An Exploratory Framework for Future E-government Research Investments

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Abstract

After more than a decade of e-government research, little work has been done to envision the longer term future of government and society and the unanswered questions associated with such a vision. This paper reports the results of a survey of thirteen future-oriented research themes generated by an international research partnership. The survey generated responses from 383 experts in 54 countries. It revealed strong consensus on the overall importance of future e-government research, as well as a small number of differences among regions and stakeholder groups regarding the relative importance of individual themes. The study also produced a four-factor framework for organizing and classifying e-government research that comprises relevance, confidence, interoperability, and innovation as interacting elements of any future vision of e-government.

1. Introduction: in search of a framework for e-government research

E-government (or digital government) research has been in progress since the mid 1990s. Research is most extensive and advanced in Europe and the United States, but significant work is also now being conducted in Asia, India, Latin America, and other parts of the developing world. The first phase of e-government research focused mostly on ways to devise, implement, and evaluate online information and services to citizens, as well as on citizen involvement in the decision making processes of government. The few general frameworks [13] [15] that focus mostly on this relatively narrow aspect of e-government, i.e., the direct relationship between government and citizens.

In Europe, e-government research has been embedded in the Information Society Technologies (IST) program which addresses the goals of i2010 [11] and the Lisbon Agenda to create within Europe the world's most advanced knowledge society. Accordingly, extensive research has been supported in the various Framework Programs associated with IST, nearly all of which has included both academics and industry participants as well as specific development and deployment goals in addition to the generation of new knowledge.

In contrast, the US National Science Foundation Digital Government (DG) research agenda does not specify research topics, particular development goals or desired outcomes (beyond the expectation of generating new knowledge useful to government). Instead, the federally-funded DG research agenda in the US has emerged over time through both investigator-driven proposals and NSF-funded workshops organized by university researchers from a variety of fields. These workshops [such as 4,6,7,8,10] usually involve government officials as well as academics. They have helped to identify key issues within the domains of government that could benefit from formal research partnerships between universities and government agencies at the national, state, and local levels. The US research "agenda" therefore comprises an eclectic set of topics and problems, in contrast to the European approach which connects research funding to overarching governmental goals.

Nationally-supported programs in other countries tend to be modest in size and scope. Some follow the structured EC model and others are more open-ended as in the NSF model. Under all of these programs, researchers world-wide have been conducting e-government research using a number of different funding mechanisms at every level of government [16].

Academics have begun to debate whether e-government is an academic discipline or a more broadly based field of inquiry, or whether it will simply be absorbed by more traditional disciplines [5]. Others contend that the current approaches contribute little to either theory or practice [17, 18]. At the same time, governments have developed and deployed hundreds of e-government applications, mostly oriented toward providing access to government information or delivering transaction-based services to citizens and some businesses. While there is growing acknowledgement that e-government goals challenge the capacities of traditional government organizations

and processes to make effective use of ICT as a strategy for effectiveness and innovation [19], back office transformation projects, cross-boundary relations, effectiveness, and impact have been less studied. Very few observers have offered a future-oriented view of e-government using scenarios that emphasize selected dimensions such as the degree of government intervention in the economy and citizen attitudes toward privacy and surveillance [14]. While debate about focus, rigor, and impact abounds, the e-government research agenda is clearly not close-ended, nor is it finished. However, until both government and the research community develop a broader vision for the future of ICT-enabled government, research programs are likely to remain narrowly focused and may become marginalized or diminished.

2. eGovRTD2020 – envisioning the future of government

A future-oriented approach to e-government research is just beginning. In recent years, many EU Member States have revised their existing strategies for public sector modernization and eGovernment transformation. However these strategies and activities usually take a short to mid-term perspective of 3-5 years [13].

By contrast, eGovRTD2020 [1], co-funded by the European Commission under the 6th Framework Programme of IST, takes a 12-to-15-year view. A research partnership across Europe, the US, and Australia, it tackles the challenge of envisioning the future of government and the role that ICTs will play in it. The project rests on an argument that e-government research is needed to nurture those developments we want to enable in the longer term – and to avoid possible futures that are not desirable. It therefore is designed to sketch eGovernment in 2020 through both scenario building and roadmapping methodologies with the goal of generating a richer future-oriented research agenda for advancing effective and democratic e-government.

