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Information, Institutions and Governance: Advancing a Basic Social Science Research Program for Digital Government

Jane E. Fountain

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INFORMATION, INSTITUTIONS AND GOVERNANCE

Advancing a Basic Social Science Research Program for Digital Government

Jane E. Fountain

National Center for Digital Government
INTEGRATING INFORMATION AND INSTITUTIONS

HARVARD UNIVERSITY
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INFORMATION, INSTITUTIONS AND GOVERNANCE

Report of the May 2002 National Workshop
Developing a Basic Research Program for Digital Government

Center for Business and Government
John F. Kennedy School of Government
Harvard University

Sponsored by
The National Science Foundation

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INFORMATION, INSTITUTIONS AND GOVERNANCE

Advancing a Basic Social Science Research Program for Digital Government

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The National Center for Digital Government

The National Center for Digital Government at the John F. Kennedy School of Government, Harvard University was established with support from the National Science Foundation to build international research capacity at the intersection of information technology, governance, and organization. A primary goal of the Center is the application and extension of the social and applied social sciences to strengthen digital government research. For more information regarding the Center, see the National Center for Digital Government website at http://www.ksg.harvard.edu/digitalcenter.

This report may be cited as Jane E. Fountain, "Information, Institutions and Governance: Advancing a Basic Social Science Research Program for Digital Government," National Center for Digital Government, Kennedy School of Government, Harvard University, September 2002. All correspondence should be directed to the author at the National Center for Digital Government, Harvard University, John F. Kennedy School of Government, 79 JFK St., Cambridge, MA 02138 or by email at jane_fountain@harvard.edu.

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This report represents the central topics of discussion addressed at the workshop. Not every comment or perspective of the workshop participants is represented equally here, however the contents attempt to be faithful to the main points of discussion and key "findings" of workshop participants in their deliberations. All errors of fact or interpretation are the responsibility of the author not the workshop participants or the National Science Foundation.

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EXECUTIVE SUMMARY

To provide guidance and discussion meant to support the development of the Digital Government Program to include research in the social and applied social sciences, more than 30 experts gathered at Harvard's Kennedy School of Government in Cambridge from May 30 to June 1, 2002 for a national workshop to aid in the development of a broadly-based, multidisciplinary social science research agenda for digital government. In spite of significant innovations in information and communication technologies, digital government remains at an early stage of implementation. Moreover, the implications of IT for the future of government are as yet dimly perceived notwithstanding a stream of speculation and informed commentary on the future of democracy and governance. The timing of the workshop and the related call for proposals by the National Science Foundation Digital Government Program, therefore, is propitious along several dimensions:

1. Proactive policy decisionmaking

An important, time-sensitive opportunity exists to make a major difference in the development of digital government in the United States at the federal, state, and local levels and internationally through U.S. leadership and partnership. A strong basic research agenda can potentially save American taxpayers billions of dollars by generating knowledge and recommendations proactively rather than post mortems retroactively (Fountain and Osorio-Urzua, 2001). An applied, rigorous research agenda would clarify for policymakers and the research community the costs and benefits of alternative future paths. Researchers take a longer perspective in studies of digital government than most elected or career decisionmakers can take in their decisionmaking roles. Thus, research has the potential to forecast likely positive results and negative outcomes before government actions are taken and resources committed.

2. Advancement of knowledge

A coherent, focused research agenda for digital government has the potential to help modernize and invigorate the social sciences. Social science departments in most U.S. universities lag behind empirical developments in the societal use of information and communication technologies. Many academic researchers have been slow, perhaps even reluctant, to consider information technology as an endogenous variable and to take on the difficult and risky intellectual work involved in the extension and refinement of standard theories and conceptual frameworks. Thus, more attention to theory development and empirical research in mainstream social sciences has the potential both to leverage existing knowledge to better understand the information revolution and, reciprocally, to extend many twentieth century theories and concepts in which information processing is implicitly assumed to be pre-Internet.

3. Development of human and social capital

The results of the workshop are anticipated to contribute to the nation's human and social capital. This capital could be used to respond to the challenges of digital government through convening scholars and practitioners, enhancing knowledge transfer, and improving dissemination of information. A research program providing funding to scholars is likely to draw scholars to digital government research with feedback effects on curriculum and course development in the nation's colleges and universities. There is an acute need for digital government expertise in the form of faculty, research, and course materials in social science programs and in professional schools of public policy, the institutions that train government decisionmakers and career civil servants.

The workshop in Cambridge brought together researchers from several disciplines and applied fields, including political science, computer science, public policy and management,

sociology, psychology, and organizational behavior. Active participation of federal and state government officials at the cutting edge of digital government added expertise concerning practical priorities, feasibility, and the current state of practice and knowledge.

The purpose of the workshop was to broaden and deepen the research base for digital government by drawing more extensively and strategically on the social and policy sciences to expand the range of theories and conceptual frameworks that might be leveraged in this domain. A powerful research base is intended to foster a stronger democratic society; to build capacity for policymaking, government operations, and service delivery; and to maintain the ability of the United States to lead digital government research and practice internationally.

In some cases, the outcome of digital government research will be to diffuse the use of information technologies in government more quickly. But other research findings may slow diffusion by revealing potential negative consequences of planned uses of IT in government. In all cases, the results of digital government research should be to provide knowledge and tools that improve governance in two fundamental ways. First, research findings should improve existing government programs and processes by increasing speed, transparency, and convenience and by lowering costs. Second, digital government research fosters the development of new government capacity by enabling new types of programs, organizational forms, service delivery mechanisms, and policy design.

A set of questions posed to participants before and during the workshop structured the workshop:

1. What are the most important impacts of information technologies on the structure and processes of government organizations? Which impacts are already discernible? Which are likely to emerge during the next decade?
2. Reversing the causal arrow, how are public managers and policymakers using information technologies to craft new

organizational forms or to make important modifications to present forms? What decisionmaking and problem-solving processes are emerging as the principal means of mutual adjustment?

3. What is the impact of increasing use of information-based, networked forms of organization on the institutional structures – for example, oversight, budgeting, accountability systems – that regulate governance?
4. What perspectives, theories, conceptual frameworks, and methods seem particularly useful for the study of the developmental processes and organization of digital government?
5. What forms and processes of collaboration between social, policy, and information scientists might further a research agenda for digital government? How might an organization like the National Science Foundation Digital Government Program provide incentives for the advancement of high-quality multidisciplinary research?

Participants drew from these questions to develop a set of white papers, prepared and circulated in advance of the workshop, and to elicit background papers from participants' ongoing research programs. These papers are available on the workshop website at http://www.ksg.harvard.edu/digitalcenter.

