

## **E-GOVERNMENT RESEARCH IN EUROPE: DISCIPLINARY UNDERSTANDING AND STATE OF PLAY FROM EGOVRTD2020**

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*eGovernment has become an important area of research. Quite some funding has been provided for research projects to investigate specific topics. Under the 5<sup>th</sup> and 6<sup>th</sup> Framework Program of the Information Society Technologies (IST), the European Commission (EC) funded projects to advance eGovernment developments in Europe. In the early phase, focus of funds lied at implementing eGovernment through online offers of information and access to online forms. Reengineering was barely an issue. Later on, a shift of focus could be noted to take into consideration also back-office modernization. Nowadays, funding at European level is provided mainly for networked solutions, interoperability and some major eGovernment themes that have not yet been developed well; eParticipation and electronic Identity Management are among them. Within the current framework program, also projects to identify future research themes in eGovernment are being funded. eGovRTD2020 is such a specific support action to provide a roadmap for future research in eGovernment. It shall identify themes the next framework program of the EC shall focus on. Apart from that, the project shall provide support for proper strategic planning (research programs and implementation plans) at national level of governments. eGovRTD2020 shall develop scenarios and visionary images of governments, society and ICT developments in 2020. Based on a state of play analysis and the scenarios, eGovernment research is being examined to discover strengths and weaknesses of current eGovernment research. The insights shall help to design an eGovernment research roadmap for the next years to come. This paper reports results from the state of play of eGovernment research in Europe and around the world.*

### **1 Introduction**

Over the last years, eGovernment has become an important area of research. Quite some funding has been provided to investigate specific topics of eGovernment (e.g. by the European Commission or the National Science Foundation in USA). Most of this funding is provided to projects strongly oriented towards applied research. At national level, rather technology development and implementation are envisaged instead of core eGovernment research.

Scanning the academic world, many research institutions claim to investigate eGovernment. In terms of disciplines, these institutions are diverse and widespread: some of them focus on the organisational and socio-economic aspects; others are strongly technology-oriented. Still

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others focus on the legal facets. Also, strategic issues of change and ICT impact in governments and society are being investigated in some cases. The multitude of disciplinary views makes eGovernment a theme studied in many traditional disciplines.

Unfortunately, the distinct approaches to investigate the area have led to a wide set of definitions and understandings. Some of the specificities of the discipline are that eGovernment cuts across disciplines and that this transitional and integrative discipline does not fit into traditional thinking within single research disciplines. Instead, eGovernment tries to link views and concepts from original disciplines, which - in their core activities of research - would not meet. Consequently, eGovernment as a research discipline is frequently put into question. Quite a few critical voices claim that eGovernment uses research methods available in Information Systems (IS) research or other core disciplines established for a long time. Others argue that eGovernment is covered in IS research or in other single disciplines such as social sciences, political sciences, computer science, etc.

However, Wallace Sayre (cited in [16]) claimed already more than ten years ago that "public and private management are fundamentally alike in all unimportant respects". Several publications discuss the critical differences between eBusiness (or eCommerce) and eGovernment [16], [23]. In order to bring forward own innovation in the public sector, eGovernment needs to be researched as much as electronic markets, new ways of cooperation, virtual organisations, common online business, economics of electronic production and services provision, innovative ICT, etc. Thereby, findings from distinct disciplines need to be linked with one another or even more, these need to be integrated to understand the overall field.

The challenge of current eGovernment research is to exploit and diffuse its excellence as an integrative discipline. In the contribution at hand, we first describe certain key disciplinary aspects of eGovernment (section 2). In the research project eGovRTD2020, which is co-funded by the EC and NSF, research foci and future research themes for eGovernment have been investigated. Section 3 briefly describes the project and the methodology applied in the state of play study. In section 3, key findings of the state of play analysis are being reported. Section 4 describes the next steps in the course of the project. In the conclusions, some recommendations for a wider acceptance of eGovernment as a research discipline are being provided.