2.1. State of play, scenarios and gap analysis

The project began with a State of Play review [16] which summarized the current topics and status of e-government research in Europe, the US, Australia, and parts of Asia. This phase was followed by scenario building [9] developed in regional workshops with experts from governments, information and communication technology industry and academia. The scenarios offer alternative futures where the idea is that the 'real' future for e-government in 2020 lies in some combination of possibilities. In general, none of the scenarios consider technology to be the key element of the future. Instead, technology is one of a number elements (along with societal and environmental forces) that can lead to innovation. The workshop participants developed 29 scenarios and then the project team consolidated them into eight archetypes that lie along several key dimensions: trusted vs. distrusted government; full-service vs. core business government, and a stable vs. a disruptive environment. On a global scale, the scenarios offer insights into broad social, political, and demographic concerns that will shape both government and society in the coming decades.

A gap analysis was then performed to compare the current state of e-government research to the situations depicted in the eight scenarios. Through an analysis and validation process, two kinds of gaps were identified – topics that are currently being researched but not in a way that addresses the implications of the future scenarios, and gaps that pertain to new and different conditions generated by the scenarios that are not currently the subject of research. The gaps were then elaborated and linked to a number of research themes that address them.

Based on these results, roadmapping workshops were conducted in Europe, the US, and Australia to refine the themes and generate mid- and long-term research actions to address them. As a final step, the research themes were assessed and refined jointly by the international project team and were then organized into thirteen broad areas [2]. This final set of themes was then the subject of an international online survey to validate them and ascertain the relative importance of each theme as an area for future research investment. The remainder of this paper presents the design and results of that survey.

2.2 Resulting research themes

The thirteen themes that comprise the e-government research roadmap were specified as follows:

- *Trust in eGovernment.* Trust is a fundamental element in all aspects of government, including eGovernment. However, the processes by which trust is built, destroyed, used, or abused are poorly understood and differ from one culture to another. What conditions are necessary and what mechanisms are needed to build and maintain trust in eGovernment processes and services?
- *Semantic and cultural interoperability of public services*. Globalisation and population movements are making societies increasingly multicultural. In principle, increased Internet access and the potential of the web for communication and education should bridge cultural boundaries. Yet,

cultural and language differences continue to block effective communication and action across different countries, groups, and governmental functions. How can semantics, ontologies, or other approaches address this cultural interoperability problem? How can consistent public services be provided across cultures and languages?

- *Information quality*. Governments, the market, and individuals increasingly need well-defined, timely, accurate, reliable and appropriate information drawn from many sources. In the future, guaranteeing information quality will become both more important and more difficult as the number and variety information sources (including informal sources such as wikis and blogs) continues to grow. What mechanisms are needed to find, select, evaluate, and authenticate information that is appropriate for a given use?
- *Assessing the value of government ICT investments.* After years of substantial investments of public funds, the potential benefits of eGovernment can no longer be assumed, but must be demonstrated. What frameworks, methods, and metrics are needed to appropriately monitor, evaluate, and communicate the costs and benefits of these investments? What internal and external factors influence the value of eGovernment for different stakeholders?
- *E-participation, citizen engagement and democratic processes*. In using ICT, elected officials and civil servants must remain open and accountable in their activities, behavior, and decision-making. At the same time, government must ensure that those individuals and groups who wish to participate in democratic processes have the opportunity and means to do so. What are the social and technical dimensions of participatory democracy? How can the health of democratic discourse be measured?
- *Mission-oriented goals and performance management*. Many eGovernment projects do not start with the primary mission of government in mind. Instead, they are often dominated by a technology-driven approach. This is similar to the situation in which a budget is structured and evaluated by the nature of expenses rather than by the public service goals that expenditures support. In both cases management attention is diverted away from the core mission. How might a mission-centric view of eGovernment change priorities, investments, practices, and assessment of results?
- *Cyberinfrastructures for eGovernment.* Future eGovernment technology platforms could consist of a reliable, ubiquitous infrastructure that supports systems and applications assembled out of readily-available, re-usable components. However, realization of this possibility requires research in various domains including whether and how a building block-oriented ICT-industry could develop, and what types of architectures, building blocks, and standards are needed.
- *Ontologies and intelligent information and knowledge management (KM)*. Governments are currently struggling with huge information overloads, with new and emerging ICT capabilities, and with a shortage of information management skills and human expertise. How can ontologies and KM facilities (such as search, retrieval, visualisation, text mining, and intelligent reasoning) be exploited to achieve information quality and economy, and to support KM processes in eGovernment settings?
- *Governance of public-private-civic sector relationships*. Increasingly, governmental functions and public services incorporate significant roles for private sector or civic organizations. These roles play out in a variety of relationships from advisory, to collaborative, to contractual, to full partnerships. What principles and frameworks are needed for sharing responsibilities and exchanging information among networks of diverse organizations in ways that generate public value and satisfy public requirements for fairness, accountability, and competence?
- *Government's role in the virtual world*. Global electronic markets, virtual organizations, virtual identities, virtual products and services, and Internet-related crime are growing in prominence and importance. In a world that is increasingly non-physical and borderless, what are government's roles, responsibilities and limitations?
- *Crossing borders and the need for governance capabilities*. The scope of problems and trends that governments need to cope with vary widely in size, intensity, and complexity. Social networks, gender issues, environmental concerns, political movements, etc. reach beyond local, regional or national borders. How can government support communication, action and services across traditional borders and what governance networks are needed in such diverse cultural / technical / political contexts?
- *eGovernment in the context of socio- demographic change.* Demographic trends with global consequences (such as age distribution, wealth