A set of critical topics, identified by workshop participants, form the basis for strategic foci of a digital government research agenda focused at the intersection of IT, organization, and governance. The four strategic areas for a basic research program are briefly summarized here and developed in greater detail in the main report:

Strategic Area 1: Information Technologies, Governance and Organizations. Central research questions at the intersection of technology, organization, and governance include the following:

- How does IT interact with the structure and processes of government organizations?
- How do institutional structures--such as oversight, the budget process, or legislation – affect the development of networked forms of governance?
- How are government managers and policy makers using IT to develop new organizational forms or to modify existing forms?
- What are the impact of IT on intersectoral, intergovernmental and interagency coordination and collaboration?
- What policy and political processes influence data integration and standards? How do they do so?

Applied research would examine practical, problem-based questions related to the topics above and would examine strategic, operational, and other management issues related to the implementation, use, and evaluation of IT in government. High priority issues encompass critical elements of government performance, including effectiveness, efficiency, accountability, access, responsiveness to citizens, federalism, and capacity for learning and innovation.

Strategic Area 2: Digital Government and its Stakeholders. Empirical research on the users of digital government is a central priority given wide speculation and predictions regarding digital democracy and citizenship in an information society. Specific research questions include:

- How do citizens actually use online government information and services?
- Is there a digital divide not only in access to equipment but also in the ability to navigate, search and query in an online environment?
- If so, how might this digital divide be addressed?
- How are interest groups and civic associations using the web?

- What are the key emergent changes that might be empirically identified and described in civic engagement?

In addition to research on users, key stakeholders requiring further research include a variety of actors who play distinctive roles in the design, development and implementation of digital government tools, applications, and systems.

Strategic Area 3: Change, Transformation, and Co-evolution. The process of change requires research separate from the topics above in order to focus specifically on the transformative processes that lie between inputs and outcomes. This category includes:

- Antecedents and consequences of specific change processes
- Catalysts and incentives for change
- Models of emergence and network development from complexity theory
- Extension and application of current theories of co-evolution, technology adoption, technology transfer, knowledge diffusion, and innovation.

Strategic Area 4: Systematic Research Design. Stronger research design in the domain of social science research on digital government would result in valid and reliable results, findings with greater generalizability, and – perhaps most important – accretion of sound research findings rather than the more fragmentary approach that has characterized the emergent domain of digital government research. A basic research agenda should include not only problem-based research but also research that draws from and, in turn, refines and reinvigorates central social science theories and perspectives. Without systematic research design, findings and methods fail to accumulate to produce a base upon which researchers can build. A basic research agenda:

- Should include a portfolio approach to investments in research that combines short-, medium- and long-range projects;
- Leverages the utility of comparative research; and
- Employs a variety of approaches, methods, and theoretical perspectives.

In addition, the workshop reaffirmed the important role played by the Digital Government Research Program in the development and support of a digital government research agenda. The Digital Government Program within the Directorate for Computer and Information Science and Engineering at the National Science Foundation pioneered support for research on the technologies and applications required for digital government. The program requires researchers to work with government agency partners in order to ground research in current, practical challenges faced by government. Moreover, it has employed a network building approach not only funding research but also building the community of scholars and practitioners necessary to produce a sustainable, coherent research agenda. The logic is compelling for a natural extension of these efforts to include central research questions of organization and governance in the portfolio of research topics associated with a digital government research agenda for the nation.

In sum, a basic research program similar to that outlined in this report is likely to yield:

- A powerful knowledge base to provide greater understanding of the interdependence among information technologies, organization, and governance for researchers, decisionmakers and IT developers.
- Research results and understanding to build more effective digital government that is responsive to citizens in terms of accuracy, speed, convenience, cost, and access; democratic in its structures and processes; and secure and reliable.

- Practical insights, tools, and frameworks for government decisionmakers and those charged with building and managing in digital government.

Recommendations

The Digital Government Program should continue to require high-quality research design, as do all National Science Foundation research programs. It should encourage systematic deductive and inductive approaches as well as confirmatory and exploratory research given the range of research questions and lack of scholarly, including applied, research in the domain of digital government.

The Digital Government Program should sponsor workshops held in cooperation with the social science research programs to continue to develop connections between major social science theories, concepts, and studies and research questions in the domain of digital government. Small incentives to social and applied social science researchers and doctoral students are likely to have a large payoff in terms of building the community of researchers and the knowledge base.

The Digital Government Program should develop a portfolio approach to research funding that explicitly incorporates social science and applied social science research in the service of understanding and influencing technological design, development and use in governance. A portfolio should include technical, social, and socio-technical projects; short-, medium-, and long-range projects; and research focused on the topics and issues described in this report, including emergent organizational forms, inter-organizational (specifically, government-to-government or cross-agency) arrangements, civic engagement and interest group behavior as well as studies of individual citizen behavior related to digital government; and explicit study of dynamic systems including models of change, transformation, co-evolution, and learning.

Comparative research should be encouraged as one means to move beyond single case study design to improve generalizability of results. Comparative research, in a second sense of the term, should also include cross-sectoral and cross-national studies. Cross-national studies are important as a means to promote technology and knowledge transfer. Moreover, cross-national research is necessary to build an understanding of the relationship between state structure, in terms of policymaking instruments, history, and culture, and the development of digital government.

The Digital Government Program should consider development of two major studies: a long-range, panel study focused on state governments and a large-scale comparative study of state structure and digital government across a sample of major, developed nations. A focus on state government exploits an opportunity to promote technology and knowledge transfer among state governments during a critical time in the development of digital government. Comparative study at the state level would complement the comparative study of the Quicksilver initiatives already funded through the National Center for Digital Government at Harvard. Comparative, cross-national study would begin to build scholarly comparative research in digital government as well as increase the probability that innovative practical solutions to governance challenges will be harvested.

Practitioners remain in urgent need of unbiased information to inform current decisionmaking concerning technology and its use in government. The requirement by the Digital Government Program that researchers partner with government agencies in order to ground research in practical, current problems should continue. In addition, the Program should explicitly encourage research and tools to promote practitioner access to knowledge and knowledge, as well as technology, transfer across governments. The academy tends to discourage research products written for practical audiences. Therefore, the National Science Foundation might partially offset these disincentives

with "counter" incentives to support such products for the benefit of the nation.

Finally, the workshop reaffirmed the important role played by the Digital Government Program in the development and support of a digital government research agenda. The Digital Government Program within the Directorate for Computer and Information Science and Engineering pioneered support for research on the technologies and applications required for digital government. The program requires researchers to work with government agency partners in order to ground research in current, practical challenges faced by government. In addition, it has employed a network-building approach not only funding research, but also building the community of scholars and practitioners necessary to produce a sustainable, coherent research agenda. The logic is compelling for a natural extension of these efforts to include central research questions of organization and governance in the portfolio of research topics associated with a digital government research agenda for the nation.