## **2 Multitude of shapes of the eGovernment research discipline**

In order to shape eGovernment as a discipline, one needs to understand its many facets. Several years ago, [24] has developed a framework for integrating various perspectives of eGovernment. The approach tried to cover and integrate findings from different disciplines of research such as public administration sciences, computer sciences, economics and public governance, jurisprudence, social and socio-technological sciences, etc. The aim was to understand the inter-linkage of eGovernment specific topics. With such a comprehensive understanding of the various aspects of ICT usage in the public sector, eGovernment developments taking care of a broad set of requirements have been facilitated.

Putting the discussion on a meta-level, eGovernment is to be seen as a field of applied research. It has links to many well established disciplines of research (see Figure 1). Some of these sciences are:

- *Social and human sciences*: Research in this field broadens the definition of users to a variety of stakeholders and institutional aspects. Social, economic and psychological sciences investigate these themes. Issues investigated here are e.g. how users interact with governments, how governments can establish a better relationship model with their customers and how employees interact within their organisations and across organisational boundaries. Aspects of eInclusion and digital divide are further topics of interest here. Finally, research investigates how much new technology can impact society and add value to government services and productivity.
- *Political, strategic, democracy, and legal sciences*: These are concerned with the impact of ICT usage in the course of decision making, be it at political or strategic level of governments. Furthermore, this area investigates issues of ICT supported democracy and direct participation of citizens and citizen representatives in democratic decision making facilitated through ICT. ePolicies and eGovernance (also shaped in the organisational and economics research) are other catchwords that were brought forward as certain aspects of eGovernment research. Recently re-activated topics are the support of social networks as a means to freeing the individual from traditional networks of influence (family, friends, co-workers and neighbours) or a democratic interaction fostered via an active 'marketplace of ideas'. Co-governance between state institutions and civic actors, civic networks and creative commons models to facilitate concrete community involvement are yet other areas of investigation in this research field.
- *Information and knowledge research sciences*: Recently, eGovernment researchers have taken up the investigations in information and knowledge management. The specific research attention in the field was spurred by new findings in semantic web and ontology research from artificial intelligence and computer science. Since the public sector deals with informational and knowledge resources by large, it is also in huge need for intelligent search and retrieval of information. One distinction to other research investigations is that the users in eGovernment are very heterogeneous, so different means of search and visualisation of information and knowledge are required. Apart from that, the eGovernment research community is investigating intelligent content and knowledge sharing mechanisms, application of intelligent agents and comprehensive one-stop accessibility of dispersed knowledge resources. Aim is to provide intelligent and ubiquitous support systems for decision making, eServices provision, employee knowledge portals, policy discussions, citizen participation in democratic matters, etc.
- *Organisational and economic sciences*: This area develops concepts of organisational structures in the public sector, including networked governments, public-public as well as public-private partnerships and their effects on productivity, efficiency and legality. Keywords that came out of this type of research are e.g. good governance, better governance, new public management, modernising governments, accountability, transparency, quality of service or public value generation. Also the area of monitoring and benchmarking can be assigned to this domain of research.
- *Computer sciences*: This area is concerned with concepts and solutions for the technical implementation of eGovernment solutions. Examples of research aspects are interoperability between bureaucratic systems as a whole and across regional and national borders; tools and services for public service provision by large without any media breaks and by means of various communication channels; electronic identification, encryption and digital signatures; electronic payment.

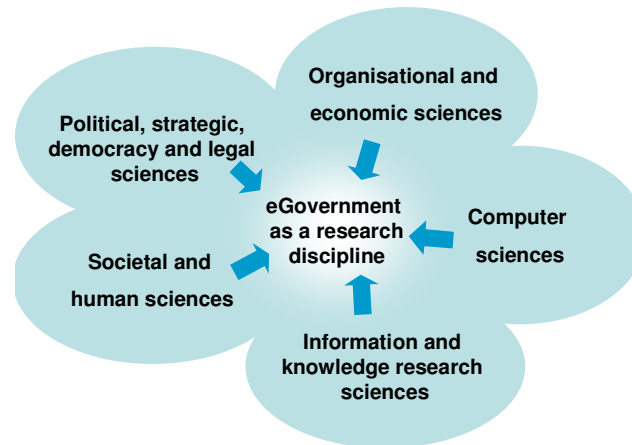


Figure 1: Multidisciplinary and integrative role of eGovernment as a research discipline

