



## Back to practice, a decade of research in E-government

Said Assar, Imed Boughzala, Isabelle Boydens

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## **CHAPTER 1**

### **Back to practice, a decade of research in e-government**

#### **Editorial Introduction to the book**

##### **Authors:**

##### **Saïd Assar, Imed Boughzala**

Institut Telecom, Telecom Business School  
9, rue Ch. Fourier  
91011 Evry, France

Email: {said.assar, imed.boughzala}@it-sudparis.eu

##### **Isabelle Boydens**

Université Libre de Bruxelles, Faculté de Philosophie et Lettres  
Département Sciences de l'Information et de la Communication - CP 123  
Avenue F.D. Roosevelt, 50  
B-1050 Bruxelles, Belgium  
Email: iboydens@ulb.ac.be

##### **Abstract**

E-government is a multidisciplinary field of research based initially on empirical insights from practice. Efforts to theoretically found the field have opened perspectives from multiple research domains. The goal of this chapter is to review evolution of the e-government field from an institutional and an academic point of view. Each chapter of the book is briefly presented and is positioned according to a vision of the e-government domain of research.

## 1.1 E-government definition and evolution

Information and communication technologies (ICT) have been used in governmental organizations since the beginning of the computer era. For example, one of the first large scale applications of computers was during the presidential election in the US in 1954. Since then, governmental information systems have evolved in parallel with those of organizations in the private sector. When internet technologies and the e-business phenomena hit the market a decade ago, the terms "e-government" and "digital government" were introduced and many definitions have emerged in the research literature [GRÖ04b, YIL07]. For the sake of this chapter, we retain the following characteristics: (1) the usage of internet technologies to deliver services online and to rationalize, redesign and significantly improve public administrative processes; (2) the reorganization of public institutions so that to reduce cost and to enhance the quality and the efficiency of services offered to citizens, companies and other governmental partners; (3) the development of a new democratic spaces in which relations between public institutions, citizens and enterprises are redefined according to a participatory perspective. The ultimate goal is to leverage technology for creating a new generation of cost efficient, transparent, interactive and ubiquitous ICT-enabled public services.

E-government is constantly evolving all around the world. This evolution is regularly measured and tracked by public institutions, private agencies and researchers alike. At the European level, the European Commission has conducted since 2001 a benchmarking project that measures the availability and sophistication of 20 basic public services for citizens and businesses. This benchmark establishes the foundations for the progressive and planned modernization of pan-EU e-government comparison. For businesses, the services being monitored include social security contributions for employees, corporate tax and VAT (Value Added Taxes) declaration and payment, and public procurement. For citizens, the services being tracked include income tax declaration and payment, change of address notification, job search and requests for car registration and building permits. The development of e-services is measured with two indicators: the degree of 'sophistication' of the public services that are offered online, and the number of services that are fully available online ([EUC09]). Figure 1.1 presents the five-stage maturity model for benchmarking e-services sophistication. Stages 1 to 3 correspond to the increasing levels of sophistication which are 'one-way interaction' and 'two-way interaction'. Stage 4 corresponds to the 'transactional' stage - also called full electronic case handling - where the user applies for and receives the service online, without any additional paper work. The fifth level, 'targetisation' (or 'personalization'), provides an indication of the extent by which front- and back-offices are integrated, data is reused and services are delivered proactively (users do not have to submit a request to take advantage of the service).

