to provide an indication of possible effects from a digitalized channel of communication without encountering many of the issues experienced in the pilot. These changes were done to the Alpha version of the performance indicator set which was transferred from a table format to an online questionnaire format, resulting in a new Beta version of the artifact.

The Beta version was instantiated through a questionnaire sent to the contacts provided by Difi (e.g. CIOs and department heads for communication) for 14 public organizations including the original participating organizations from the problem formulation stage. The ADR team received full feedback from seven state agencies and supplemental feedback (e.g. number of out-going messages) from one agency.

Earlier estimates of the yearly number of out-going messages have been suggested to be 47 million in total [26]. Results from the questionnaire showed that there are over 70 million out-going messages sent by ordinary mail every year (not including e-mail or other channels) just from these eight respondents. The state level agencies in Norway number about 800 agencies in all [27].

The respondents were asked to evaluate the cost of each out-going message compared to the government's average estimates of 2.7 EUR per ordinary postage and 0.4 EUR per electronic transfer [28]. Results from the questionnaire showed a mixed evaluation for the cost of ordinary postage, depending on the degree of process automation or outsourcing of handling and arrangements for postage. An estimate using the average numbers as-is indicates a saving in cost of 2.3 EUR per digitized out-going message. This shows a potential of over 160 million EUR a year when considering only the volume from the eight agencies. It is easy to assume that the total cost saving potential on the state level alone, with its 800 agencies, would be much higher.

Each respondent was also contacted by phone and was questioned about the process of creating estimates and their initial evaluation of the performance indicators. Half of the respondents reported that they had trouble providing estimates for the main indicator: number of out-going messages per year. This surprised the team as it was considered a tangible quantitative indicator. One main issue reported was the need to involve several people from different sub-departments, including archives, to get an overview over the different types of out-going messages and estimates for each type.

These results, and our experience with the use of the performance indicator set were reported to Difi for their use in the decision support documents to be sent to the ministry as the exit criteria of the BIE iterations. The scope of effects estimated with the performance indicator set was not comprehensible enough for Difi's goal of a socio-economic analysis of the three approaches to digital communication. They did

not reach the objective of establishing necessary information for the ministry to reach a decision.

5.3 Stage 3 Reflection and Learning

The ADR team's initial understanding of the context from the Problem Formulation stage and the evaluation of the iterations in the BIE stage followed a concurrent stage of Reflection and learning. The researchers in the team had an initial understanding of the performance indicator set as it related to the eGep framework. From the Problem Formulation stage we cast Difis problem with assessing different approaches to digital communication as an instance of assessing effects of eGovernment initiatives as a class of problems. The adaptation and use of the original Semicolon performance indicator sett based on eGep was a solution to the specific problem Difi was facing, cast as an instance of performance indicator sets for eGovernment effects as a class of solutions.

Inputs from practitioners for the Alpha version, such as the Difi list of indicators, were compared to the same eGep framework adjusting the indicator set to the context. The end-users in one municipality used the indicators and provided their perspectives on the artifact. This early evaluation of the Alpha version in the 1st iteration showed the ADR team the importance of a shared understanding of the performance indicators and the context in which these were to be applied.

This formative evaluation led to a major revision for the Beta version, including reducing the number of indicators in total, and requiring only an estimate for one main indicator (the number of out-going messages). Outcomes of this more summative evaluation showed that even an estimate for a tangible quantitative performance indicator required enough coordination efforts and time resulting in several agencies to opt out of contributing to the business case. Together with goals and scope changes in the assessment process changing over time, the resulting report was not enough to ensure a decision in the ministry.

5.4 Stage 4 Formalization of Learning

Reflection on the design efforts in the case uncovered several problems for this specific assessment of approaches to digital communication, which in turn can be related to the assessing the effects of eGovernment initiatives as a class of problems:

- Performance indicators had very general and unfamiliar definitions, which led to a difficulty in application of the indicators.
- The description of the suggested eGovernment initiative was lacking important details that lead to uncertain assumptions in the assessment.
- Performance indicators and the description of the eGovernment initiative were developed apart, and were not viewed as a whole until end-users were to assess the approaches.
- The assessment goals and scope changed over time and were not clearly communicated up-front, contributing to insufficiencies in the resulting decision documents.

- End-users and managers did not have a shared understanding of the indicators, change context, and assessment process, leading to misunderstandings.

Our learning from experiencing these problems and trying to solve them using a performance indicator set can be related to performance indicator sets for eGovernment effects as a class of solutions. We have described this learning in the form of proposed design principles (Table 2) which are prescriptive statements for building this or other instances of the class of solutions [17].

Table 2. Design Principles

Design Principle	Description
Simplicity	Performance indicators should have easily understandable definitions, and should be simple to apply to avoid costs for end-users assessing effects. Contextualized definitions of performance indicators and simple instructions on how to apply it's measure can reduce misunderstandings and the level of special competence needed.
Precision	e-Government initiatives should be described precisely to avoid costs for end-users assessing effects. Precise details in the description of system changes can reduce the need for ad-hoc assumptions and time consuming process analyses.
Pragmatism	Precision in change descriptions and simplicity in definitions and application of performance indicators should be balanced as a pragmatic whole to avoid costs for end-users assessing effects. Viewing of the description of an e-government initiative and the performance indicators that describe its effects as an ensemble can help to create a pragmatic balance when developing and using a performance indicator set.
Realism	Scope and goals for assessing e-government initiatives should be realistic and clearly stated up-front to increase the likelihood of complete and useful decision support. e-Government initiatives can affect a wide range of values and management can assist the process of assessment by stating which values are strategically important and why.
Shared Understanding	Assessors of the e-government effects and managers should have a shared understanding of performance indicators, ICT and organizational change, and the scope of the assessment. Create a shared understanding of the assessment up-front by having stakeholders describe assessment indicators, context, process and goals in their own words.

An overview of the BIE stage including start and exit criteria, summarizes the participatory design efforts and contributions of this case (Fig. 4). The contributions reflect learning from successes and mistakes of developing, instantiating and evaluating the ensemble artifact of performance indicators as content, change context description, and the assessment process including application of indicators and the use of the resulting measures [18].

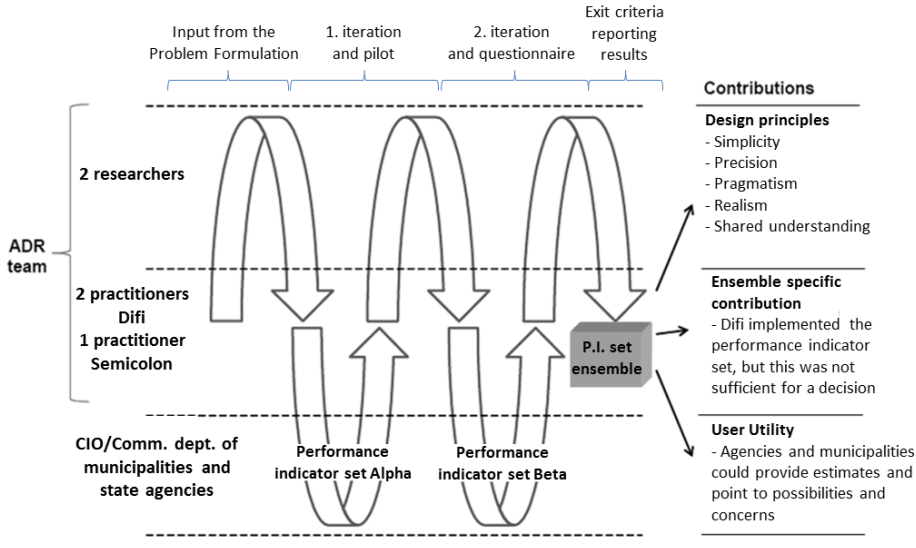

Fig. 4. Organization-Dominant BIE in the Difi case (based on [17] pp. 43)

6 Conclusion

This paper has provided experiences from a Norwegian effort to use readily available performance indicator set(s) in a practical setting. Results from this effort uncovered several issues when applying a standardized set of performance indicators on very diverse public services. Based on our active involvement as part of an ADR team we formulated five design principles that can guide future design and instantiations of similar artifacts namely *Simplicity, Precision, Pragmatism, Realism* and *Shared understanding*. Further research can refine the proposed design principles or add additional principles based on the assessment of effects from eGovernment initiatives as the class of problems and performance indicator sets as the class of solutions.

