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Information and Technology: Improving Public Sector Capability to Address Societal Challenges

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Abstract

This paper argues for a dedicated, social science-based research program to address the question "How do the societal context and institutional character of government interact with emerging information and communication technologies to shape the capabilities and performance of the public sector?" The ability to answer this question can only result from non-domain specific research that studies the societal context of government and the information resources and technologies affecting government. Because of government's inherent complexity and unique role as the leader in addressing the world's grand societal challenges, there is an urgent need to understand the practice context of government and how it influences the policy, management, and organizational political, and public factors that shape information use and IT applications. Currently there is a lack of research on the public sector and while there are devoted resources to government areas there is little scientific attention to the government organizations and processes that are both the sources and customers of the programs. With focus on this cross-cutting research, government can improve its capacity to serve society and researchers can seek opportunities for new theory development that links government context to the fundamental questions of organizational and technical action.

Introduction

How do the societal context and institutional character of government interact with emerging information and communication technologies to shape the capabilities and performance of the public sector? This paper argues for a dedicated, social science-based research program to address this question. The argument rests on two premises about the study of information and technology as central elements of governance and government. One premise is that the enormous scale, ubiquitous influence, and distinctive societal context of government are undervalued in existing social science research programs. The second premise is that information resources and technologies profoundly affect government's role in social, political, and economic life in poorly understood ways. We argue from these two premises that full attention to the unique context, power, and character of government in organizational research is necessary for both theory building and performance improvements. We argue further that research on information technology as a social and organizational phenomenon that ignores government as an explicit focus will be severely limited in intellectual scope and broader societal impact.

The research area we propose is worthy of a dedicated program in part because of the unique role of government as the residual claimant ("the buck stops here") in addressing grand societal challenges, both systemic and emergent. Systemic challenges are built into the fabric of US government. They include responsibilities fundamental to democracy, such as maintaining the rule of law, protecting civil and economic rights, providing transparency and accountability, and acting as the steward of vital records and information about government actions. Emergent challenges are unanticipated, episodic, and typically pose a serious threat to society, such as a major terrorist attack, a natural disaster, or a financial crisis.

Government's ability to meet these challenges is powerfully shaped by information and computing resources and the capabilities they support. That support goes far beyond management or analytical tools. The challenges of information stewardship, for example, shift and grow with technology innovation and escalating security threats. Responses require policy, technical, and organizational agility, including new IT and security strategies, to deal with emergent threats. These threats can be as specific as new malware like the Stuxnet worm or as broad a societal shift as the exponential growth of mobile device use. Research that covers such diverse issues and disciplines is sorely lacking.

Gaps in Research

This lack of research is due in part to neglect in federal research programs. NSF's SBE program website mentions *government* only five times across all 17 program areas, three of those under Political Science. There is no clear emphasis on the public sector in the SBE program, though other targeted areas receive attention (e.g., Nanotechnology Undergraduate Education in Engineering). There are dedicated federal research agencies and programs for areas deemed sufficiently important, like defense, homeland security, medicine, the environment, energy, and atmospheric sciences. These programs devote billions of dollars to R&D projects, but with scarce scientific attention to the government organizations and processes that are both the sources and customers of the programs.

Social science research communities devote only small and scattered attention to government. The American Sociological Association's 24 sections include only two related to government.

The American Political Science Association's 42 sections include only one dealing with public administration and another with IT in politics. The American Economics Association and Allied Social Science 2011 convention included only about a dozen papers bearing on government as a focus of study.

Some multidisciplinary research communities show greater interest in government. The Academy of Management Public and Nonprofit Division's 2010 meeting included 13 workshops and 30 paper sessions, roughly half on government themes. Although scholars in public administration and educational administration, public health, criminal justice, and social work devote major attention to government, they pay less attention to the roles of information and technology. The Association for Public Policy Analysis and Management's fall 2009 conference (APPAM), for example, included only four papers touching on these themes. Since 2000, two top public administration journals, *Journal of Public Administration Research and Theory* and *Public Administration Review* published only thirty papers touching on IT in government, many of which were general discussions of e-government, not empirical studies of government actions or impacts.

More narrowly defined digital government research focuses greater attention to technical questions than on information and technology as resources, outputs, or objects for policy attention. This digital government work (Scholl, 2010) comes from a variety of academic communities including members of the Digital Government Society of North America, originally founded and supported by NSF. Other communities are evident in the IT-related conference tracks that include e-government themes. These include the Hawaii International Conference on Systems Sciences and IFIP EGOV in Europe.

Government, Technology and Information

Government structure

The multi-layer, multi-functional context of government presents serious problems for research and theory building. Conceptualizing government itself presents substantial ontological difficulties. Government comprises many entities, organizational forms, missions, and ways of operating. The most fundamental building blocks of theory and research—systematic analyses and descriptions of the objects of research—are lacking. Organizational and institutional theory developed largely through research in the private sector does not suffice. We need a more fully developed and empirically grounded ontology of government entities. Institutional categories like *police agency*, or *school district* provide inadequate analytical leverage for designing organizational research. A two-car, village police department and the NYPD are both police agencies, subject to the same laws. But to say so reveals little of value about how their information and technology needs and challenges vary.