1. TOWARD A BASIC SOCIAL SCIENCE RESEARCH PROGRAM FOR DIGITAL GOVERNMENT

National capacity and government practice would be strengthened by leveraging the inherent, extensive relationship between digital and electronic government research and the social and applied social sciences. To this end, the Digital Government Program, the Digital Society Program, and the Political Science Program of the National Science Foundation awarded a grant to Harvard University to organize and convene a workshop for the purpose of advancing a basic digital government research agenda with emphasis on those social and applied social sciences whose focus is governance, organizations, institutions, public management and administration, complexity and networks. The workshop is meant to provide guidance and recommendation to support and broaden the leadership of the National Science Foundation in digital government research.

1.1 Purpose and Objectives of the Project

The workshop was designed to outline and support development of a **long-range**, **basic research plan** and longer-term vision **for research needs in digital government** focused on **organizational, institutional, and governance issues**. The research agenda is intended to complement an existing technical research and development agenda. Its purpose was to identify theory and research from the social and policy sciences likely to have substantial payoff in the domain of digital government

research. The national workshop convened social scientists, technical specialists, and government executives.[1]

The potential of information and communication technology to fundamentally affect the basic structures and processes of governance signals a disjunctive change with serious implications for research and practice. Although a substantial number of publications speculate on the future and the promise or peril of technology, much less theory-based scholarly research has been undertaken. Moreover, a research agenda that is systematic and cumulative has yet to be developed. Digital government research to date has been undertaken largely by entrepreneurial scholars from a variety of different fields and backgrounds working in relative isolation from one another and with little institutional support from professional associations, mentors, and the complex web that constitutes the academy. There is only an emergent community of scholars to whom universities, nonprofits, and government decisionmakers might turn for scholarly and applied research, results, and guidance. Similarly, an emerging, but as yet incoherent, field of research at the intersection of information technology, organization, and governance could be developed to serve the nation.

The workshop yielded three types of results:

1. Workshop participants **identified critical topics** in the social and applied social sciences for digital government research.
2. Workshop participants **identified fields and sub-fields of research**, and associated research methods, that, if exploited, would strengthen the foundation of a robust research agenda.
3. The workshop itself was designed to build human and social capital for digital government research and practice through knowledge transfer and development of working relationships among scholars and practitioners who would be

[1]The workshop website is located at http://www.ksg.harvard.edu/digitalcenter. See Appendix A of this report for a list of workshop participants and their biographies.

unlikely to meet through their respective professional associations and networks. The ripple effects of this **network building activity** are expected to extend beyond the workshop and the participants to the institutions and professional networks of the researchers and practitioners involved.

Central topics addressed by the workshop participants include:

- Cross-agency and interorganizational, networked, use of the Internet and related information technologies
- Structural, process, administrative, management, and governance changes related to the development of networked organizational and technical systems
- Effects of networked arrangements on the policymaking process, on decisionmaking in government, and on a variety of political, organizational and institutional issues including power, interest group processes, and federalism
- Broader implications of networked governance for democratic theory, accountability, jurisdiction, privacy, civic engagement, business-government relations, and the institutional structure of government

A set of research questions outlined the scope of the workshop. Questions served as the basis for a series of white papers and background papers written by the participants and circulated before the meetings. These papers also formed a common point of departure for the workshop discussions. The guiding research questions were:

1. What are the most important impacts of information technologies on the structure and processes of government organizations? Which impacts are already discernible? Which are likely to emerge during the next decade?

2. Reversing the causal arrow, how are public managers and policymakers using information technologies to craft new organizational forms or to make important modifications to present forms? What decisionmaking and problem-solving processes are emerging as the principal means of mutual adjustment?
3. What is the impact of increasing use of information-based, networked forms of organization on the institutional structures – for example, oversight, budgeting, and accountability systems -- that regulate governance?
4. What perspectives, theories, conceptual frameworks, and methods seem particularly useful for the study of the developmental processes and organization of digital government?
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The purpose of the workshop was to broaden and deepen the research base for digital government by drawing more extensively and strategically on the social and policy sciences to expand the range of theories and conceptual frameworks that might be leveraged in this domain. A powerful research base is intended to foster a stronger democratic society; to build capacity for policymaking, government operations, and service delivery; and to maintain the ability of the United States to lead digital government research and practice internationally.

In some cases, the outcome of digital government research will be to diffuse the use of information technologies in government more quickly. But other research findings may slow diffusion by revealing potential negative consequences of planned uses of IT in government. In all cases, the results of digital government research should be to provide knowledge and

tools that improve governance in two fundamental ways. First, research findings should improve existing government programs and processes by increasing speed, transparency, and convenience and by lowering costs. Second, digital government research fosters the development of new government capacity by enabling new types of programs, organizational forms, service delivery mechanisms, and policy design.

1.1.1 Definitions of Terms

As used in this report, the definitions of information technology, governance, and organizations are intentionally broad:

- ***Information technology*** refers to the full range of information and communication technologies and applications currently used in digital and electronic government as well as those information technologies, systems, and applications on the developmental horizon.

- ***Governance*** encompasses the structures, processes, and behaviors that together provide steering and rowing functions in government. These include traditional fields within political science, the more applied fields of public policy, management and administration, and governance within complex, adaptive systems, including markets.

- ***Organization*** is used in its most expansive sense of coordination and control in multi-actor settings to accomplish complex tasks. It includes formal organizations as well as institutions, interorganizational arrangements, and social networks. Typically, the organizations of interest will be government agencies or programs at the federal, state, or local levels. The term also includes other branches of government and may include private or nonprofit entities that play a role in the production or delivery of government information or services.

- Research concerning ***digital government*** is broadly defined as research related to the intersection of government practices and information technologies. Some experts define "digital government research" as those activities that advance a process or opportunity for government to build a strategic vision given a technology horizon that is approximately five years into the future. ***Electronic government, or e-government*** refers to the current potential to build government services and practices using existing technologies and applications.

The social and applied social sciences refer to the social science disciplines – sociology, psychology, economics, political science, and anthropology – and the applied fields that focus on practical government and organizational problems and that draw in varying degrees from the related disciplines. The applied fields relevant for this report include public policy, management, and administration; and organizational behavior.