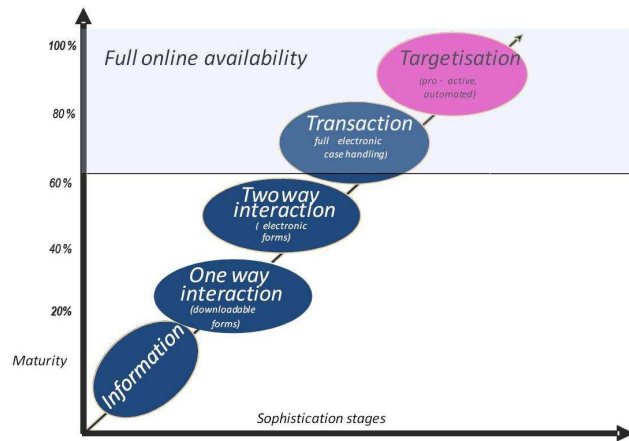


Figure 1.1: E-government evolution framework (extracted from [EUC09])

According to the 2009 edition of the European Commission benchmark ([EUC09]), the leading six nations on the full online availability of the basic 20 services are: Austria, Malta, Portugal, the United Kingdom, Sweden and Slovenia. With regard to the online sophistication of the 20 basic services, the leading six nations are Malta, Portugal, Sweden, Austria, Slovenia and Estonia.

At the international level, the United Nations department of Economic and Social Affairs (UNDESA) has regularly published reports which rank the member states of the UN according to a quantitative composite index of e-readiness based initially on website assessment, telecommunication infrastructure and human resource endowment ([UN05], [UN08])<sup>1</sup>. In its 2010 edition, significant changes to the survey instrument were introduced, focusing more on how governments are using websites and Web portals to deliver public services and expand opportunities for citizens to participate in decision-making ([UN10]). According to this latest report, table 1.1 presents top 20 countries in e-government development. For the E-Participation Index, Republic of Korea, Australia and Spain hold the 3 first positions in the top 20 countries.

<sup>1</sup> All survey data since 2002 has been compiled by the UNDESA into an 'E-Government Readiness Knowledge Base' available online at <http://www.unpan.org/egovkb/>.

Rank	Country	E-government development index value	Rank	Country	E-government development index value
1	Republic of Korea	0.8785	11	Singapore	0.7476
2	United States	0.8510	12	Sweden	0.7474
3	Canada	0.8448	13	Bahrain	0.7363
4	United Kingdom	0.8147	14	New Zealand	0.7311
5	Netherlands	0.8097	15	Germany	0.7309
6	Norway	0.8020	16	Belgium	0.7225
7	Denmark	0.7872	17	Japan	0.7152
8	Australia	0.7863	18	Switzerland	0.7136
9	Spain	0.7516	19	Finland	0.6967
10	France	0.7510	20	Estonia	0.6965

Table 1.1: Top 20 countries in e-government development (extracted from [UN10])

At the academic level as well, many models have been proposed to understand the maturity of e-government and to capture different stages of e-services development. While initial stages in these models are very similar concentrating on the availability of governmental information, on the possibility of downloading forms for initiating an administrative process (e.g. identity card renewal), and on the possibility of handling this process partly or fully online in a transactional bi-directional mode, later stages differ slightly. In [LAY01], later stages concentrate on the vertical integration (local systems linked to higher level systems within similar functions) and horizontal integration (systems integrated across different functions, real one-stop function for citizens and enterprises). In [SIA04], later stages concentrate on public services transformation through their integration in a homogenous network of governmental services. This last stage is characterized by political transformations as it requires the reorganization of public agencies. In [EBR04] and [STA05], the integration of public services (with each other and with private sector services and systems) is also the main issue for the latest stages of the maturity proposed frameworks. Finally, in [AND06], an extension to the initial model of [LAY01] is proposed based on an empirical investigation in Denmark. The latest stage of this extended model is called 'Revolution' and highlights fundamental change in governmental practices and processes characterized by data mobility and sharing across public and private organizations, application mobility across public employees and services, and ownership to data transferred to final users. The authors recognize however that there are cases where direct application of their model is less appealing and where specific contextual element should be taken into account (e.g. back-office intelligence units, homicide investigations in police departments).

To conclude this first section, the question of measuring e-government performance and evolution is an important issue for all stakeholders. Although significant and relevant data is gathered annually about the subject by international institutions (United Nations, European Commission), and although many research

models have been proposed to characterize the underlying evolution process, the subject is still investigated by the research community (e.g. [KOH08], [SHA08], [BER09]).