distribution, immigration, and mobility and distribution of workers) are generating pressing issues in both developed and developing countries. What opportunities and risks do these demographic movements imply for governments at the various administrative and political levels? What ICT and eGovernment services will be needed in such an environment?

- *Data privacy and personal identity*. On the one hand, the potential of modern ICT could be exploited to take advantage of personal information to improve the performance and quality of government services. On the other hand, privacy and personal data need to be secured and protected in order to prevent misuse and fraud. What policies, protocols, and data management mechanisms are needed to balance individual privacy protection with effective and efficient use of that information by government?

3. Survey methodology

The survey was conducted on line between February and April 2007 [3]. The population consisted of all participants in the 21 previous project workshops as well as members of selected listservs associated with e-government.

Members of the eGovRTD2020 project team distributed the invitation to participate in the survey to these listservs and to all individuals who had participated in the workshops they had personally organized. The invitations briefly described the 2020 project goals and invited addressees to lend their expertise to the project by completing the survey. A direct link to the survey instrument was provided. Team members also distributed the same invitations to the e-government-oriented listservs in which they each held membership. These listservs included IS World/Egov SIG, the Public and Nonprofit Division of the Academy of Management, the American Society for Public Administration, the European eGov Society, the Digital Government Society of North America, the US National Association of State Chief Information Officers, Democracy On-line, the Association of Policy Analysis and Management, the Association of Internet Researchers and others. In this way, the invitation was broadly distributed to relevant groups around the world.

Given the nature of listservs, the total N of the survey population is unknown, although the professional interests of the target population are well established. As a consequence, we are very confident that the respondents are relevant sample of the community interested in e-government, but we do not know the extent to which the respondents are representative sample of various sub-groups. Accordingly, the data analysis described below is a first exploratory look at the opinions of this community, and not a definitive study.

In this exploration, a number of statistical analyses were conducted to help construct a preliminary framework for future e-government research needs, to identify the strength of apparent consensus (if any) about the importance of various themes, and to probe for apparently important differences across regions or stakeholders. The results can be used to design more refined tests of these questions in the future.

Respondents were asked to assess the importance of the thirteen research themes for inclusion in future investments in e-gov research. Each theme was briefly described as shown in section 2 above and each one was additionally characterized by 3-5 key words. Respondents were asked to assess each theme on a scale from one to six where 1 = not at all important and 6 = extremely important.

Respondents were also asked two demographic questions: to identify the country in which they were then working, and to identify themselves with one of seven stakeholder groups which most closely matched their own professional expertise The group were International Public Institution, National Government, Regional Government, Local Government, ICT Industry, Academia, and Consulting

4. Survey findings

4.1 Respondents

The 383 respondents listed 54 different countries in response to the question about where they were working. These countries were then categorized for further analysis into the 6 regions shown in Table 1.