1.1.2 The Importance of Distinctions among the Sectors

Government operates in a distinct structural, political, and economic environment whose ultimate aim is democracy rather than efficiency or profit. Multiple constituencies influence government structures, processes, and programs through democratic means. Thus, the planning and development of digital government, while bearing some similarities to analogous efforts in the private sector, follows a distinct course governed by multiple constituencies, separation of powers, checks and balances, political and budgetary cycles, and other institutions of democracy in the United States. Although many findings and lessons from business and research based largely on private sector firm behavior can be applied to government, direct translation is difficult and problematic.

Some high-performing private sector firms are able to link the actions of divisions within the firm to ultimate success in terms of profit and loss. Government was never developed to measure success in terms of profit and confounding variables can make it difficult to link the actions of agencies and programs clearly with outcomes. Performance-based government strives to build such connections within the context of U.S. democratic systems, but the "multiple bottom lines" of government make such clarity difficult, if not impossible, to achieve – or to achieve in the same way that private firms can.

Nonprofit organizations face an environment characterized by funding concerns and cycles, volunteers, and adherence to values and missions that at times threaten survival and effectiveness. The growth of the nonprofit sector during the past decade or so in United States society has led to a burgeoning research area in a sector that remains less well understood than the public or private sectors.

Increasingly, government decisionmakers work across the three sectors as well as across federal, state, and local levels of government to accomplish goals (Kamarck and Nye, 2002). In doing so, they face a more complex environment than implied by models that are exclusively market-oriented or restricted to formal government organizations.

1.2 Rationale

The chief impediments to digital government are not technical, but social, organizational, and institutional. The potential of digital communication and information processing exceeds the capacity of social actors and social systems to exploit that potential. An imbalance in funding toward technical projects rather than social research fosters new technologies more rapidly than the current absorption rate of the government or most complex organizations and institutions (President's Information Technology Advisory Committee, 1999). Greater attention to social and policy research not only would enhance the absorption rate of technology but also better illuminate for technical specialists the environment in which their technologies will be implemented and used.

1.2.1 Institutional Change

The fundamental restructuring of government from bureaucratic structures joined through oversight bureaucracies and Congress to greater use of horizontal arrangements using, at times, less formal governance mechanisms, market mechanisms, and temporary configurations, signals an emergent change in the structure of the state and policymaking capacity (Fountain, 2001). To date, there are few normative studies or theories to guide such restructuring. Social scientists concerned with institutions have examined state structure and capacity and the role of policymakers in developing institutional capacity (Evans, Rueschemeyer, and Skocpol, 1985; Heclo, 1974; March and Olsen, 1989; Powell and DiMaggio, 1991). Yet most work within this stream of research predates the use of distributed information systems and the Internet and remains virtually

untapped as a source of insight into the development and implications of digital government.

American government has begun the process of institutional and agency change necessary to exploit the benefits of information technologies in a democratic society. Many agencies, particularly at the state and local levels of government, are just beginning to develop web-based services to citizens and other web-enabled structures (Fountain and Osorio-Urzua, 2001; La Porte, Demchak, and Friis, 2001; West, 2001). As of 2000 there were approximately 27 federal interagency websites. At the federal and transnational levels of government, a small number of organizations and policy networks have moved beyond the production of simple websites to the complex tasks of building interagency interactive websites, commonly known as portals (Fountain, 2001). Concerns regarding ownership and use of government information, privacy, security, the meaning and obligations of citizenship, civic engagement, accountability, privatization, and other practical issues of government have come to the fore as information technologies and their use bring about unanticipated consequences and challenges (Kamarck and Nye, 1999; Norris, 2001). Yet little applied research has examined such fundamental changes and their implications.

1.2.2 A Systematic Approach to Research

These fundamental shifts in governance call for more theoretically informed, systematic approach to digital government research than currently exists. The interrelationship between technical and non-technical variables points to multidisciplinary studies as well as those that fall mainly within the disciplines and related applied fields.

Recent tragic events heighten the salience and timeliness of research at the intersection of information technology, governance, and organizations. Digital government has the potential to greatly contribute to security, privacy, and interagency coordination through modernization of information

gathering and analysis. Pattern recognition and filtering systems can serve as powerful "early warning" of potential attacks by non-governmental, geographically distributed actors. Researchers who work on privacy and security would benefit from the opportunity to consider these issues within the broader policy context of contemporary American government in which market mechanisms have become predominant and in which funds for government activities are shrinking. The central challenge of information technology use in large complex social systems has always been to balance its unparalleled potential for surveillance and control with its equally powerful ability to foster liberty and freedom through knowledge (Zuboff, 1988).

1.3 Background

The Digital Government Program within the CISE Directorate at the National Science Foundation has developed a highly productive framework to catalyze social learning that grounds research in the practical issues facing government decisionmakers. The Digital Government Program approach links government agencies with researchers as co-designers and co-producers of research. Federal agencies, as well as other government bodies, co-sponsor research initiatives, thus leveraging National Science Foundation resources.

The early emphasis of the Digital Government Program was primarily on supporting cutting edge technological developments to advance digital government infrastructure, systems, and tools. Among these are geographical information systems; data collection, integration, visualization, retrieval, storage, and search technologies; and multimedia systems. The Digital Government Program has supported research on a small number of social policy and government issues that have been closely associated with digital government; including universal access and the digital divide, privacy and security, electronic voting and intergovernmental cooperation.

1.3.1 Related Agenda Building Efforts

Related efforts, more broadly focused, include the NSF Information Technology Research initiative which was established following the release of a major report by the President's Information Technology Advisory Committee (PITAC), which called for substantial national investment in research on the social, behavioral, and economic implications of the Internet. Although falling broadly under the purview signaled in the PITAC report, digital government research comprises a distinctive domain along several dimensions. These dimensions map to the distinctions between the public and private sectors in governance processes, the use of markets and incentives, responsibilities to the public and the polity, and more.

For this reason and others, the NSF Digital Government Program, now in its fourth year, was initiated originally within the CISE Directorate to catalyze the diffusion of technological innovation to government and to support the development of technologies and applications with specific value to government organizations and actors. The Digital Government Program established the National Conference on Digital Government Research in 2000. It convenes the Digital Government Program's growing network of grantees and guests at an annual research conference. The conference program and proceedings include an increasing number of research projects focused on organizational and public management topics.