Principles from the recently proposed ADR method guided our design and assessment of the indicator set together with practitioners from Difi and the validation through instantiations by public organizations in Norway. We found the method very useful for providing researchers and practitioners with the required structure to collaborate on practical problem solving and suggest that the method has a strong potential in a practical and interdisciplinary field such as eGovernment.

Acknowledgements. This research was part of the Semicolon II Project supported by Research Council of Norway.

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Citizens' Attitudes towards Electronic Identification in a Public E-Service Context – An Essential Perspective in the eID Development Process

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Abstract. This article addresses the development of electronic identification (eID) for public e-services and reports from an empirical study of young Swedish university students' attitudes towards eID. A public e-service at the Swedish Board for Study Support which demanded secure electronic identification was focused. Our findings from three focus groups show that usability and security are two main themes that the respondents found to be important in order to trust eID and e-services. This example of how citizens' attitudes towards eID can be explored in focus groups is related to an on-going national development process of a new eID solution on a strategic and artifact level. In this process no citizens are participating or involved so far. Potential risks with neglecting citizen attitudes in such processes, in a longer perspective, are decreased usage of public e-services and lack of trust in e-government. This article shows that citizens' attitudes can serve as important additional input to the development of eID solutions that supports successful e-government.

Keywords: Electronic Identification, Citizens' Attitudes, Focus Groups, Public E-service, Trust.

1 Introduction

The use of public e-services is increasing in most countries, as an important part of e-government. More advanced, integrated public e-services are introduced, compared to early years' cataloguing e-services [22]. Complex e-services do often require secure solutions for electronic identification and signing of documents [cf. 30]. There are many on-going efforts to develop electronic IDs (eID) that are equally secure and easy to use, both on national level [35] and in international projects. The European Commission conducted a survey in 2007 indicating that a majority (28 out of 32) of the member countries use or plan to use an eID scheme [12]. Some countries have signed agreements on mutual recognition, but eID systems differ between member states and inter-operability across borders was almost non-existent at the time of the survey [ibid.]. In EU this situation has been addressed within the STORK project (Secure identity across borders linked) where a European eID inter-operability platform has been established in order to enable citizens and businesses to use their national eIDs in any participant member state for use of public e-services [ibid.].

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 260–272, 2012.

In Sweden, which is the national context of the empirical study in this article, a coordinating function responsible for the development of Sweden's future eID solution has recently been established. The commission of this e-identification board is to define technical requirements and enable government agencies' and municipalities' access to eID solutions. The goal of this effort is to provide eIDs to citizens and businesses that are easily accessible and possible to use together with all public e-services. This should also enhance competition between service providers and improve conditions for developing new methods of electronic identification and signing of documents [35].

As these examples show, there is a lot of work going on in the field of eID development and implementation. Even though the e-government area nowadays is surrounded by statements of the importance to be citizen-oriented and user-focused [e.g. 5; 18; 24; 26; 36], we do however not identify the same user centeredness when it comes to eID development. The issue's complicated matter seems to imply a focus on infrastructures, standardization, and involved governmental actors' power relations at the expense of citizens. eID's technical nature together with security and privacy issues are instead put in foreground. The ambition to reach consensus among all involved public organizations seems to be demanding enough, without analyzing citizens' attitudes as users of eID. In one sense, eID can be viewed as a technical aspect of e-services. No one choses to use an eID without a purpose; i.e. an eID is always used in conjunction with an e-service, and as such it is an important prerequisite for an e-service. On the other hand, for the common e-service users it can be difficult, and not even necessary, to separate the eID from the e-service. The link between an e-service and the eID is also an aspect not explicitly addressed in the literature. The eID in general has received relatively little attention in non-technical research [33] and is identified as an urgent research theme [17]. To put it in other words, the material dimension of the eID has, so far, received more attention than the social and organizational dimension of it [cf. 27]. The users' experience of the eID might influence their opinions of the e-service and vice versa, as well as the service provider, largely. This makes us argue that citizens' attitudes towards eID are crucial to understand, from a theoretical and practical point of view, in order to increase successful public e-service and e-government development, implementation, and use.

The purpose of this article is, thus, to highlight the importance of addressing and exploring a selected group of citizens' attitudes when developing eID solutions within a public e-service context. We report from an empirical study of young Swedish university students' attitudes towards eID when using an e-service at the Swedish Board for Study Support. Three focus groups were conducted with students who were asked to use a public e-service which demanded secure electronic identification. After having conducted the assigned tasks the students' attitudes were discussed in the focus group. By using this example we aim to show that a thorough understanding of how a certain crucial target group (in this case students who finance their university studies with national study loans) apprehends the use of electronic identification is vital in this kind of national development process.

After this introduction, the article is organized in the following way: In Section Two we describe the theoretical background of electronic identification as well as citizen participation and involvement in e-government projects, followed by the research approach and the focus group design in Section Three. In Section Four we present and analyze our empirical findings. The article is concluded in Section Five, together with some statements about further research.

2 Theoretical Background

In this section of the article we discuss core concepts from the fields of electronic identification and citizen involvement and participation in e-government projects.

2.1 Electronic Identification

When technical systems, with social and material dimensions [27], such as e-services, are developed to avoid risks and problems in society, new risks might evolve simultaneously [11]. The development of eID solutions is an example of this kind of process that deals with certain problems, but also creates new requirements of security and trust in the systems. In Sweden several governmental inquiries have questioned both the technical infrastructure and the business model that today's eID solution builds upon. The investigations point at several weaknesses; e.g. technical complexity, a complicated business and pricing model, as well as lack of transparency, flexibility, user interface standards, and a long-term perspective. Additionally, user related problems are also reported regarding acquisition, usage and updating of eIDs. It is, for example, not possible to use eIDs on public computers since the eID is connected to certificates and security applications on a certain computer. People without permanent residence in Sweden cannot easily get an eID which might be seen as a democracy problem. People who need to use eID in their professional work have to use their personal eID as all eIDs are based on a person's social security number. [34] Altogether, there is a fear that the legitimacy of safe public e-service provision might be threatened by these weaknesses. Since the agreement with the present eID solution providers soon is about to be renewed, a development process that should result in a new eID solution avoiding the above mentioned problems has been initiated.