Respondents were distributed across the stakeholder groups as follows: International Public Institution (9.3 percent), National Government (6.5 percent), Regional Government (5.7 percent), Local Government (5.4 percent), Academia (63.2 percent), ICT Industry and Consulting (9.8 percent)

Table 1. Regional Distribution of Respondents

Region	N	percent
Old Europe (E10)	190	50.8
Latin America	14	3.7

US/Canada	86	23.0
Developed Asia	9	2.4
Other Developing World	19	5.1
Australia/NZ	17	4.5
New Europe (New EU members and aspiring members)	39	10.4

4.2 Importance of themes

Overall, the respondents rated all of the themes as moderately important, with mean scores between 3.24 and 4.17 on the six-point scale. Table 2 shows the mean scores on the question of importance of each theme for investment in future e-government development. Eight of the 13 scored at or above the mid-point of the scale (3.5), indicating relatively high importance for respondents as a whole.

Table 2. Mean Ratings of Importance for Future E-government Research Themes

	N	Mean	Std. Dev.
Data privacy and personal identity	373	4.17	1.043
Trust in e-government	377	4.06	1.127
Information quality	374	3.89	1.126
E-participation, citizen engagement and democratic processes	371	3.82	1.161
Ontologies and intelligent information and knowledge management (KM)	371	3.58	1.309
Governance of public-private-civic sector relationships	373	3.58	1.239
Assessing the value of government ICT investments.	377	3.55	1.271
Mission-oriented goals and performance management	374	3.50	1.257
Crossing borders and the need for governance capabilities	372	3.40	1.303
Government's role in the virtual world	370	3.40	1.233
eGovernment in the context of socio- demographic change.	372	3.28	1.288
Semantic and cultural interoperability of public services	375	3.27	1.318
Cyberinfrastructures for eGovernment.	373	3.24	1.297

4.3 Differences among regions and stakeholders

A set of statistical tests was performed to probe for differences among stakeholder groups or world regions with respect to the importance of each of the four categories described above. As a result of the application of several parametric and non-parametric tests for differences in group means, only a few differences emerged.

For the majority of themes, there was no statistically significant difference detected among the regional groups. No differences were apparent in the mean importance ratings for the most highly rated themes of trust, and privacy and identity, nor for the two lowest rated themes, semantic and cultural interoperability and cyberinfrastructure. There were also no statistically significant differences among stakeholder groups for cross-boundary governance or government's role in the virtual world. This pattern suggests that there is general agreement that trust, privacy, and identity are the most important areas for future study, while there is some common interest in topics that pertain to the changing role of government, and agreement that technical data and IT topics are perhaps less urgent overall.

Statistically significant differences (ANOVA, $p < .05$) did emerge for information quality (rated as more important in Latin America and new/potential EU member states), assessment of the public value of ICT (rated less important throughout Europe than in the rest of the world), mission orientation (rated more important in Asia and the Developing World than elsewhere), and ontologies and knowledge management (rated more important in Latin America, Other Developing Countries, and new/potential EU member states). This pattern may indicate stronger interest in emerging democracies in the need for reliable, authentic, standardized government information and for e-government investments that move an entire government toward a higher value and functionality within society.

Finally, both old and new/potential European states rated ICT value assessment lower than did other regions of the world. In this pattern, it may be that the "value proposition" or "value for money" calculation of e-government is less pronounced in the social welfare environment Europe than in other countries.

Because the academic stakeholder group comprised more than 60 percent of the respondents, the overall results are clearly skewed to its interests. To try to reveal the extent of this bias, all the other groups were combined into a single government/industry group in order to conduct reasonably valid comparisons with the academic respondents. The mean scores of these two groups were then compared. Three themes showed statistically significant differences between these two groups: assessing the public value of ICT investments, governance of public-private-civic relationships, and e-participation in government decision making. In all three cases, the academic stakeholders rated the theme

Table 3. Factor Analysis of Research Themes

Themes	Underlying Categories			
	Innovation	Interoperability	Confidence	Relevance
Assessing the value of government ICT investments.	.176	-.100	.098	.774
Mission-oriented goals and performance management	.200	.159	-.049	.714
Trust in e-government	.250	-.061	.727	-.115
Data privacy and personal identity	.100	.192	.730	.040
Information quality	-.107	.313	.625	.245
Semantic and cultural interoperability of public services	.151	.710	.048	-.183
Cyberinfrastructures for eGovernment.	.158	.566	.141	.366
Ontologies and intelligent information and knowledge management (KM)	.033	.749	.192	.092
E-participation, citizen engagement and democratic processes	.617	-.107	.068	.114
Governance of public-private-civic sector relationships	.626	-.072	.187	.271
Government's role in the virtual world	.605	.172	.025	.130
Crossing borders and the need for governance capabilities	.694	.364	-.024	-.081
eGovernment in the context of socio- demographic change.	.566	.314	.138	.167

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
337 cases using listwise deletion.

as more important than did the composite of the other stakeholders. These three themes are already the focus of a fair amount of e-government research, which may partially explain the stronger rating by the academics. They also tend to be second order concerns for government actors, whose more immediate concerns tend to focus on service delivery and cost-containment rather then these more structural and value-laden topics.