The initial Digital Government Program workshop that addressed public management issues at the intersection of technology, organizations, people, and governance was carried out under grant no. 99-181 by the Center for Technology in Government, based at the University at Albany, State University of New York.[2] More recently, the Digital Government Program

[2] The results are available in the report, "Some Assembly Required: Building a Digital Government for the 21st Century," Center for Technology and Government, State University of New York, Albany.

sponsored a national workshop on Internet voting, which took up some of the social science questions related to potential implementations and impacts of Internet voting.[3] Finally, the Digital Government Program sponsored a study by the Computer Science and Telecommunications Board (CSTB) on the contribution IT research might make to increasing the effectiveness of government operations and activities.[4]

Recent initiatives by the Social Science Research Council support the importance of a research agenda located at the intersection of social and technological phenomena and their interdependence. The Internet Summit, sponsored by the Social Science Research Council and the National Science Foundation to inform a major NSF-sponsored research program led by John Robinson, University of Maryland, Paul DiMaggio, Princeton University and W. Russell Neuman, University of Southern California, convened in the spring of 2001. The Internet Summit issued an internal report recommending research topics including the digital divide and broader issues of inequality; organizational design and change; and questions of conflict, community, and forms of sociability. Recommendations also included a call for institutional development, training programs, and, more generally, field building.

Similarly, the Social Science Research Council developed the Program on Information Technology, International Cooperation, and Global Security (ITIC)[5] with a broad agenda to extend and invigorate the fields related to international relations and international political economy. The ITIC Program provides opportunities for sponsored doctoral and post-doctoral

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[3] The report is available at http://www.internetpolicy.org/research/e_voting_report.pdf.

4 This study, "Information Technology, Research, Innovation, and E-Government," was published by the National Academy of Sciences in 2002. It can be read online at http://www.nap.edu/books/0309084016/html/.

[5] http://www.ssrc.org/programs/itic

fellowships and has organized a summer institute to strengthen the community of researchers engaged in ITIC research.

The extension of the NSF Digital Government Program to support research on the social, organizational, and governance impacts of digital government, in addition to its ongoing support of technical research, is necessary to build a foundation for digital government research and to strengthen government practice. The 2002 workshop, organized by the National Center for Digital Government at Harvard University, sought to fill gaps in preceding efforts by explicitly linking digital government research more closely to the social and applied social sciences.

1.3.2 A Rationale for Programmatic Development

A gap exists in the research community for a focused effort to lead and support research and practice on digital government that draws significantly from the social and applied social sciences. The present effort is designed to address this gap. Its timing is critical given major investments by governments in infrastructure, design, social learning, and professional practice. These investments can be positively influenced by a practical and scholarly research effort, with researchers working in close contact with government decisionmakers, and, in certain research domains, with information technology developers.

The workshop built upon past efforts and represents a logical next step in the development of the Digital Government Program. It builds upon relationships with federal and other government agencies and extends the network of scholars conducting research on digital government by drawing into the community outstanding social and policy researchers. The workshop focused discussion and planning at the intersection of information technologies, organization, and governance. It was meant to address a gap in the research community regarding, specifically, digital government and its relationship to the social sciences and public management. The results of the workshop link directly to the continued development of the Digital Government Program and related National Science Foundation

programs by providing informed recommendations developed through expert deliberation.

2. INPUT FROM THE RESEARCH COMMUNITY: WORKSHOP FINDINGS AND RECOMMENDATIONS

A set of critical topics in the social and applied social sciences outline the strategic focus for a digital government research agenda focused at the intersection of the IT, organization, and governance. Recommendations for the four major categories of a research program are briefly summarized here and developed in greater detail below:

Strategic Area 1: Information Technologies, Governance and Organizations. Central research questions at the intersection of technology, organization, and governance include the following:

- How does IT interact with the structure and processes of government organizations?
- How do institutional structures--such as oversight, the budget process, or legislation--affect the development of networked forms of governance?
- How are government managers and policy makers using IT to develop new organizational forms or to modify existing forms?
- What are the impact of IT on intersectoral, intergovernmental and interagency coordination and collaboration?
- How can intergovernmental and interagency coordination and collaboration be enhanced with IT?
- What policy and political processes influence data integration and standards? How do they do so?

Applied research would examine practical, problem-based questions related to the topics above and would examine

strategic, operational, and other management issues related to the implementation, use, and evaluation of IT in government. High priority issues encompass critical elements of government performance, including effectiveness, efficiency, accountability, access, responsiveness to citizens, federalism, and capacity for learning and innovation.

Strategic Area 2: Digital Government and its Stakeholders. Empirical research on the users of digital government is a central priority given wide speculation and market surveys regarding digital democracy and citizen demand for online information and services. Specific research questions include:

- How do citizens actually use online government information and services?
- Given the evidence for a digital divide not only in access to hardware and telecommunications but also in the ability to navigate, search and query in an online environment, how might this digital divide be addressed?
- How are interest groups and civic associations using the web?
- What are the key emergent changes that might be empirically identified and described in civic engagement?

In addition to research on users, key stakeholders requiring further research include a variety of actors who play distinctive roles in the design, development and implementation of digital government tools, applications, and systems.

Strategic Area 3: Change, Transformation, and Co-evolution. The process of change requires research separate from the topics above in order to focus specifically on the transformative processes that lie between inputs and outcomes. This category includes:

- The antecedents and consequences of specific change processes, catalysts and incentives for change
- Models of emergence and network development from complexity theory
- Extension and application of current theories of co-evolution, technology adoption, technology transfer, knowledge diffusion, and innovation to digital government.

Strategic Area 4: Systematic Research Design. Stronger research design using the perspectives and conceptual frameworks of social science is likely to lead to research results of greater validity and reliability, findings of broader generalizability, and – perhaps most important – accretion of sound research findings. A basic research agenda should include not only problem-based research but also research that draws from and, in turn, refines and extends central social science theories and perspectives. Without systematic research design, findings and methods fail to accumulate and to produce a base upon which researchers can build. A basic research agenda should:

- Include a portfolio approach to investments in research that combines short-, medium- and long-range projects
- Leverage the utility of comparative research
- Employ a variety of approaches, methods, and theoretical perspectives.

2.1 The Organization of the Workshop

Care in the advance planning for the workshop, selection of experts, and a participatory approach to the development of the final report were central to the anticipated usefulness and quality of the results. An executive group advised the principal investigator regarding participants, the workshop agenda, and the

contents of the final report. The executive group included academic researchers from several different technical and social disciplines as well as government executives.[6]

The workshop was planned for no more than 30 participants in order to preserve capacity for in-depth, informal discussion. Participants' areas of expertise include:

- Public management and administration (particularly in the areas of digital government, innovation, management of change, cross-agency relationships, operations, and service delivery)
- Organizations and institutions (political science, sociology and organizational behavior)
- Networks (including interorganizational, policy, and social networks and complexity theory)
- Political science (including bureaucracy, intergovernmental relations, and government reform)
- Information science (including natural language processing, information seeking, human-computer interaction, digital libraries, information design and information policy)
- Practical executive and management experience in government (including federal and state levels)

Workshop participants were invited to prepare white papers to outline and describe critical needs for research on digital government using the set of questions that structured the scope and content of the workshop as a point of departure. These papers were circulated before the workshop to focus and inform discussion.[7]

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[6] Appendix A notes the members of the executive committee.