## **1.2 E-government as a field of research**

E-government started as a practitioner field of investigation, basically convening practitioners trying to meet the new challenges of the internet medium by implementing new systems and offering new services creatively [GRÖ04b]. Based initially on empirical insights from practice, first e-government conferences were practitioner-oriented with some academic invited keynotes. Rapidly, more academia-oriented conferences emerged, and the body of e-government related knowledge grew rapidly. The maturity of the emerging research field was questioned already in 2004 [GRÖ04a]. It was criticized then as lacking theoretical foundation with insufficient levels of rigor and relevance in applying investigation method, in establishing results and in claiming their applicability to more general cases.

Significant efforts have been made since then to improve e-government research quality [GRÖ06], and to define more rigorously e-government as a domain of investigation and as a field of research [HEE07, HOV07]. In these studies, a large number of research papers published in prominent conferences and journals were analyzed according to multiple criteria's:

- Research type: descriptive, theoretical, theory testing, theory generating, philosophical.
- Research method: product description, survey, questionnaire, experiment, ethnography, grounded theory, document analysis, reflection on project experiment, web content evaluation, literature review.
- Researcher's home department: business, computer science, political science, information systems, library and information studies, government agency, non academic research institution.
- Literature used: public administration, management, computer science, e-government, information systems, e-business, political science.

Findings confirm what other researchers have suggested [SCH07]. E-government is an emergent multidisciplinary field of research in which focus on practice and on practical recommendations is a prominent characteristic. Although theoretical ground is still under construction, it certainly qualifies as a legitimate emerging scientific discipline.

### 1.3 Presentation of the book

The material presented in this book is a collective contribution to the e-government domain. Contributors come from 9 different countries and are either practitioners in e-government or researchers which have been directly or indirectly implicated in e-government projects. Each chapter is a specific field study in which different investigation methods have been applied and combined according to the case study methodological approach [YIN03]. The primary audience of this book is scholars and practitioners in the area of e-government. It is also of interest to MSc level students in curriculums related to ICT in public administration, information systems and e-business, and who seek practical cases in online services design, implementation and evaluation.

To present the research topics that are covered by the book chapters, we rely on future research themes identified by the road mapping e-government research project eGovRTD 2020 [COL07]. This project, funded by the European Community within the 6<sup>th</sup> framework program FP6, aims to identify and characterize the key research challenges, required constituencies and possible implementation models for holistic and dynamic governments in Europe and around the world in 2020 and beyond. This project identified 13 interrelated research themes, out of which 11 are of concern for the research work presented here. A mapping between these research themes and the chapters of this book is presented in table 1.2, together with a mapping to the investigation methods used in the chapter's case study.

Chapter 2, entitled "E-procurement, from project to practice: Empirical evidence from the French public sector" by Godefroy Beauvallet, Younès Boughzala and Saïd Assar, is an analysis of public e-procurement adoption in France. Electronic platforms for supporting public transactions are an important application of e-government. In France, new regulations since 2005 are pushing public and private actors to adopt electronic means for handling all steps of purchase process in public organizations. Based on two different quantitative surveys made in 2005 and in 2008, the authors analyze the public and private users' perception of the virtualization of the procurement process. Between 2005 and 2008, a significant progress is noticed in adopting electronic means for public agencies to publish a call for tender, for enterprises to upload a proposal using an electronic signature, and to a much less extent, for public managers to process the submitted proposals and taking a decision concerning the choice of the product and of the provider. Many enterprises are still reluctant to submit proposals online because there is a lack of confidence in the digital system. And, unfortunately, there is a visible digital divide between public agencies (e.g. ministries, main governmental institutions) that have enough resources to master the technology; and those, mainly local authorities in rural parts of the country that are struggling to digitalize their procurement processes.