The specifics of eGovernment as a research field are that this area integrates different disciplines in the investigation of eGovernment innovation and solutions. As such it investigates and designs new models of public organisations and it investigates the changing roles of civil servants and citizens, e.g. citizens as customers, stakeholders, political agents etc. In continued interlinking of multiple views, eGovernment as a research discipline re-defines the organisation and implementation of public policy under new technological and communicative regimes thereby integrating legislation, culture, geography, selective adoption of technologies. Another integrative axe is to combine user needs and design with e.g. program development / system theory and with business administration sciences, social sciences and economic sciences. Yet another integrative axe is the inter-linkage between issues of eGovernment, public sector information, data sharing, spatial data infrastructures, geo information technologies, etc.

With the view of eGovernment research being a link between different disciplines, it can contribute to the overall development and innovativeness of the public sector in various ways such as:

- Putting in place innovative solutions that can be deployed in the public sector in various areas
- Driving innovative solutions to the field of application (new technologies to be applied to the public sector)
- Taking up the needs of the public sector and investigate new concepts, frameworks and solutions
- Being the forerunner/pilots of solutions
- Carrying out studies and analyses by large, thereby securing independence and neutrality of specific interest parties
- Contributing to international standardisation and integration efforts
- Transferring knowledge and skills to the ICT sector and governmental application fields
- etc.

In the following, we report the methodology and results of a study carried out within a European project eGovRTD2020.

## 2 eGovRTD2020 and the Methodology

### 2.1 The eGovRTD2020 project

The main objectives of eGovRTD2020<sup>2</sup> are to identify and characterize the key research challenges, required constituency, and possible implementation models for holistic and dynamic governments in 2020 and beyond. Thereby, the vision of eGovRTD2020 is to transform the European Government landscape into a coherent community, anticipating customer needs and leveraging the potential of public agencies. eGovRTD2020 shall, through its visionary and strategic recommendations, contribute as well to the European Community to become the world leading knowledge society.

The findings of eGovRTD2020 shall build a baseline for the 7th Framework Programme of the European Commission in respect to eGovernment research themes and priorities. It shall also provide a guideline for national research programmes to support innovative RTD for public sector responsibilities and a highly innovative knowledge society.

In order to reach such challenging objectives, the project started with a review of the current status of eGovernment research. The findings are reported in this paper. Thereafter, a series of regional scenario-building workshops was carried out, in which government, academic, and other participants collaborated to describe possible futures of governments, society and ICT in 2020.<sup>3</sup> Subsequently, a gap analysis was carried out in order to assess the differences between today and possible future scenarios for eGovernment in 2020. On this basis, a detailed research roadmap for the transformation process will be developed within further targeted workshops. The roadmap shall address emerging technical, organisational, social, economic, and political research alike.

### 2.2 Methodology for analysing the state of play

The methodology to investigate the state of play in eGovernment research is based on desk research. The study considered research initiatives, research activities, as well as research programs and strategies in different countries and globally. This kind of research extracted its findings from existing relevant literature. The aim was to scan the current eGovernment research landscape including main eGovernment strategic documents in Europe and globally. For this purpose, foresight studies, research efforts of governments and other research institutions, strategies and policies of eGovernment research both short- and long-term have been investigated. To make the state of play report a valuable result, the impacting aspects of eGovernment and eGovernment research, both present and future, were considered as well. The analysis of relevant material was structured around the following dimensions:

- current research programs in eGovernment, eGovernment research strategies of the different countries and sources of funds
- current eGovernment policies and strategies in Europe, America and Asia-pacific region relevant for eGovernment research
- main relevant (running and finalized) research projects around the world.

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<sup>2</sup> See <http://www.egovrtd2020.org/> for more details.