Viewing government structure as a network provides some help for understanding the government context. A small body of research shows network structures as important in government, but highly complicated and often unstable (Dawes, et al., 2009). In these network structures of shifting authority and negotiated relationships, the flow and control of information is central to effectiveness. Little is known about how these networks coordinate IT development and implementation, or manage information flows, stewardship, or sharing.

Governmental structures and policies also affect planning and investment. Long gestation IT projects face challenges from annual budgets and political cycles. Government also bears the full cost of every investment it makes; there are no tax write-offs for government. Subsidies often shift costs across levels of government, making accountability and value assessment both more important and more difficult.

Government responsibilities

One main focus of the research we propose is how IT connects with government's responsibilities, the range of which is larger and more diverse than any other type of organization. Information technologies and information needs are central to virtually all. Rather than review such a wide range, we focus on two core responsibilities as illustrations: residual claimant and information steward.

Government's role as the residual claimant for problems facing society means simply that it cannot ignore or walk away from a massive oil spill or a hurricane or any other major threat to the society. That responsibility is distributed over levels, agencies, and jurisdictions in tangled ways. IT systems that support information sharing and coordination are therefore crucial to fulfilling these responsibilities, especially in coordinating efforts in response to natural disasters, terrorism, and other emergent crises. Existing models are inadequate for understanding and improving how these complex webs of government actors and actions work in these critical situations.

Government's responsibility as information steward for society is diffused throughout many agencies and levels. These responsibilities expand with the exponential growth in information, especially in digital form. Maintaining security, authenticity, integrity, and long-term access are thus especially difficult, particularly for maintaining vital records (marriage, death, property ownership, etc.) and for assuring transparency and accountability. Recent efforts to increase openness in government have exposed extensive organizational and technical challenges requiring additional research.

The need for nontechnical research on technology and information

Research focused on the technical components of IT is insufficient to meet the challenges and responsibilities governments face or to model information and technology in practice. Recent research framing these issues in terms of the *practice turn* emphasizes the importance of context in understanding the nature and outcomes of practice. We argue for a research program that recognizes the practice context of government and how it influences the policies, management frameworks, organizational cultures, political interests, public expectations, and ideologies that in turn shape information use and IT applications.

Summary

Pursuit of digital government research requires a strategy to overcome cultural and organizational barriers. This kind of non-domain-specific research incorporates multiple streams from political science, computer science, organization science, information science, sociology, and other fields. Incentives for research in traditional academic disciplines do not extend easily

to scholars performing cross-cutting research and even discourage or penalize multidisciplinary work that does not conform to the dominant norms. The risks for scholars can be substantial and may diminish prospects for transformative research.

These risks diminish when NSF legitimizes and supports multidisciplinary research in cross-cutting programs of this kind. The Digital Government Program began a bit more than a decade ago when some of the nation's finest computer, information, and social scientists and government practitioners designed a digital government research agenda for the National Science Foundation (Dawes et al. 1999). That effort spawned a community that has grown in size, significance, and ability to create new knowledge about the phenomenon of digital government and to translate that new knowledge into practice. Although NSF support discontinued after five years as planned, the program met its primary objectives: creating a new body of research and an active community with conferences, journals, and professional associations. The projects supported ran a gamut from computer science to social science, although a majority focused on the more technical aspects of digital government.

Other cross-cutting programs supported significant research on government and IT, particularly the Information Technology Research and Knowledge and Distributed Intelligence programs. Currently the CISE Information and Intelligent Systems program includes topics of the sort advocated here. These programs can help advance the research agenda we propose, but they have a discipline-based mission and typically a short life that hinders long-term development.

Sustained commitment and support is needed to expand the cadre of experienced scholars, who are the primary infrastructure necessary to advance digital government research. Building this cadre will require cross-cutting approaches to education and participation in research. The kind of multidisciplinary discoveries needed rely on networks of colleagues and clusters of related research. This can be fostered by post-doctoral fellowships program where recent PhD students can work in cross-disciplinary research centers. Support for scholars to work directly with or in government agencies would help build the experience and insights necessary to design and conduct field studies involving public policies, IT systems, and their interrelated processes and outcomes.

Without a research program of the type we propose, the existing digital government research community will likely continue to pursue narrow questions and limited goals with some NSF support. However, opportunities to develop a more comprehensive, innovative, or integrated approach are unlikely to emerge. Without the legitimacy of NSF-sponsored research programs, research on government IT is less attractive to junior faculty and students, who will incur the greatest risk for taking this path. Opportunities for new theory that links the government context to the fundamental questions of organizational and technical action will be diminished or lost.

More importantly, opportunities to improve the capacity of government to serve society will surely be missed. The challenges facing governments in the US globally are growing in both complexity and risk. Climate change, terrorism, fragile financial systems, energy depletion, natural disasters, and many other threats strain the capability of governments to respond. Information and technology are central to that capability, and remain understudied and poorly understood components of government and governance. We thus return to our opening question:

How do the societal context and institutional character of government interact with evolving information and communication technologies to shape the capabilities and performance of the public sector? The research community can make important contributions to answering this question with the sustained support of a dedicated NSF program.

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