5. Factor analysis: an underlying framework

In order to investigate relationships among the themes that might present a more parsimonious set of research categories, a principal component factor analysis was performed, using Varimax rotation and listwise deletion of missing data. In all, 337 cases were included in the analysis. A variable was considered to be associated with a factor if its factor loading was 0.4 or higher. The results are displayed in Table 3.

The themes clustered together into four factors each of which can be associated with a more general underlying concern. These were labeled "Relevance," "Confidence," "Interoperability," and "Innovation."

Relevance pertains to the themes of mission-orientation and assessment of the public value of ICT investments. Both of these themes direct attention to the ways in which ICTs may be used to accomplish the purposes of government. They reflect a frequent observation encountered in the study that ICT-driven research as well as ICT-driven governmental change often lead governments to divert their attention to ICTs *per se*

rather than to the ways in which these tools can assist them to carry out their main public purposes.

Confidence encompasses themes of trust in e-government, personal privacy and identity, and information quality. These three themes, taken together, cover the wide range of concerns that citizens, businesses, and government entities all share when considering how information is gathered, managed, used, and shared in e-government initiatives and applications.

Innovation covers a set of four themes that comprise the ways in which traditional government structures and functions are changing or could be changed by advanced ICTs. These themes include greater involvement of citizens in decision making; governance of networks of organizations that cross public, private, and civic sectors as well as regions and levels of government; recognition of the effects of global social and demographic changes, and the emergence of virtual worlds.

Interoperability addresses the final three themes (cyberinfrastructure, onotologies and knowledge management, and the need to work across semantic and cultural diversity). This set of themes represents the structures and tools that will be needed to support both confidence and innovation as well as equity and diversity within and across e-government activities and constituencies.

These four categories suggest a direction for future investments in e-government research that departs from the frameworks that look mainly at a normative framework for service delivery and citizen interaction . This direction takes a broader view of the changing nature of government in an era characterized by burgeoning amounts of information in diverse formats, ubiquitous forms of information gathering and use, and widespread flow information among many actors in society that is often unregulated and may even go unrecognized. Moreover, these four ideas interact with one another, playing out differently in different political systems and economic environments. Such a framework is analytical rather than normative. It does not suggest that there is a "best" form of e-government to move toward or to strive for, but that many different forms are possible, each with attendant costs, benefits, and consequences in different parts of the world.

6. Conclusion

The final survey of eGovRTD2020, offers some insights into the importance and the nature of a future e-government research agenda. While the survey has its limitations, the exploratory data analysis strongly suggests several conclusions.

First, it demonstrates that the themes generated through future-oriented scenario-building and roadmapping methodologies resonate in all corners of the world. All thirteen themes that emerged from a year-long effort to engage hundreds of scholars and practitioners were rated near or above the mid-point on a scale of importance for future investments. Clearly, then, an e-government research agenda continues to be relevant and important around the world. More important perhaps is the clear departure from an overwhelmingly ICT-driven view of e-government to one that is much more complex and nuanced, with sharply drawn perspectives on such matters as governance, trust, multi-culturalism, and organizational capabilities.

Second, the themes coalesce around four important values linked to the future of the public sector:

- *Relevance* of ICT investments to the fundamental mission and purposes of government,
- *Confidence* in government's intentions, credibility and performance,
- *Interoperability* among not only systems and applications but also across data sources and among languages, political systems, and cultures,
- *Innovation* in both the structure and function of the public sector including the need for engagement, roles, and responsibilities that extend beyond the government itself into the civil and private sectors.

Finally, the survey data suggest that certain topics are more salient among different stakeholder groups and regions of the world. These potential differences seem to rest on stages of democratic development, economic status and political culture, and stakeholder values. All are worthy of further exploration as e-government continues to grow as a global phenomenon.

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