The process is organized by the Swedish e-identification board, mentioned in the introduction. The process is on-going and has so far engaged public sector in many ways; both directly as participants in the process and as reviewers and critics of the suggested outcome. A public investigation has been conducted, a hearing has been held, and many public actors have been involved in different ways [35]. In one sense this process is very inclusive and open minded as it strives to listen to and involve as many stakeholders as possible. One group that is left outside the process is, on the other hand, the citizens.

2.2 Citizen Involvement and Participation in E-Government Projects

In an e-government context, public e-services are developed for "all citizens", thus, an inclusive ambition seems feasible [e.g. 2; 4; 31]. Understanding the needs, usage situation, requirements and challenges of future users is necessary in order to develop public e-services that will be frequently used. Governments cannot actively stimulate or even force usage in the same way as a private organization can order employees to use a certain IT system. This situation makes it even more delicate to develop public e-services. Commonly used methods for user participation, such as participating in the project group, in focus groups (as described below) or test groups, might be useful in the e-government context as well. But since such representatives for citizen groups always will be extremely marginal in relation to all possible users in a target group, we also need other methods to involve citizens [5].

In e-government policies and strategies there has often been a strong rhetorical emphasis on the citizen perspective. In many governments' national strategic action plans for their e-government agenda, citizen aspects, as a part of "customer orientation", are distinctly put forth. The ambition to ease citizens' authority contacts, provide better public services, make governmental internal work processes more efficient and ease administrative burden, and increase possibilities to participate in democratic processes (e-participation) are a few examples of intended citizen benefits to be identified in strategic governmental intentions and documents [e.g. 8; 36; 39]. At the same time, lack of citizen participation and involvement is common in many e-government projects and by several researchers explained as a reason for unsuccessful project results [e.g. 18; 29]. Citizen participation can contribute to e-services that are usable for the citizen and meet an experienced need or solve citizens' problems [15]. These e-services also have potential to be trusted and perceived as secure, as trust in technology and administration often goes hand in hand [6]. Altogether, previous studies on the importance of citizen participation [5] imply that the development process of eID should not be seen as an exception. Citizens' attitudes, thus, need to be considered when developing eID solutions as a part of public e-service use and e-government development and implementation.

3 Research Approach

The overall research design in this study is qualitative and interpretive [41] and based on three interactive focus groups. Focus groups have a long history as a data collection method in the marketing field [13]. Over the years focus groups have become an instrument in the public society to hear "the people's voice". Focus groups are also used as a data collection method by researchers, mainly in social sciences [40]. Recently, focus groups have been used as a method in critical social information systems (IS) research [37]. Morgan [25] describes focus groups as group interviews. A moderator guides the group when discussing decided issues by posing questions (in our case open ended questions together with questions oriented towards particular aspects of the eID solution) that have been formulated in advance. A focus group is always created with a specific purpose; a knowledge gap that the focus group is

supposed to fulfill. Focus groups are a feasible method to gather knowledge and enquiries from different individuals [ibid.]. Different persons possess pieces of knowledge about a certain matter and when these pieces are brought together, shared and discussed the total amount of knowledge increases. When organizing and performing a focus group it is important to be able to declare what the group is supposed to produce; the expected outcome.

The moderator who coordinates the focus group must try to facilitate that everyone participates and that no one dominates the group. The atmosphere should be friendly to encourage everybody to contribute to the discussion in order to fulfill the underlying purpose of the focus group. The moderator is not supposed to insert his or her own opinions into the discussion [20]; instead the moderator should ask generative questions to the group. Morgan [25] argues that the focus group can be either homogenous or heterogeneous. This implies that the participants can either be gathered so that they are similar or different regarding certain matters; for example, gender, age, education, and life situation. There are advantages with groups of people knowing each other as well as with groups of strangers. Individuals view issues from different perspectives and focus groups are, thus, a suitable method to use in order to understand how different views are constructed and expressed [19]. Focus groups thereby provide a profound discussion in a certain matter. This is in line with Powell and Single [28] who define a focus group as 'a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research' [p 499].

Stahl et al. [37] note that focus groups, despite the long history in many fields, still is not an often used data collection method in IS research. However, focus groups have been used in several e-government projects to gather citizens' opinions of e-services [9; 10] before and during e-service development processes [e.g. 1; 23]. Focus groups have also been characterized as a suitable and beneficial research method when conducting e-government studies [3]. In this study we follow a proposed phase model for focus groups in e-government development and implementation projects, which is further described below.

3.1 Focus Group Design and Performance

Axelsson and Melin [4] propose a phase model to guide the performance of focus groups. The phases are (1) introduction, (2) open discussion – brainstorming, (3) discussion from user scenarios or use of e-services, (4) concept based discussion, and (5) evaluation. In this study the Swedish Board for Study Support was chosen as the empirical case. The Swedish Board for Study Support is an agency which early launched public e-services that demanded secure electronic identification and was, thus, suitable for this study. The Swedish Board for Study Support's main, and crucial, target group is students who finance their studies by national study loans. Therefore we recruited in total 16 university students from a Swedish university as focus group participants. Three focus groups were arranged; one focus group with six students from mixed educational programs ("Mixed"), one focus group with six students from information systems studies ("IS"), and one focus group with four

students from culture studies ("Cultural"). By doing this we aimed for both heterogeneous and homogenous groups regarding educational background, as discussed by Morgan [25]. The focus groups also differed regarding gender, which year of university studies the student was in, and what kind of computer and certificate the student used. Both soft certificate ("Soft") (downloaded to a certain computer) and hardware based certificates ("Hard") (a smartcard with the certificate) were used, as well as PC compatible computers ("PC") and Apple Macintosh ("Mac"). Below in table 1, the focus group participants are described.

Table 1. Three Focus Groups

Focus group	Gender	Respondent	Year	Education	Certificate	Computer
Mixed	Male	M-1	5	Industrial economics	Soft	PC
	Male	M-2	1	Industrial economics	Soft	PC
	Female	M-3	1	Information systems	Soft	PC
	Female	M-4	4	MBA	Hard	Mac
	Male	M-5	2	Information systems	Hard	PC
	Male	M-6	1	Industrial economics	Soft	PC
IS	Male	IS-1	4	Information systems	Soft	Mac
	Male	IS-2	4	Information systems	Soft	PC
	Male	IS-3	4	Information systems	Soft	PC
	Male	IS-4	4	Information systems	Soft	Mac
	Male	IS-5	4	Information systems	Soft	Mac
	Female	IS-6	4	Information systems	Soft	PC
Cultural	Male	C-1	3	Cultural studies	Soft	PC
	Male	C-2	1	Cultural studies	Hard	PC
	Female	C-3	4	Cultural studies	Soft	PC
	Female	C-4	4	Cultural studies	Soft	PC

We followed the advice to let two moderators lead the focus group [4]. One of them could then be active and provide the discussion by posing questions while the other documented and observed the situation. The focus groups were initiated by the two moderators who introduced the purpose of the focus group. All participants had a client relation to the Swedish Board for Study Support; i.e. they had taken national study loans. They had also access to an eID and had previously used some e-services at the Swedish Board for Study Support's website. This implies that the participants were not totally novel e-service and eID users. After the introduction and an open discussion about the electronic identification topic, the participants were asked to use an e-service at the website (www.csn.se) to perform two tasks; 1) use their eID to login and calculate the repayment, and 2) suppose that they have forgotten their eID password and had to solve this problem. When all participants had performed these two tasks the moderators led the discussion based on open questions. The purpose of this discussion was to find out the participants' opinions about the tasks they had completed; for example, if the tasks were easy, if they encountered any problems, but also how they thought about security aspects when they used their eIDs and the

e-service. Questions were asked both about the present solution for eID and wishes for the future. The focus groups were concluded with an evaluation where the process was examined in order to find aspects that could be improved in next focus group or issues that had not been covered in the discussion.