		Chapter n°												
		02	03	04	05	06	07	08	09	10	11	12	13	
<b>Investigation method</b>	Quantitative (surveys)	■				■								
	Qualitative (interviews)					■				■				
	Experiment								■	■	■			
	Legal document / web site analysis	■						■					■	
	Project report		■	■			■				■	■		
	State of the art / review of the domain				■								■	
	Design science approach			■					■	■	■	■		
<b>E-government roadmap themes</b>	Trust in e-government				■	■		■						
	Semantic and cultural interoperability of public services								■	■	■			
	Information quality						■							
	Assessing the value of government ICT investment	■	■											
	E-participation, citizen engagement and democratic process							■						
	Mission oriented goals and performance management	■	■	■										
	Cyber infrastructures for e-government			■			■			■	■	■	■	
	Ontologies and intelligent information and knowledge management								■					
	Governance of public-private-civic sector relationship	■	■											
	Government's role in the virtual world				■				■				■	
	Data privacy and personal identity				■	■								

Table 1.2: Mapping between chapters' content (columns), investigation methods and research themes (lines).

In chapter 3, Lizbeth Herrera and J. Ramon Gil-Garcia analyze a successful strategy involving three ICT projects through a case study of a Mexican federal agency. Entitled "Implementation of E-Government in Mexico: The Case of INFONAVIT", this chapter uses a technology enactment framework composed of institutional, organizational, and managerial factors. Overall, the results of this study show that having a strategic plan that aligns the ICT project objectives with the overarching organizational goals leads to successful implementation because the technical, organizational, and institutional resources are managed in an integrated fashion. The chapter also reports specific factors that had an impact on the characteristics and success of the three ICT projects.

The context of the case study analyzed in chapter 4 is the US army services. In the chapter entitled "The Casualty Assistance Readiness Enhancement System (CARES) – A Case Study in Rapid Prototyping and Design for Flexibility", Simon R. Goerger, Ernest Y. Wong, Dale L. Henderson, Brian K. Sperling and William



Bland describe and evaluate a system implemented to help in processing the benefits that are due to the surviving family of fallen U.S. military service members. Most of these entitlements require a considerable amount of paperwork and necessitate a great deal of patience, attention to detail, and composure from families at a time when their grief is raw. Even though the U.S. Army appoints a Casualty Assistance Officer (CAO) to help surviving family members through this process, the soldiers serving as CAOs tend to be inexperienced and oftentimes find themselves challenged to provide accurate and thorough assistance. Consequently, some families do not receive all benefits in a timely manner, and some entitlements may be overlooked entirely. The Casualty Assistance Readiness Enhancement System (CARES) is an information system designed to improve how the Department of the Army cares for military families. The tool and associated process reduced the time required to complete forms, reduced the potential for errors on repetitive information, assisted CAOs through the process and provided electronic copies of completed forms. The approach in the design of CARES (the process) demonstrates a viable methodology for the rapid development of a software solution to support an administrative process that is often performed by inexperienced users under the guidance and review of mid level managers.

Chapter 5 is dedicated to electronic identification. As online services are now widely used, and as the exchanges of personal data become more and more widespread, electronic identification is becoming a key function for the security of the process and for the protection of privacy. In France and throughout Europe, e-government services, as well as private services, already use different means of electronic identification. Fabrice Mattatia, in his chapter entitled "An overview of some electronic identification use cases in Europe" presents problems concerning identification in the digital space, and reviews the different technical solutions that are actually implemented in Europe for issuing electronic identity cards (e-ID). He discusses as well the question of e-ID interoperability, which is the main issue when it comes to give access to all European citizens to e-services of any Member State.