<sup>3</sup> For further details see Deliverable D 2.1 at the project website (<http://www.egovrtd2020.org>) and [2]

The analysis results have further been structured along the following research areas (see also Figure 2):

- ICT related research, including new and innovative technologies that might be of interest in future eGovernment applications.
- Government modernisation research, including organisational change, networked governments, new business models, new public management, citizen integration, customer orientation, etc.
- Research in legal groundings and economic issues in Government modernisation based on ICT diffusion
- Research in society evolution, people using ICT as a daily support tool, people rejecting ICT, people expecting governments to serve in traditional mode, society change, problems of societal change such as digital divide, ICT illiteracy, ICT addiction, etc.

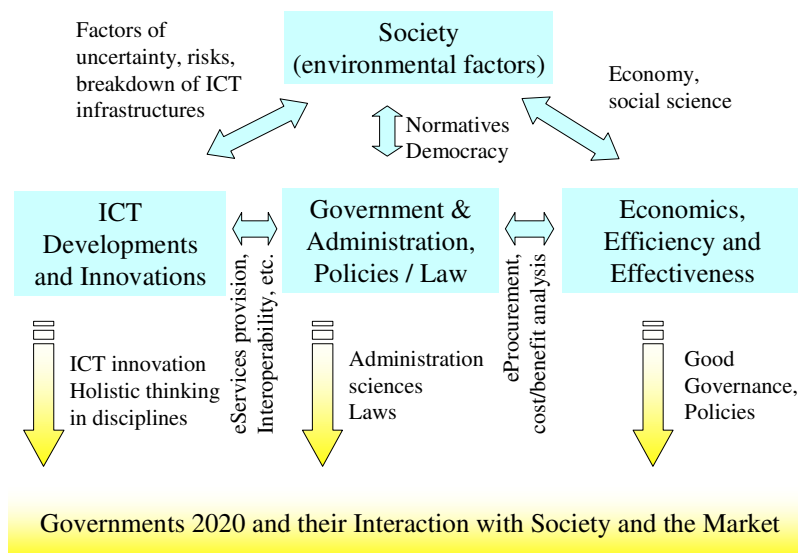


Figure 2: Identification of research areas (in grey/turquois) and competencies along certain relations of areas (arrows): the methodology used to investigate the state of play in eGovernment research

A concluding reflection of the overall overview of programs, themes, and future trends in the distinct dimensions of eGovernment research was carried out to assess the future needs and weaknesses of current research.

### 3 Findings from the state of play study

The central task of the first project phase was to collect, summarise, describe and compare information about the main eGovernment research programs and policies, as well as existing eGovernment research strategies in Europe, America and Asia-pacific region. Current available studies discussing eGovernment research and development of the near future were as well considered. Special attention was given to technical, political, administrative, organizational and social influences to eGovernment research.

The state of play covers EC related strategic documents concerning eGovernment and compares it to national strategies of some European Member States. Furthermore, it covers

the results and recommendations of several foresight studies. In the following, the most important findings are reflected. The results are clustered into

- a) EC related strategic documents,
- b) ICT related research programs and strategies,
- c) Programs and strategies to support government modernization research,
- d) Research programs and strategies to investigate society evolution, and
- e) Strategies and programs to spur innovation and change.

### 3.1 EC related strategic documents

Within the EU, most member states do not have own eGovernment research policies. Instead, they focus on guidelines the EC allocated through the Lisbon strategy [17] or the i2010 initiative targets [3]. As a result EU member states concentrate on more investment and innovation, particular in increasing the speed of innovation development and productivity. Other key targets are to set up a single European information space and promote an inclusive European information society.

Other EC programs related to the i2010 strategy and the eEurope Action Plan [9] are for example the MODINIS program, the Interchange of Data (IDA) and Interoperable Delivery of Pan-European eGovernment Services to Public Administrations, Business and Citizens (IDABC) programs [15], eTEN (Trans-European Networks) [12].

Table 1 depicts the list of topics extracted from the current available literature research of the above named EC related strategic documents.