The focus group documentation was then analyzed in an interpretative way [41] in order categorize data and identify patterns that would provide us with further understanding of young citizens' attitudes towards electronic identification. This qualitative, empirically grounded analysis resulted in two major themes of the respondents' attitudes; usability of eID and security of eID. These themes are discussed in the next section.

4 Analysis of Focus Groups Statements

In this section we discuss some inductive statements from the focus group participants in order to explore young citizens' attitudes towards their use of eID. As the analysis of the empirical data indicates two major themes; usability and security, the statements are structured according to these themes.

The focus group participants brought their own laptops (PC or Mac) to the meeting together with their soft or hardware based certificate for eID. They were asked to conduct the tasks in the web browser they usually use. Both soft and hardware based certificates have certain operative system (OS) requirements that have to be met. This implies that the user of a certain certificate has to install an approved OS and web browser version before use. Soft certificates are downloaded to the computer or to an USB memory stick. Soft certificates also require a security application on the computer, but can then be used without any other device. Hardware based certificates are placed on a smartcard which is put in a certain smartcard reader connected to the computer. The heterogeneity of today's eID solutions was illustrated in the focus groups as the above mentioned platform dependencies were present and discussed.

4.1 Usability of eID

The focus group participants were asked to solve the task to get a new password for their eID. Depending on what eID solution they use, they encountered different usability related challenges and problems. The participants did not immediately know how to solve the task, but most participants found out that they had to contact their bank as the bank is certificate provider. The common opinion was that this was unnecessarily cumbersome. Several participants argued that it was not worth the effort to get a new password instead of downloading a new certificate: *"There are so few things I use eID for, so the effort I spend on downloading the certificate and put it on a USB stick that I bring with me, does not match the need. It's easier to just download a new one next time."* [IS-3]

The students use their eID rather seldom, which makes them argue that they could accept some usability inconveniences. On the other hand, they seem to find their eID solutions usable. As one of the respondents [IS-4] said, he would not use it if it had

severe usability problems. He argued that usability is much more important than security in this case. Another respondent agreed and continued: *"If it isn't useful, I might as well choose to use paper forms and a pen instead."* [C-3]

One respondent [M-6] thought that the fact that he has to download a new certificate when he changes computer makes the portability and the usability suffer. Another respondent [M-2] assumed that this must be an even larger problem for novice Internet users, which others agreed upon: *"We are used to download things. What about elderly people who might not understand why they have to download security applications and certificates?"* [M-3]

Differences regarding how citizens of certain ages regard eID and the use of public e-services were also discussed during the focus groups. As we have only studied young and well-educated citizens (i.e. university students), most of them technology positive, this view might of course be biased. However, the respondents agreed that their generation is used to information technology and e-services, but also puts high expectations on their usability: *"We belong to the Wikipedia generation – a click and then we expect everything to be done."* [IS-1]

Altogether the focus group discussions illustrate that even though the general impression is that the present eID solutions are rather usable, there are some aspects that influence the opinions about usability of eID. The frequency of eID use is put forth as one aspect together with how familiar a person is with the Internet and e-services in general terms. These aspects seem to affect the attitude towards the use of eID. Flexibility in the usage situation is partly dependent on which kind of certificate a user has, and this is also emphasized as an important aspect of the usability impression.

4.2 Security of eID

The other theme present in the focus group discussions is security, which of course is an obvious dimension of electronic identification. One respondent said that she finds her eID to be safe, which is important for her: *"If I had not felt it was safe, I would not have used it."* [IS-6]

One of the respondents [IS-1] argued that security in present eID solutions is rather low, that is at least his impression of it. He said that since he downloads a new certificate each time he uses the eID, due to forgotten passwords, he gets the feeling that it is unsecure. Another respondent [IS-3] continued this line of thinking and said that the security level is so high that the usability suffers and that, instead, decreases security, when people act as this respondent [IS-1] does.

The focus groups with students from mixed educations and information systems studies mostly agreed that the use of eID had several advantages compared to the use of paper-based forms. The speed and the sense of security when getting a receipt immediately after signing a document were regarded as advantages compared to manual handling. In the third focus group, consisting of students in cultural studies, the opinion that traditionally signing feels more secure was instead dominating. This notion was also mentioned by a respondent in one of the other focus groups: *"I can 'feel the paper' when I'm signing a document in a traditional way, instead of using*

the Internet. I think people appreciate that feeling. That is probably the main reason for people not using e-services." [IS-4]

However, none of the three focus groups seemed seriously worried about security issues when using eID. The fact that there are no financial transactions or sensitive personal information in the tested e-service appears to be decisive. The students use eID mainly in their contacts with the Swedish Board for Study Support and the Swedish Tax Agency. These agencies' e-services do concern financial matters (loans and taxes), but the students do not apprehend the eID use as directly influencing their finances. A respondent argued that there is no really harm if: *"[…] someone would sign something in my name at the Swedish Board for Study Support."* [M-1]

This is an interesting opinion to relate to the on-going development processes of new eID solutions, as security is the main theme in these projects. An eID solution does of course have to be secure. The focus groups results do, however, illustrate that usability aspects are put forth as even more important to young citizens than security.

5 Conclusions and Further Research

Even though the findings from the focus groups indicate that young citizens regard *usability* as more important than *security* aspects when using eID, we also identified a relationship between usability and security in the data material. Both usability and security aspects are requested if the respondents should use the eID and, consequently, the e-service. When they regard the levels of both usability and security as satisfying they trust the electronic identification and signing process. The attitudes above concerning usability and security are, thus, linked to trust – a theme only briefly touched upon above in the focus group data. *Trust* is an important factor in all identification processes; both as a prerequisite and as an effect of identification. In fact, democracy depends in part on the trust in public institutions on a general level [21]. Therefore, trust is an essential issue also in e-government research and development. Several studies have explored the role of trust in different sectors.

Trust can be related to the potential of public e-services to improve government transparency, responsiveness, and accountability. Even with this potential, e-services will only be adopted if citizens deem them trustworthy [6]. Bélanger and Carter [ibid.] provide a model where they divide trust into institution-based trust (e.g. trust in the Internet, such as secure data transmission, as an essential part of e-government) and trust in the government agency providing the e-service. The latter highlights aspects such as organization and knowledge in the agency. Labels like "trust in the government" and "trust in the Internet " are also present [ibid.]. In the light of this model, usability aspects might be related to trust in the government while security aspects are vital for trust in the Internet. Understanding both these kinds of trust seems to be essential for development of successful eID solutions.

The perceived level of trust in the eID influenced whether the respondents in our study choose to use the e-service or not. If they cannot remember their password or find it too cumbersome to download a new certificate, they use another communication channel when interacting with the agency. This is an important aspect

that goes against the view of eID development as a purely technical matter that does not have to comprise any user participation. One theoretical contribution of the study is thus that there is a need to focus both social and material dimensions of the artifact [27] in this case the eID. The eID obviously serves as an entrance to the e-service, which usability and security levels might discourage or encourage the citizen to go on and use the e-service. This is in a long-term perspective decisive for an agency's possibility to realize the potentials in using e-services as a part of e-government development.