Chapter 6, by Rowena Cullen, is entitled "Privacy and personal information held by government: a comparative study, Japan and New Zealand". This chapter reports on the concepts of information privacy and trust in government among citizens in Japan and New Zealand in a trans-national, cross-cultural study. Data from both countries is presented, and cultural and other factors are sought which might explain differences in attitudes shown. Hofstede's dimensions of culture are used as the theoretical background for the analysis of cultural differences. In both countries, citizens display a range of views, not related to age or gender. New Zealand citizens express concern about information privacy in relation to information held by government, but show a higher level of trust in government overall. Japanese citizens interviewed also indicated that they had major concerns about information privacy, and had considerably less trust in government than New Zealand respondents showed. They were more inclined to attribute breaches of privacy to lax

behavior in individuals than government systems. In both countries citizens showed an awareness of the trade-offs necessary between personal privacy and the needs of the state to hold information for the benefits of all citizens, but knew little about the protection offered by privacy legislation, and expressed overall concern about privacy practices in the modern state.

The main theme of chapter 7 is information quality. Data quality is a strategic matter in the context of e-government as the integration of services requires authentic, coherent and reliable data. However, establishing databases that are devoid of duplication, redundancy or ambiguity isn't simple neither in theory nor in practice, although administrative databases are often regarded wrongly as 'simple'. In its chapter entitled "Strategic issues relating to data quality for e-government: learning from an approach adopted in Belgium", Isabelle Boydens demonstrates that this is not the case, in particular because of the questions of interpretation that they raise. This chapter is based on case studies stemming from the Belgian federal administration (social security, business directories, federal authentic sources, etc.). Contrary to the assertions of common theories postulating a permanent bijective relationship between data and the corresponding reality, she argues that an empirical information system evolves over time along with the interpretation of the values that it allows to determine. To address data quality, she proposes a temporal framework that provides new operational strategies to improve administrative data quality (mainly, new ways to define quality indicators for continuous monitoring and reengineering strategies). This framework demonstrates how the approach is generally applicable in the context of empirical information systems.

Chapter 8, by Lucie Langer and entitled "Long-term verifiability of remote electronic elections" is directly related to the e-participation theme of research. Retention of election documents is essential for verifying the proper conduct of an election ex post. The documents retained provide for later review in case an election contest is filed. In the context of the German Basic Law, the principle of public elections laid implies the need for public verifiability. This applies to remote electronic voting in particular as physical observation is not achievable in this case. While the retention obligations on paper-based elections are governed by electoral law, according specifications for e-voting are still an open issue. The chapter therefore addresses the following questions: Which existing legal obligations on retention of election data have to be complied with? How can they be transferred to the scenario of remote electronic elections? Based on an analysis of the retention obligations specified in German electoral law, the author identifies the conditions which must be documented and are thus subject to long-term verifiability. She investigates then how they can be adapted to the scenario of remote electronic elections. Her work contributes to establishing the basis for legally binding e-voting in Germany. As electoral law in Europe is rather consistent, this contribution might be useful to other countries as well.

Chapter 9 is entitled "Laws-based ontology for e-Government services construction – Case study: the specification of services in relationship with the venture creation in Switzerland", and is written by Abdelaziz Khadraoui, Wanda Opprecht, Michel Léonard, Christine Aidonidis. The compliance of e-Government services with legal aspects is a crucial issue for administrations. This issue becomes more difficult with the fast-evolving dynamics of laws. This chapter presents an approach to describe and establish the link between e-Government services and legal sources. This link is established by an ontology which is called "Laws based ontology". This ontology is used as means to define and to construct e-Government services. It may not be exhaustive, but it is nonetheless based upon an unquestionable source of information, the laws themselves. The proposed approach is illustrated with one case study: the specification of services in relationship with the venture creation in Switzerland and in the State of Geneva. The authors have selected the Commercial Register area which mainly encompasses the registration of a new company and the modification of its registration.

The theme of chapter 10 by Anne Fleur Van Veenstra and Marijn Janssen is service integration and interoperation on the web, and it is entitled "Architectural principles for orchestration of cross-organizational service delivery – Case studies from the Netherlands". Realizing integrated service delivery (ISD) requires government agencies to collaborate across their organizational boundaries. Orchestration of services is one way of achieving coordination of processes across multiple organizations. In this chapter, authors identify architectural principles for orchestration by looking at three case studies of cross-organizational service delivery chain formation in the Netherlands (preparation module for joint permit requests, information system for import of veterinary products, and information system supporting the asbestos removal process). In total, six generic principles were formulated and were subsequently validated in two workshops with experts: (i) build an intelligent front office, (ii) give processes a clear starting point and end, (iii) build a central workflow application keeping track of the process, (iv) differentiate between simple and complex processes, (v) ensure that the decision making responsibility and the overview of the process are not performed by the same process role, and (vi) create a central point where risk profiles are maintained.