Research topic	EC related documents
Trust and security	FP 5, FP 6, MODINIS, eTEN, FISTERA, EICTA
understanding individual user needs	FP 6, MODINIS, eTEN, FISTERA, EICTA
harmonization and interoperability	FP 6, IDABC, MODINIS, eTEN, FISTERA, EICTA
Inclusive European Information Society	FP 5, FP 6, MODINIS, eTEN, FISTERA, EICTA
socio-economic inclusion	FP 5, FP 6, MODINIS, eTEN, EICTA
access for all to government services	FP 6, MODINIS, FISTERA, EICTA
Health	FP 5, FP 6, MODINIS, eTEN, FISTERA
knowledge management	FP 5, FISTERA
Investment	EICTA
value chains	eTEN, FISTERA

Table 1: Top EU level research topics found in EC related documents

Looking up the named research priorities resulting from the EC related strategic documents, a clear focus is on the investigation of trust and security, followed by understanding the individual user needs and interoperability. These aspects can be seen as ICT driven research, while other factors such as Inclusive European Information Society, socio-economic inclusion and access for all to government services belong rather to socio-economic research.

### 3.2 ICT related research programs and strategies

Many existing studies identified accessibility and broadband availability as crucial factors to follow the Lisbon strategy [17] and the i2010 targets [3]. Especially, access for all to government services requires socio-economic research on the needs of certain target groups; for instance elderly and disabled citizens [4] [22]. Therefore, the accessibility of information via indexing and structuring data e.g. through semantic web or data mining have been identified as important topics to be investigated [5]. Furthermore, multi-channel accessibility and access [18] through mobile devices shall become available [11] [25] [5].

Seamless data exchange calls for improved harmonization and interoperability. Consequently, standardisation calls for basic infrastructure technologies and domain specific technologies. Especially in respect to the approach of a single access portal, semantic interoperability [6] is required to support avatars and intelligent agents, which will lead users through complicated proceedings and which will route them to the back-office.

Besides, continuous focus on creating trust and security is being recognized by national and international ICT research. Of particular interest are authentication and identification for interaction purposes. Especially, biometrical identification is promoted by governments [8]. Furthermore, a need to intensify research in the field of permanent document identity and identifiers could be extracted [1].

### 3.3 Programs and strategies to support government modernization research

Government modernization research can be divided into two research areas: First, the interaction between government and citizens or businesses, which requires research to understand user needs and develop user-centric systems. Particular attention should be given to the interfaces between both, citizens and government, and between human beings and ICT in general [7] [19] [4] [20]. Second, government modernization at the so-called back-office; here, research has to focus on knowledge management, which shall support the sharing of experiences, good practices and information [13][1]. Furthermore, research on providing cross-organisational workflow management is strongly linked with interoperability and new ways of shared services over the Internet [6]. Especially, the seamless exchange and storage of documents necessitates further research, both at technical and organisational level [1].

Among the current sectorised foci, eProcurement research is stressed by many of the existing studies [18] because it creates high impact and benefits to both, public agencies and businesses. Consequently, current research focuses the development of common solutions and standards for an appropriate electronic public procurement across Europe and across all levels of the public sector [19].

### 3.4 Research programs and strategies to investigate society evolution

A main objective the EC set up for the next years to realize is the development of an inclusive information society and to improve quality of life [3]. To reach that goal citizen empowerment could be identified as a crucial factor [10] [4] [14]. Many existing studies describe that socio-economic research in the area of how to empower citizens to participate in the information society is a must. Particular attention needs to be given to support life-long learning [4] [14] through the development of eLearning methods and systems [14][13][22]. In particular, the needs of an ageing society and of people with special needs should be taken into account [3].

A focus on ambient intelligence [18] and eHealthcare services [22] are further themes research is currently investigating. Challenges to be solved are to understand the social characteristics of the health domain and to develop innovative socio-technology applications. This requires as well technical standards and guidelines to ensure compatibility, interoperability, scalability, and reliability [20].