The purpose of this article has been to highlight the importance of addressing and exploring a certain group of citizens' attitudes when developing eID solutions within a public e-service context. The three conducted focus groups have provided us with illustrations of how young citizens, in our case university students within different study programs, think about the usability and security of eID. Even though the small amount of respondents cannot tell us how general these attitudes are in a statistical sense, the very presence of attitudes of eID indicates that citizens should not be excluded from the development and the future implementation process. This also calls for further theoretical and practical investigations of perspectives and models, e.g. conceptual foundations of identity and e-identity [16]. This study contributes with an illustration of how attitudes gathered from the focus groups can be used as an early warning system providing decision makers, development project leaders, and others with indications of aspects and interpretations of the intended eID solutions in an e-service usage situation. Neglecting citizen attitudes cannot be done without risking that important opinions are disregarded. This might in a longer perspective lead to decreased usage of public e-services and lack of trust for e-government, as discussed above. We have shown a brief example of how citizens' attitudes can be caught. These attitudes can serve as important additional input to the development of eID solutions that supports successful e-government. A conclusion from this study is that citizen participation is important not only in public e-service development, but also when developing electronic identification solutions for e-services. This also calls for further conceptual and theoretical studies in the area.

It is has not been our ambition to give a comprehensive view of citizens' attitudes towards eID in this article, but our findings indicate that further citizen-oriented studies are necessary as complement in national and international development and implementation processes. Future contributions to conceptual development regarding e.g. the linkages between the eID and the e-service, and the general citizen orientation perspective in the e-government research field are also essential. A more systematic approach to explore different citizen groups' attitudes towards eID in an e-service context would be a feasible next step to take, also including groups with a different age structure, private vs. professional eID use, and public sector vs. private sector (e.g. e-business). Addressing trust [cf. 6] deeper in the eID context is another major issue for further research. eID can also be studied in relation to the concept of personal identity [cf. 7] and technology adoption and acceptance [38] in order to better understand the theoretical basis for electronic identification. The latter dimension can also be combined with a more explicit stakeholder perspective [14; 32] in further research. The interface between the eID and the e-service used is also

interesting to study more in depth, as well as the type of e-service offered (e.g. if sensitive or more confidential information is affected than in the present case) and its relation the eID. The fact that several providers of e-services and eID's are present makes the issue of trust and accountability even more delicate, not at least when breakdowns occur.

Acknowledgments. This study has been financed by the Swedish Civil Contingencies Agency. We are also thankful to Karl Eriksson and Tommy Talén, master students in information systems 2011, for their supportive work in the focus groups described above.

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A Framework for Evaluating Citizens' Expectations and Satisfaction toward Continued Intention to Use E-Government Services

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Abstract. This paper examines the role of expectation and satisfaction in influencing citizens' intention to continue using electronic government services. In order to investigate the key factors that affect an individual's use of Information and Communication Technology within the context of electronic government, a framework combining Social Cognitive Theory and Expectation-Confirmation Theory is used to investigate satisfaction and continuity of use of e-government services. Further, the study incorporates DeLone and McLean's IS success model along with the E-S-QUAL model to incorporate technical, organizational and Information Systems quality into this framework. The proposed framework will help in shaping further studies in cognitive, managerial and technical factors related to e-government adoption and use. This study argues that quality and consistency in e-government services affect the expectations and satisfaction of citizens, therefore impacting on its continuity of use.

Keywords: E-Government, Use, Continuity, Expectation, Satisfaction.

1 Introduction

In recent decades, the topic of electronic government (e-government) has been the subject of much debate within the research community [1]. Since the emergence of e-government in the late 1990s, the public sector has invested heavily in Information and Communication Technology (ICT) to support their work processes and e-enable their services. However, with the increasing use of e-commerce in the private sector, citizens have become more experienced in the use of electronic services, thus expecting a similarly high standard of service quality from government agencies. Yet, the literature suggests that individuals' performance vary based on their self-efficacy and therefore have different expectations [2]. Bandura [3] argues that the advancements in ICT and associated social developments have had a considerable influence on personal efficacy for self-development. In e-government, the purpose is to improve service delivery to all stakeholders [4] but research suggests that the

H.J. Scholl et al. (Eds.): EGOV 2012, LNCS 7443, pp. 273–286, 2012.

potential of e-government services and enabling IT applications are underutilized [5]. This has forced government organizations to change their current technologies or to adopt other strategies that combine multi-channels for e-government service delivery [6]. Consistency or harmony between e-government services and citizens' behaviour is crucial toward utilising these services, and then to continue to use them. These notions of cognition have been discussed previously by scholars who have employed similar constructs in order to explain the acceptance, continuity and utilization of ICT [7][8][9].

E-government is evolving toward more sophisticated and complex systems of rules and standards [10]. Public sector managers are looking for solutions to optimize services but at the same time, citizens and other stakeholders are looking for better services; they are influencing the evolution of e-governance and the quality of services through their previous experience. These two varying perspectives will establish new expectation and satisfaction levels as well as associated behavioural patterns [2]. Coiera [11] emphasised the role of interaction between human and computational agents, concluding that the characteristics of individual technologies and psychological/social issues can be combined to explain the overall decisions that individuals make when using technology. Thus, the interaction between users (cognitive factors) and their social, technological and organisational environment (environmental factors) plays an important role in the continuous use of e-government systems.

The challenge that government faces is the question of 'how to maintain and continuously improve satisfaction and expectations among citizens, and match the provided e-government services with their level of skills'. Some researchers have noted that user satisfaction, rather than behavioural intention, is a more appropriate dependent variable in mandated use environments [12][13][14][15]. There is a need for highly appropriate measures for evaluating the success of new information systems (IS) and their links with user satisfaction [16] but in an e-government context, we argue that satisfaction with technology alone does not wholly explain the interaction between citizens and government in practice. Bandura [2] emphasizes the role of self-efficacy; this is the process whereby users regulate their behaviour based on what they can or cannot do, according to their self-evaluated ability and reactions; having skills related to particular actions or needs is critical for effectively utilizing e-government. However, any lack of access to e-government services could widen the gaps between the different socio-economic levels and hinder citizens from gaining the full benefits of e-services [17][5][18]. As an inference from this, "organisations may be able to achieve considerable economic benefits (via relatively low incremental investment) by successfully inducing and enabling users to (appropriately) enrich their use of already-installed IT-enabled work systems during the post-adoption stage" [6], i.e. government departments may need to consider how to encourage potential users to utilize existing systems.