[7] A complete list of the papers is included in Appendix D of this report. The papers are available at http://www.ksg.harvard.edu/digitalcenter.

The workshop was planned and organized from October 2001 to April 2002 and convened at the Kennedy School of Government, Harvard University, beginning on the evening of May 30, 2002 and ending in the afternoon of Saturday, June 1, 2002. Workshop participants met in plenary and in small working groups which then reported to the entire group.[8]

Using detailed notes from the workshop taken by rapporteurs as well as follow-up discussion with participants, the Principal Investigator drafted the workshop report for comment and review by the executive group and by the participants, including program officers of the National Science Foundation. Following the first round of review, the succeeding draft report may be circulated more widely for comments by other researchers and practitioners. A draft report was prepared for review in July and August 2002 timed to be available following the Digital Government Program's August 2002 solicitation announcing a new category of proposals focused on social science and public management research on digital government. The draft workshop report, in its pre-review form, was made available on the National Center for Digital Government website and announced as one source of information for researchers in the August solicitation from NSF. The final report was released in November 2002 prior to the deadline for proposals to the NSF Digital Government Program.

The following sections summarize input from participants and the results of the workshop discussions.[9]

2.2 Objectives of a Research Program

Government has long supported research and development of information technologies. But to advance beyond technological

[8] The workshop agenda is provided in Appendix B.

[9] A list of preliminary themes guiding the organization of the workshop is given in Appendix C. A comprehensive list of all themes raised by participants is included in Appendix D.

research and development to digital government requires a substantial and serious investment in organizational, social, and governmental research. Technologies are designed, adopted, implemented, and used in a particular environment within government. The interdependent relationships among technology, organizations, and governance and their strategic implications remain poorly understood by researchers and government decisionmakers (Fountain, 2001). Thus, a critical gap in knowledge and practical skills required to influence digital government will be filled by this research agenda.

A stronger research agenda should result in substantial improvements in requirements gathering as government decisionmakers and managers work with their supply chain partners to design, develop, and implement IT systems. Strengthened national research capacity should extend the focus of decisionmakers beyond the indisputably important but partial engineering focus on "faster, better, and cheaper" results to fundamental governance and organizational issues including jurisdiction, interagency arrangements, accountability, and collaboration. Research on agency structure and processes, or citizen needs and preferences, will inform the development of digital government by improving political, policy, and management decisionmaking. The expected results of these improvements in decisionmaking will in turn yield positive benefits for democracy by furthering equality, access, civic engagement, citizenship, and public service.

In sum, a basic research program similar to that outlined in this report is likely to yield:

- A powerful knowledge base to provide greater understanding of the interdependence among IT, organization, and governance for researchers, decisionmakers and IT developers. It is often difficult for developers to appreciate the legal, political, and democratic questions embedded in design decisions. Therefore, research design and projects which bring together social and technical scientists may

assist in bridging the gap between specialized knowledge of governance, democracy, complex organizations, and politics and that of information and computer scientists and analysts. To note one example, little systematic examination of the implications of the use of cookies by government actors has been undertaken, yet cookies are becoming prevalent on government websites. There are fundamental differences in using cookies in the private versus the public sector in that public sector use of such tools raises privacy issues because the U.S. Constitution comes into play. There needs to be a better dialogue between public administration theorists, constitutional law theorists, and digital government developers regarding this, and many other, system design and development issues.

- Research results and understanding to build more effective digital government that is responsive to citizens in terms of accuracy, speed, convenience, cost, and access; democratic in its structures and processes; and secure and reliable.

- Practical insights, tools, and frameworks for government decisionmakers and those charged with building and managing in digital government.

3. STRATEGIC AREA 1: INFORMATION TECHNOLOGY, GOVERNANCE AND ORGANIZATION

Three distinct, but inter-related, levels of analysis order key research issues in IT and the organization of government. First, **internal** agency organizational issues are of central concern, aimed at improving the performance of government agencies or programs using digital technologies (e.g., Gupta, Dirsmith, and Fogarty, 1994; Heintze and Bretschneider, 2000; Kogut and Zander, 1992). Second, an important focus of research concentrates specifically on **boundaries** and interfaces, including the boundaries that lie between functional areas within agencies, boundaries between agencies or organizations, and boundaries between government and citizens (e.g., Ancona and Caldwell, 1992; Goes and Park, 1997; Hansen, 1999; Ibarra, 1993; Stevenson and Gilly, 1991). Similarly, human-computer interfaces may be thought of as boundaries that distinguish two entities or as the system of rules that joins entities across boundaries. Research on the human-computer interface is well established. Human-computer interfaces, such as client service management interfaces, involve a complex ecology of digital, human, organizational, and governance elements. The relationship of boundaries and interfaces to the organizations, networks, and government of which they are a part is an essential area for research. Third, increase in networked governance and the myriad issues raised by **networks** obligates a digital government research program to foster research that will improve understanding and control of networks. Like interfaces, networks should be conceptualized in socio-technical terms as complex ecologies of social, digital, and organizational systems (e.g., Ahuja and Carley, 1999; Manev, 2001; Monge and Contractor, 2002; Wellman et al., 1996).

A series of cross-cutting topics flow through the three levels of analysis and pose distinct questions for a research agenda. This report focuses on a partial list of such issues and

concentrates, in particular, on knowledge management and customer service because of their current salience in government.

3.1 Organizational Performance Issues

Information technology interacts with organizations at two fundamental levels. First, IT can be leveraged to improve current performance. But at a second level, IT enables transformation, or substantial changes, in the form, structure, and processes in government (Schedler and Scharf, 2001).[10] Thus, second-level change is not simply improvement of the status quo but movement to new equilibrium. First-level research questions include:

- How can decisionmakers use technologies within organizations to enhance performance?
- How can a variety of information technologies – for example, video conferencing and smart cards – improve performance through their ability to track and assess information to improve decisionmaking?

Research questions at the second level of impact include:

- How can technologies enable or lead to change in the structure of government functions, processes, and programs?
- How do policymakers enact technology through the use of institutionalized behaviors?