### 3.5 Strategies and programs to spur innovation and change

Up to now, innovation mostly takes place at the business sector. The public sector mainly picks up existing ICT and adapts it to its needs (if at all). However in some cases, solutions are not suitable for the public sector. Especially in critical areas of identification, trustworthiness and privacy, the public sector needs targeted solutions which the private sector just does not require. Also, some sectors are specific to the public sector, so innovation is key in the government settings in order to reach the targets of the Lisbon agenda or of i2010. In order to spur developments in the public sector and for the specific needs of governments and society, specific research needs to strengthen innovation within that area.

## 4 Comparison of eGovernment policies and strategies

In the eGovRTD2020 state of play analysis, the views and foci of the existing studies and the current situation of eGovernment research have been compared. Table 2 gives an overview of the ten most emphasised eGovernment research topics extracted from both, the EC related documents and the EU Member States strategies and policies. The priority was set up by ranking the topics of interest according to their number of occurrences.

EU level topics of interest	Country level topics of interest
Security and trust	Security and trust
Understanding individual user needs	eLearning
Harmonization and interoperability	Co-operation between public and private sector
Inclusive European Information Society	Added value service generating and delivery
Socio-economic inclusion	Understanding user needs, user-centric service delivery
Access for all to government services	Identity management and authentication
Health	eInclusion
Knowledge management	Interoperability
Investment	Broadband technology and access
Value chains	eProcurement (eCommerce, eBusiness)

Table 2: Ranking and comparison of the research priorities extracted from EC related strategic documents and national EU member states strategies

Within the EU, most member states adopted their own eGovernment research policy from the guidelines of the EC (Lisbon strategy [17] or i2010 initiative [3]). As a result, EU member states currently concentrate on more investment and innovation, particular in increasing the speed of innovation development and productivity. The set-up of a single European information space and promotion of an inclusive European Information Society is being found in many strategic documents at national level as well.

Table 2 shows that both the EU as a whole and national governments in detail strongly focus on ‘trust and security’ issues. Since customers expect eGovernment services to be secure and trustworthy. This is a natural observation. Because a lot of personal data interchange and critical data, which must not be changed or misused through electronic transmission, is dealt with in public service provision, also ‘identity management and authentication’ have a high importance in various countries.

Similar to EC related topics, some countries emphasize digital divide related topics such as ‘eLearning’, ‘Inclusion’, and ‘user-centric service delivery’. These topics cover the need to empower citizens to take part in the Information Society. Particular attention is given to value added service generation for both the general public and handicapped citizens like elderly, disabled and socially unprivileged.

As was noticed (not surprisingly), research programs for innovation in eGovernment are barely provided at national level and in national innovation programs. Currently, most research funding in Europe is provided by the EC. Even national support for take-up and exploitation of international research results is only claimed to be provided in the near future, but barely provided already.

## **5 Outlook**

As the state of play analysis enlightens, only a few number of countries has currently eGovernment research programs or strategies in place. In most cases, countries concentrate on implementing eGovernment without the help of research. One could ask, whether eGovernment research is not needed. However, dissatisfaction about the implementation success shows that sole take up of solutions or quick implementations may not be the most successful way. In order to better understand the possible successful ways to modernizing the public sector with the drive of ICT usage, research of the field plays an important role.

The paper at hand demonstrated the current investigations and research activities in the field. Do we really address the right issues in research in order to bring the expected benefits to the application? Is research at all consulted in the implementation of eGovernment? Do we already have a proper understanding of the field so implementations can go on straight forward? Experiences tell us the opposite.

The state-of-play report carried out within the eGovRTD2020 project demonstrated that a much closer dialogue between research and application is needed. Research should be more strongly involved in large and strategic eGovernment developments at national and regional level of governments. Also, practice needs to enquire the help of research. Since the research field is rather young, it still needs support to establish a common understanding of the field. It also needs to communicate its findings proactively. Consequently, a much stronger dialogue among research and practice is needed.

Within the eGovRTD2020 project, future priorities in eGovernment research are being identified for Europe and globally. The approach in the project is to depict future scenarios of governments in 2020 via scenario methodology and to derive a research roadmap for eGovernment. The recommendations developed shall support strategic decision makers at EU, national and regional level to strengthen eGovernment research via specific research programs and by involving research more heavily in implementation projects of governments – especially in large strategic projects.

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