There has been little research on assessing the processes through which the quality of services provided by government are influenced by previous experiences and self-efficacy, and how the quality of services can influence the continuity-of-use perceptions of citizens (i.e. satisfaction and expectation vis-à-vis continuing to use e-government services). However, the issue has been briefly touched upon by various authors, e.g. [2][7] [8][14][19][20-24], who argue that citizens with positive

expectation are more likely to be involved in using e-government services, and that this could lead to an improvement in e-government practice and in the relationship between citizen and government in both the short and long term, although a detailed framework for assessing this has not been fully addressed. Accordingly, the aim of this study is to develop a research framework for evaluating citizens' expectations towards the continuous use of e-government services. Through analysing the literature on e-governance adoption as well as IS service quality models, we shall develop a conceptual framework that emphasizes the relationship between the organisation (government) and the end users (citizens). Limited research has been conducted to fully comprehend citizens' motivations to adopt and continuously use e-government services, and there is a lack of comprehensive models that take into consideration the expectations of the service provider (government) and service user (citizen) with respect to their behavioural intentions [25]. Salient personal cognitive, social and organisational factors that determine citizens' continued use of e-government services will be identified in this study. We argue that personal expectation perspectives offer a novel and relevant lens in order to appraise citizens' acceptance behaviour toward e-government use. In order to pursue the above, this paper is structured as follows: Section 2 offers a literature review of relevant theoretical models for studying user satisfaction. Section 3 introduces a conceptual framework for examining user satisfaction. Section 4 discusses the key factors that influence continuous intention to use e-government services. The paper concludes in Section 5 by summarizing the key contributions of the study.

2 Theoretical Background

E-governance is targeted at all citizens but it is difficult to satisfy the whole population. This is unlike private sector e-business services, where segmentation can be easily defined. If people are less than satisfied with the current services, they are unlikely to revisit or to recommend others to visit government websites [27]. Such behaviour could help to explain the variations in perception or cognition as well as skills while participating in e-governance [29][30]. However, there is limited research in the e-government domain that examines the impact of user satisfaction on continuous use. From a marketing perspective, Kotler *et al.* [31]considered ICT as a tool for integrating the social environment, citizens and organisations, through which entities can compete by utilising the Internet. Yet, hat research focused on groups or segmented markets to evaluate the impact of marketing and awareness strategies on satisfaction, whereas e-government is targeting the whole population. In an e-government context, Reffat [32] posits that the apparent lack of marketing strategies to raise awareness may act as a barrier to the adoption of e-government services. Further, Gilbert and Balestrini [10] conducted a study on the same issue based on attitudinal aspects of technology adoption and related service quality impacts. They found that while trust, financial security, relevance, and accurate and updated information represent major barriers, time and cost are the most important benefits that entice citizens to use e-government services. They identified three main

approaches that have theoretical and empirical bases with respect to ICT adoption and use: 1) the Diffusion of Innovation (DOI) theory and model (explained by [33]); 2) the Technology Adoption Model (TAM) (explained by [34]) and the Theory of Reasoned Action (TRA) (explained by [35]); and 3) Service Quality. All of these can be exploited to explain the variations in the levels of e-government use, from basic one-way communication up to interactive transactional services [4].

In light of the above, many governments have tried to improve the quality of their e-services by strengthening mutual trust. In this respect, e-governance is seen as a mechanism for agencies to reduce the cost and time for citizens by improving efficiency and effectiveness [29], rather than as a mechanism for cost-cutting. Almost all governments in developed and developing countries have established official e-government portals offering online services [27]. Nonetheless, if e-government services do not match the citizens' expectations, it is unlikely that they will continue to utilise them 28. According to the Diffusion of Innovation Theory [33], relative advantage, or how the user perceives the value of the innovation based on his/her past experiences and needs, is a major factor influencing the rate of diffusion. Moore and Benbasat [36], however, consider image as a significant motivator of use. Other studies have also considered social influence as an important factor [37]. Also, theories on social influence (or subjective norms) have been incorporated into models (e.g. UTAUT). Such models emphasize the role of personal perceptions in terms of peer influence on behaviour [38]; social influence cannot be ignored in e-government practice.

Besides the social theme, many other factors may influence e-government practice, for example, self-interest or expectations (as the cognitive influence of a particular action and its advantageous consequences) [2]. Further, satisfaction as an attitudinal influence is considered key in marketing studies [31], where it is used by the customer to measure the delivery of a product. However, here we consider the e-government context, and the focus is on evaluating satisfaction based on service delivery. In the same vein, Zeithaml [23] and Parasuraman, Zeithaml and Malhotra [42] discussed the gap between expected services (outcome expectation) and perceived services (satisfaction) in the SERVQUAL model. That study considered this gap from a citizen-centric point of view with respect to how public agencies deliver e-government services.

2.1 Prior Research on IT Usage

The literature on IS research suggests that the stream of technology adoption (on the individual level) has reached maturity [43]. In this regard, Chan *et al.* [15] suggest that pre-usage beliefs may serve as anchors for post-usage beliefs, as people tend to rely on their initial beliefs and early impressions in the formation of future beliefs. Hence, there may be two major barriers to adopting and continuing to use technology. A number of theoretical models have been proposed in technology adoption studies. TAM and its major determinants 'perceived usefulness' and 'ease of use' [34] together with adaptations of the TRA have been the two dominant models in previous research in IS. Further, the Theory of Planned Behaviour (TPB) and UTAUT have been heavily used in previous IS studies (e.g., [14][15][19][35][38][44]).

Many previous studies have examined the effects of user belief and attitude on IT usage intention and behaviour [19][47]. In this respect, several theoretical models have been employed, combining IS with psychology and sociology, where researchers have selected constructs from certain models while leaving out the contributions of others [19]. For instance, the UTAUT model has eight different models integrated within it [TRA, Combined TAM and TPB (C-TAM-TPB), motivational model, TPB, Model of PC Utilisation (MPCU), Innovation Diffusion Theory (IDT), and SCT]. Therefore, UTAUT has also integrated some of those models' limitations. Significantly, post-adoptive-behaviour and variables such as satisfaction and personal outcome expectations towards continuous usage of IS have not been considered. Therefore, we posit that an extended model is needed to examine the continuity of IS use. This is particularly relevant for e-government information systems, given the number of studies that have identified the significance of satisfaction towards continued intention to use e-government services (e.g., [15][14][5]). Hence, reviewing and synthesizing the relevant theoretical models in IS adoption is crucial for understanding continuity in e-government use.

Many previous IS adoption models have focused on understanding the usage of technology at the individual level and the implementation success at an organisational level, mainly in the private sector or in commercial settings. For example, while researchers such as Venkatesh *et al*. [19] and Bhattacherjee [48] focused on the private sector, users in this environment are significantly different to those in the e-government context. Moreover, these studies did not examine the post-adoptive stage (i.e. continuity of use), and in fact [15] argued that there is a need for technology acceptance studies that link pre-usage with post-use behaviour (in other words, studies that focus on continuity of use) particularly in e-governance. Further, there is also a need to consider the impact of motivation on continuing to use it [49]. A motivational model is incorporated in UTAUT but it does not explicitly examine the intrinsic motivational factor with respect to personal expectation, and therefore, citizens' internal constraints, such as personal expectations, are not considered (see [7]). As such, UTAUT leaves a gap in relation to understanding citizens' personal outcome expectations towards e-government use. For instance, Layne and Lee [4] mentioned speed and cost as important features of e-government services; these are crucial for citizens in an e-government context, but not for employees who work in public organisations because they are more likely to be motivated by job prospects or salary. Hence, from a citizen's perspective, self-efficacy forms part of personal outcome expectation as an intrinsic motive [2] in an e-government context. In addition, Bandura states that both anticipated satisfaction and the negative appraisals of insufficient performance provide incentives for action. He also suggests that when individuals accomplish a given level of performance, they are often no longer satisfied with the service and make further self-reward contingent on higher attainments. Therefore, citizens' action and behaviour are driven by self-interest, which is influenced by self-efficacy [2][21].