A digital government research program cuts across major business processes and policy domains. It should include research on processes, policy areas, change forces and

[10] Regarding counterintuitive relationships between perceptions of red tape and IT innovativeness, see Moon and Bretschneider (2002).

complexity of interaction among these categories. The major **processes** spanning agencies and departments that guide development of integrated information systems include the following: operations, services, access (including privacy and security), licensing, enforcement, policymaking (including rulemaking, law making, and budgeting), grants and benefits, and customer service. Key **policy areas** include: national security, commerce, education, natural resources, agriculture, transportation, health and human services, economic and community development, justice and public safety finance, infrastructure.

3.2 Knowledge Management

Knowledge is deeply embedded in the individuals and processes of organizations (see e.g., Blau, 1963; Cyert and March, 1963; Simon, 1997; Zuboff, 1988). Government organizations are not exceptional in this regard. New technologies make it possible to communicate across decentralized government units and across time. However, the processing of data into information and, in turn, into knowledge (and the reverse) can lead to massive loss of content and context (Cross, Parker, Prusak, and Borgatti, 2001; Roberts, 2000). The implications of these translations and associated attrition of content and context for decisionmaking, organizational learning, and policy making remain poorly understood.

As the use of databases in government has increased, distinctions between information and knowledge – and the timeliness, relevance, and importance of each – have grown in importance. The relative importance and uses of human versus automated information and knowledge require basic research if knowledge management systems are to be designed intelligently and used effectively. To note one example: Some proponents of knowledge management assume that information in databases replaces information transfer among social actors (e.g., Borghoff and Pareschi, 1998). In other words, organizational actors can

retrieve knowledge online rather than from other people. However, research findings suggest strongly that people who contribute information to a database tend to be in greater demand by others in the social network for advice and knowledge. From a social perspective, those who contribute heavily to databases are engaged in signaling their expertise to others in a social community of practice (Orlikowski and Yates, 1994). This phenomenon is at work dramatically in the Open Source programming movement in which people volunteer their time and contribute programs (see Schweik and Grove, 2002 for research on open source systems). One major motivation for actors to contribute their time voluntarily stems from enhancements to social status and employment opportunities that result from being part of a social network as an expert. The social aspects of knowledge production and management imply the need for research on social relationships within and across organizations to complement a strict focus on technological solutions to knowledge challenges (Barley, 1990; McDermott, 1999).

Knowledge transfer involves translation of the internal categories used by people and institutions to organize information in shared databases. The "category problem" is an important cognitive and social issue to address if government is to develop large, centralized, searchable and accessible IT-driven databases of information.

Disincentives to knowledge sharing in the public sector inhibit the development of cross-boundary systems whether technical or social. It is difficult for public sector decisionmakers to use knowledge management tools because of strong disincentives to knowledge sharing across programs, departments, agencies, and levels of government. Whereas it is assumed that private sector firms use knowledge management as a source of competitive advantage, the incentives that currently operate in most governments work against information sharing. It may be that studies of project-based organizations – those in which employees from different functional specialties are

organized around specific projects – would yield insights into incentive structures that reward cross-boundary communication and information sharing, and whose features might translate to some government settings. Overall, systematic research is needed to clearly identify and analyze impediments and incentives to knowledge sharing in government and to develop potential solutions that are not merely technical in nature but organizationally and politically feasible. It will be necessary to modify incentives in government to promote knowledge management across traditional boundaries.

Increasingly, knowledge management in government crosses the boundaries of sovereign nations. Promising solutions for governmental problems are found in a variety of governments. Tools to promote knowledge transfer and dissemination should be designed with international usage in mind.

3.3 Increasing Government Responsiveness

The development of e-government has co-evolved with a major government reform effort that emphasizes customer service or greater responsiveness by government to citizens. For the past decade, government managers have focused on technological, cultural and business process redesign to develop operations that are not simply more efficient, but more responsive to citizens. (For an example drawn from the Small Business Administration, see Van Wert, 2002). Typical improvements to operations include increasing access, information, courtesy, and flexibility. The goal of responsiveness contrasts with traditional government foci of efficiency and standardization. (For potential exceptions to the tradeoff between responsiveness, efficiency, and accountability through the use of IT, see DiMaggio, Hargittai, Neuman, and Robinson, 2001.) Yet the methods and mindset needed to design operations and systems from the perspective of the citizen, or user, are not well integrated into agency decisionmaking patterns and cultures. The design and

development of interagency operations and systems compound the challenge because these arrangements must be responsive to several different customer segments or client populations. The development of interagency web portals – for example, fedstats.gov, students.gov, seniors.gov, and business.gov – is one example of this class of problem (Fountain, 2001; Fountain and Osorio-Urzua, 2001).

Research that translates "best practice" from private sector customer service operations to government agencies would aid knowledge dissemination and technology transfer across sectoral boundaries. In particular, government decision makers need to understand the trade-offs between responsive service provision and cost control. These trade-offs are currently "hidden" in government because no direct pricing mechanisms exist for most services to citizens. Workshop participants did not recommend or suggest that government services should be fee-based. The point is that it is more difficult for government managers to establish the break-even point for responsiveness versus costs in the absence of key variables used by firms, notably the cost of services to targeted customer segments. Online customer service introduces new challenges to cost-benefit analysis. Moreover, the development of digital government does not eliminate traditional channels; it requires management of multiple and parallel channels – face-to-face, telephone, and online – for customer service operations making the problem of cost-benefit analysis even more complex for government.

Other key research topics regarding customer service in digital government include: information gathering and data collection to understand citizen needs and preferences, the role of cross-functional design in the creation of single points of contact for citizens, and the use of cross-sectoral (public, private, and nonprofit) partnerships to develop and manage complex customer relationship systems in government. Partnership with private and nonprofit entities for development and management of integrated data systems raises serious questions of data ownership, privacy, security, system reliability, process

transparency, and accountability. These important and intellectually challenging questions form a research agenda that should be of considerable interest to social and policy scientists.

3.4 Control

Organizations control operations and people through several mechanisms, including budgets, oversight, and other information processing systems. Information technology can be used not only to enhance responsiveness to citizens but also to improve control in organizations while simultaneously allowing greater discretion and innovation (DiMaggio et al., 2001). Monitoring of electronic mail, pattern recognition programs, and organizational rules embedded in software increasingly constrain and control the latitude of government employees and citizens in their interactions with government. Research on both the positive and negative implications of control systems is an urgent need to build improved understanding of emergent patterns in digital government and to inform current decisionmaking concerning the design and deployment of information systems.

3.5 Boundaries and Interfaces

Boundaries and interfaces are critical elements of government-to-citizen (G2C), government-to-business (G2B), and government-to-government (G2G) processes, as well as of networked governance. Research questions in this domain span technical, organizational, and political issues. **Politically**, agency interaction, collaboration, and integration may require legislative change to renegotiate relationships mandated under law. **Technical** questions -- particularly those of privacy and security, interoperability, and reliability -- have been described in detail in related reports. **Organizational** research issues relate to the effect of IT on boundaries and the social characteristics of interfaces. Research on emergent organizational forms, complex

adaptive systems, and project-based organizations contributes to an understanding of boundaries and interfaces in information-based organizations.