Chapter 11 is entitled "Achieving Interoperability Through Base Registries for Governmental Services and Documents Management", and it is written by Yannis Charalabidis, Fenareti Lampathaki and Dimitris Askounis. As digital infrastructures increase their presence worldwide and citizens and businesses are provided with high quality one-stop services, there is a growing need for the systematic management of those newly defined and constantly transforming processes and electronic documents. An Interoperability Registry is a system devoted to the formal description, composition and publishing of traditional or electronic services, together with the relevant document and process descriptions in an integrated schema. Through such a repository, the discovery of services by users or systems

can be automated, resulting in an important tool for achieving interoperability. This chapter describes the architecture, components, underlying ontology of an interoperability registry platform that has been developed in Greece, the context of the new Greek Digital Strategy plan. The chapter illustrates the applicability of the approach through experimentations with the VAT process, which is by nature, a process spanning multiple organizations.

The theme of chapter 12 is Human-Computer Interface. Entitled "Envisioning Advanced User Interfaces for e-Government Applications: a Case Study", it is written by Gaëlle Calvary, Audrey Serna, Joëlle Coutaz, Dominique Scapin, Florence Pontico, and Marco Winckler. The adoption of e-government services provided to citizens depends upon how such applications comply with the users needs. Unfortunately, building e-government web site doesn't guarantee that all citizens who come to use it can access its contents. These services need to be accessible to all citizens/customers equally to ensure wider reach and subsequent adoption of the e-government services. User disabilities, computer or language illiteracy (e.g. foreign language), flexibility on information access (e.g. user remotely located in rural areas, homeless, mobile users), ensure user privacy on sensible data are some of the barriers that must be taken into account when designing the User Interface (UI) of e-government applications. Whilst several initiatives (such as the W3C WAI) focus on how to promote usability and accessibility of content provided via e-government, many governments are enhancing their technology to make their services compatible with new communication channels available through multiple devices including interactive digital TVs (iTV), personal digital assistants (PDAs), and mobile phones. In this chapter, the authors focus on this latter issue, which means the development of multi-target government services available across several platforms. They discuss the major constraints underlining the importance of investment on the UI's design of e-Government applications. They propose a framework for envisioning advanced UIs where the adaptation to the user's capabilities, available devices as well as physical and social environment will play a major role. This approach is illustrated through an experimental system developed for handling scholarship requests in a regional French administration.

Chapter 13 is entitled "Practices to develop Spatial Data Infrastructures: Exploring the contribution to E-government" and is written by Joep Crompvoets, Glenn Vancauwenberghe, Geert Bouckaert, and Danny Vandenbroucke. The main objectives of this chapter are to introduce Spatial Data Infrastructures (SDIs), and to explore their potential contribution to e-government. In order to understand the possible strengths of SDIs for e-government, the concept, components, governance and the cost - benefit analyses regarding the implementation of these infrastructures are first explained and presented followed by a short presentation of four existing SDIs in practice (Europe, Catalonia, Flanders and Leiedal). These practices show clearly the dynamic, integrated and multiple natures of SDIs. The main reason to

invest in SDIs is that they facilitate the sharing of spatial data in a way that the management and use of these spatial resources happens more efficiently and effectively. While sharing resources from multiple sources is still not common practice in e-government implementation, it will be very likely that ICTs will play a key role in improving the sharing of public resources. Lessons learnt from the existing SDI-practices and understanding of the nature of SDIs could therefore be useful support to develop efficient and high quality e-governments systems.

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