2.2 Expectation-Confirmation Theory (ECT)

When focusing on the diffusion and adoption of IT applications, three high-level stages are important: pre-adoption, adoption and post-adoption [33]. The ECT model is widely

used in the study of user satisfaction (e.g. [8][15]) and post-purchase behaviour, and holds that users' intention to reuse the system as a service is determined primarily by their satisfaction with prior use of that service [51]. Bhattacherjee [24] adopted ECT to further comprehend IS continuance use, and looked at continuance as an extension of acceptance behaviour; he addressed post-adoptive behaviour in online banking. Those results support ECT's contention that satisfaction with IS use is the strongest predictor of continuance intention. The model examined pre- and post-behaviour to verify the variation between what is expected and actual performance, so that an indicator can be perceived to decide repurchase intentions. Based on Hsu *et al.* [8], ECT was extended by integrating it with SCT to examine the motivational factors that influence one's intention to continue using Internet applications. They found that there are variances between continuity of using the Internet, outcome expectation and satisfaction. Such findings suggest that in the e-government realm, it is crucial to understand the factors that influence citizens' behaviour to continue using online services provided by public agencies. Moreover, satisfaction can be used as an evaluation process to measure citizen's perception of the e-government services. However, there are some limitations to the use of ECT; it ignores the potential change in initial expectations and consequent cognitive process variables [48].

Previous studies have found that ECT is based on extrinsic motivations rather than both extrinsic and intrinsic [49] but it can assess extrinsic motivation in the form of satisfaction as an attitudinal influence towards continuity in using e-government services. Similarly, SCT can assess intrinsic motivation in the form of personal outcome expectation to represent personal cognitive beliefs. Relative to SCT, in the relations between the three determinants of a triadic reciprocal causation model (Figure 1), ECT better fits the study of e-government use satisfaction, using satisfaction as the measurement of an event and using behaviour as a continuance intention to using e-government services. By integrating ECT into SCT, the intrinsic motivational factor is seen in SCT as the personal cognitive factors (personal outcome expectations). Further, Bandura [2] and Compeau and Higgins [52] argue that it is essential for a decision maker to consider both intrinsic and extrinsic motivational factors when examining satisfaction. Thus, we propose the use of SCT as the basis of our framework to study use and satisfaction in e-government systems.

2.3 Social Cognitive Theory (SCT)

As a well-accepted model of individual behaviour, SCT has been used to evaluate performance in various service domains [53]. SCT highlights the role of personal interaction with an external event and how this interaction introduces new behaviour. According to Verdegem *et al.* [54], users' perceptions of the e-services offered are crucial. The strong relationship between contextual variables and satisfaction requires that the use aspects (citizens' side), rather than the government (service provider side), are focused upon when evaluating e-government services. Hence, the role of users (citizens) is crucial in order to gain a better measurement of satisfaction.

The relationship between government and citizens cannot be examined without action on the part of the citizen. In this respect, SCT holds, "outcome expectations about the consequences of behaviour are a strong force guiding individuals' actions"

[7]. Expectancy is perceptually a catalyst of human motivation, as it is the perception that one's efforts will possibly result in the achievement of the desired task, which is rooted in an individual's past experience, self-efficacy, and the perceived difficulty of the assigned task [55]. Therefore, reward (in achieving the task) based on personal outcome expectation is seen as accomplishment (intrinsic), more than social recognition or promotion (extrinsic) [9]. This argument is further extended by Wasko and Faraj [56], who emphasised the role of expectation of personal benefits in terms of individual motivation. Those authors posited, "[i]n the social cognitive view, people are neither driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in terms of a model of triadic reciprocality in which behaviour, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other."

Prior research also indicates that users are more likely to execute tasks that are similar to those performed by their peers [20][2]. This is often achieved by rehearsing action and learning from past experience in the same social context (ibid). Bandura [20][2] stressed that "weak expectations are easily extinguishable by disconfirming experiences, whereas individuals who possess strong expectations of mastery will persevere in their coping efforts despite disconfirming experience". These arguments would lead that author to discard the construct in ECT of confirming/disconfirming prior experience, replacing it with outcome expectations. For that reason, the authors here use prior experience as a generic construct. On the other hand, in SCT a continuous reciprocal causation among environmental factors, cognitive factors, and human behaviour factors exists that cannot be discarded [8][2]. Therefore, prior use of an IT application is already situated within a stream of use experiences even if it has not occurred [6]. Carter and Bélanger [57] found compatibility of the system to be the most significant factor; hence, if people expect the same benefits from e-government services as they gain from using the Internet for online shopping, they are more likely to adopt e-government systems. Thus, prior experience is a crucial factor, one that influences the post-adoptive stage. The user-oriented approach suggests that in order to measure user satisfaction vis-à-vis e-government services, citizens' needs and expectations towards e-government services are essential considerations [58].

The social theme in e-government practice is critical, as the media, friends, family and co-workers all have an influence on each citizen's awareness and level of confidence [35]. Lack of awareness is a barrier to e-government practise [32]. Zeithaml *et al.* [58] emphasized the role of advertisement in increasing the level of awareness among citizens in e-government projects. Rogers[28] mentioned that middle management , top management and politicians have low IT skills, caused by lack of awareness at the first level, and therefore, citizens are expected to experience the same or less. According to SCT and the Compeau and Higgins [7] model, behavioural modelling (social influence) engages self-efficacy; by observing others, people can learn new behaviour, subject to their ability and previous experience [22][2]. According to the Diffusion of Innovation model [58], users can be categorised into five groups: innovators, early adopters, early majority, late majority and laggards. Perhaps not surprisingly, the percentage of innovators represents only

2.5%; they can however act as a role model, giving others the opportunity to observe and oversee the outcomes of using e-government.

3 Research Framework

This paper is stimulated and informed by the contributions of the above theories and models, more specifically SCT [2][52], ECT [24][8], the IS success model [16] and E-S-QUAL [42]. Those models have been widely used, however, they are less used in the field of e-government in developing countries with respect to citizens' points of view. Therefore, this study has considered the many and various previous studies [19]; it has not ignored their contribution, indeed it adds credit to their efforts. Accordingly, Table 1 presents the proposed factors (derived from the literature), which have assisted in formulating the proposed framework of this study, relating to continuance intentions vis-à-vis e-government services (see Figure 1).

Table 1. Factors Employed in Existing Studies to examine continuance intention

Constructs	Description	Theory/ model	Sources
Personal Outcome Expectations (POE)	"Is a person's estimate that a given behaviour will lead to certain outcome." Or "a judgment of the likely consequence such performances will produce."	SCT	[2][3][7][52]
Self-Efficacy (SE)	"An individual's perception of efficacy in performing specific computer-related tasks within the domain of general computing."	SCT	[2][3][7][20][21] [22][52][57] [63]
Prior Experience (PE)	Bandura refers to prior experience as enactive mastery, which is information based on "authentic mastery experiences", or past experience in performing tasks according to their expectations.	SCT/ ECT	[2][3][7][22][24] [47][48][50][52]
Satisfaction (SAT)	Users' feelings about prior e-government services use.	ECT/ D&M	[8][14][15][24] [47][48][50]
IS Continuance (IC)	Users' intention to continue using e-government services.	ECT	[24][47][48][50]
Information Quality (IQ)	Information quality reflects the degrees of personalization, relevance, completeness and ease-of-comprehension.	D &M	[16][61]
Service Quality (SQ)	One's judgment about a product's services taken as a whole, or the difference between service delivered and customer expectation.	D &M /SERV QUAL/ E-S-QUAL	[23][16][31][42] [59][60][62]
Social Influence (SI)	The degree to which peers influence the use of the system, whether positive or negative.	SCT	[2][3][14][15] [41][45][46][63]

The proposed framework underpinning this study is based on SCT, ECT and DeLone and McLean's IS success model as well as other acceptance factors (as used in UTAUT). The presented research addresses post-adoptive behaviour, which has already been modelled and influenced by factors that lead to acceptance and initial use [6]. Figure 1 illustrates the proposed framework of this study.

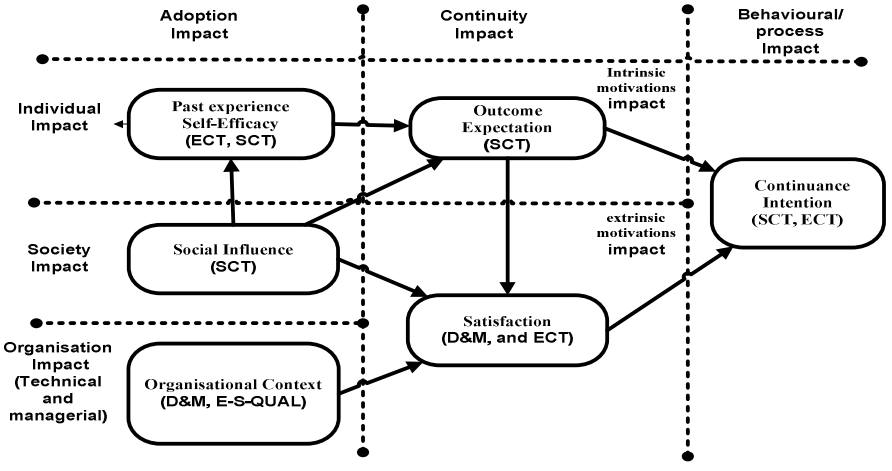

Fig. 1. The proposed framework

4 Discussion

Drawing on SCT, there are three major scopes that should be taken into consideration in predicting one's action toward a future perspective: personal factors, environmental factors and behavioural factors. Hence, linking past experience and self-efficacy with one's outcome expectation is crucial in order to broaden one's capacity through gaining the required skills, which then act as a driver for any potential or required action toward e-government services. However, the interests of a typical working citizen are different to those of one not working; the average non-working citizen is looking for cheaper and faster services, rather job promotion. Hence, the estimations of their outcome expectations require different approaches. The non-working citizen is not motivated by punishment and reward in the working environment while performing the task, which affords them more alternatives in selecting an e-service. Therefore, it is the e-service organisation's responsibility to stimulate the citizen's interest into interacting with e-government, and this can be achieved in three stages: the adoption stage, the continuity stage and the behavioural stage, as in the following three paragraphs.

Firstly, the adoption stage contains three phases: technical and managerial impact (organisational impact), social impact and individual impact. This is the external stimulus interaction that the environmental factor has on the personal factors, based on SCT. As noted from the model, the organisation, society, prior experience and

self-efficacy all indirectly influence the desired continuance behaviour, and it will not come to pass through without satisfaction or the sum of the personal outcome expectations of the citizen as a core of the process. Therefore, and in order to reach the required behaviour, an organisation should focus on the marketing impact, such as awareness, and highlight the role of skills, based on experience and self-efficacy, word of mouth and social impact in order to strengthen the function of satisfaction. However, there are marketing regulations, one may not sell a product (services or goods) that does not exist, and therefore, tangibility (system and information) and intangibility (services) should exist to ensure the availability of the product. Thus, the first step an organisation should start with is managerial impact and technical impact, by establishing the required ICT-related issues (e.g. system, infrastructure, network and other hardware as well as software, etc.); in other words, the implementation and awareness processes as well as the support of social influence (society's impact). There should a managerial plan for managerial impact and technical impact that is in line with the capability of the targeted user, correlated with a proper marketing plan. This would help in fully utilising the invested budget. Hence, a strong relationship is required between decision makers at all levels and the citizens' demands.

Secondly, the continuity impact; this stage depends upon the acceptance variables in the adoption impact, where there may be some debate over precisely which variable is needed, based on the evolution process in each society or country. In this stage, the citizen is the only one who can translate acceptance into a continuance process. The cycle of the process, through learning from past experience, will shape the course of action when dealing with a repeat procedure in e-government practice, making it easier the next time. Thus, the awareness marketing impact, conducted through media or relatives, friends and co-workers can be considered as modelling, as noted by [2] and vicarious experience. Experiencing the e-government services will make it easy to identify the weaknesses in one's personal factor (cognitive); this should then act as a driver for further enhancement in building self-efficacy. However, without continual use of the system, it would be difficult to cope with software advances or up-to-date issues. Therefore, escalating self-efficacy to the required task in the process, supported by past experience and social influence, will enhance personal outcome expectation (personal, not job in this study) by ensuring the citizen that he or she can implement and function within the services offered. As a result, the satisfaction level toward the e-services will increase as long as there is a feeling that personal skills are developing.

Thirdly, the behavioural impact; this stage is the output of how citizens perceive the delivered services, and it involves the relationship between the personal factors and the environment (social and organisational) factors. If a citizen's estimation that a given behaviour will lead to the desired personal outcome (e.g. cheaper services, lower cost), as Layne and Lee [4] stated, associated with that citizen's positive feelings about prior e-government service experiences, the citizen's intention to continue using e-government services will be reinforced. In sum, it is a learning process that could be shaped by the time needed to ensure that what is invested is fully utilised, and without continuity, e-government transformation will be difficult to realize. Yet, e-government, as an ICT-based technology, must be an up-to-date project

that deals with the changes in technology usage, which is evolving rapidly; it could be difficult for citizens to cope with these changes without the requisite skills and experience. The value that e-government can bring to citizens could act as an incentive (or external motivator) for them to improve their personal capabilities in order to exploit the services in their own interest; as the system is being used, decision makers can make sure that the system is being utilised in the correct way.

5 Conclusion

The aim of this study is develop a model to examine the factors affecting e-government continuity, satisfaction and expectation from citizens' perspectives. The model presents the relationships between the three major contexts (citizen, society and organization) with respect to the pre- and post-adoption process. The citizen's impact factor refers to previous experience and self-efficacy, and then to the resultant personal outcome expectations of the whole process (within cognitive techniques). The organizational context refers to the approach of incorporating two related models (IS Success and E-S-QUAL). By synthesizing the potential relationship constructs distributed among several models through classifying them into categories, the developed model examines the three main categories of the IS success model (system, which is synthesised from E-S-QUAL, and information and services). This is aimed at aligning the related actors within the nearest constructs. The UTAUT and E-S-QUAL features are mostly applicable to those three categories. This study has emphasized the satisfaction factor not only with reference to any increase in service quality but also to the capability of the citizens. Hence, for e-government practice, aligning the services offered with the capacity of the end-user is crucial and, as a result, it will facilitate the expansion of e-government in the future. Continuing to use the system implicitly implies a level of mutual trust among the relevant stakeholders, specifically citizens and government.

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