Organizational boundaries and technical-user interfaces are the borders where people and technology meet. The interface is both boundary and border, and it is always both social and technical in design and function. Researchers should consider how new forms and formats promote or inhibit online collaboration through interfaces and across borders.

The key technology of Weberian bureaucracy is the file organized in the file drawer (Weber, 1968). A similar organizational metaphor is the desktop. Weberian bureaucratic metaphors continue to dominate the graphical user interface of the electronic era. This prompts the following questions: What changes are occurring at the interface, the border where people and technologies meet? What are more appropriate metaphors for socio-technical interfaces?

It is ironic that the study of digital government and e-government has not yet included the central category, citizen-to-citizen, or C2C, civic relationships. Enhancing C2C is central to democratic governance. An important component of a self-governing society is civic engagement both directly with government and among citizens in forums such as public comment periods, activism, and complex problem solving related to shared problems. For these reasons, enhancing C2C connectivity should also form part of a comprehensive research program. This category moves e-government from mere transaction processing, like its kin, e-commerce, and focuses on a more central democratic issue, civic engagement.

3.5.1 Reducing Stovepipes

Despite the introduction of tremendous potential for connectivity using IT, "stovepipes" continue to dominate in government. ***Stovepipes*** refer to the inability to communicate across boundaries, between bureaucratic organizations or databases, due to lack of interoperability across hardware, software or data

systems; professional and cultural norms that prohibit or discourage information sharing; or legal strictures against communication. For example, intelligence and enforcement agencies arguably maintain stovepiped – or compartmentalized -- arrangements which preserve secrecy and protect operations but that also inhibit information sharing. Compartmentalization impedes analysis of distributed (and compartmentalized) networked organizations such as Al Qaeda. The Bush Administration effort to combine anti-terrorist agencies into the proposed Department of Homeland Security constitutes an attempt to overcome the severe performance challenges that follow from stovepiped operations by joining them in one hierarchical bureaucracy. However, organizational analysis has demonstrated that stovepiped structures, which exist within bureaucracies as much as between them, are strongly associated with cultural and professional routines as well as political constituencies, making integration difficult even when interoperable information systems have been developed (see e.g., Bacharach and Aiken, 1982; Blau and Schoenherr, 1971).

Information technology can be used to facilitate information sharing between entities. Social science and policy research can identify the potential and actual "vectors of trust" which, in addition to technical means, are necessary for information exchange among different public actors. Further, social science research should shed light on incentives that could be developed to foster appropriate information sharing across agencies and units.

Information technology holds extraordinary promise as a vehicle for combating stovepipes – or systems that function in isolation from one another -- in government, particularly through the creation of unified databases. A goal of providing centralized access to non-homogeneous distributed data could serve as a forcing mechanism for aligning definitions, terms, and content across agencies.

During the 1970s and 1980s, mainframe computers and centralization using IT was dominant. The 1980s and 1990s led to decentralization of computing largely via personal computers. The Internet enables centralization of IT services again. There may be no reason, for example, why a particular organization located in one state that is effective at operating a governmental service cannot also act as a contractor to another state using Internet services. During the next decade greater contracting out of IT services may occur with business flowing to players with economies of scale. Such a scenario would lead to more centralized IT processing across larger geographic areas. Thus, a potentially important research study might examine the research on centralization of IT from the 1970s and 1980s for potential applications in the context of contemporary information infrastructure.

Participants noted the importance of looking underneath the visible and formal structure of government to examine how governance occurs informally and across jurisdictions. Much informal governance is organized in response to discrete events; in particular, crises and disasters. In these cases, networks and project alliances form, and then dissolve, on an as-needed basis. Social science research can articulate the organizational and social elements that undergird project-based organization in government and, in turn, provide guidance to policymakers who seek to use technology to make project-based work more productive. There may be a trend toward greater use of project-based governance. If this is the case, then an understanding of its organization would strengthen much more than crisis management (see, for example, Kelly and Stark, 2002). Opportunities to improve information sharing foster knowledge management as well as cross-boundary activities.

3.5.2 Federalism and Devolution

Recent advances in IT have created opportunities to reallocate responsibilities across levels of government, affecting boundaries in terms of jurisdiction and the allocation of

responsibilities and resources. New technologies create the capacity to decentralize some policy and program activities while centralizing others. Social science researchers can draw out the impacts of technology through analysis of the information infrastructures and systems that enable decentralization and recentralization. Prerequisites for technology-assisted devolution include standards, consistency of data input and availability, support for field units, and incentives for higher levels of government to devolve responsibility to more local units.

Information integration – whether in web portals, one-stop information and services, or business process redesign – extends beyond horizontal integration (that is, integration across agencies at one level of government), to vertical integration across federal, state, and local levels. Moreover, integration efforts include global governance networks, nongovernmental organizations, and cross-sectoral partnerships across public, private and nonprofit sectors. The challenges of integration pose not merely technical but also political and organizational issues that delineate research needs.

3.5.3 Collaboration

Given the potential benefits of integration and connectivity, government officials are highly interested in a better understanding of collaboration, the process of working productively across jurisdictions or even sectors. (For an in-depth example, drawn from efforts to build interagency collaboration in forestry management, see Koch, Steckler, Delcambre, and Tolle, 2002.) The challenge of collaboration lies in facilitating joint problem-solving across functional, departmental, or agency boundaries. Collaboration is increasingly important in government because different levels of government frequently serve common customers, resources can be pooled to create efficiencies, and it is nearly impossible for single agencies to remain abreast of new technologies (Bardach, 1994, 1999).

A key element of a basic research agenda can be summarized in the following two broad questions:

- How to motivate public managers to share data and, more generally, to work jointly for the public good?
- How to understand and influence the range of barriers, from psychological and social to structural, political, and technical, that mitigate against cross-agency initiatives?

Digital government presents possibilities over the long run to enhance collaboration not only between governmental agencies but also across organizations from different sectors and among citizens themselves. The potential creation of new forms of civic engagement via digital government activities is particularly exciting and important.

Online conflict resolution may be facilitated by e-government and, in fact, may be a pre-requisite for sustainable technology-based collaboration. For example, E-bay, the online auction firm, attributes part of its success to the use of online, high-quality dispute resolution to resolve conflicts between sellers and buyers on-line. The dispute resolution services manage various levels of conflict, reputational concerns, and satisfaction with merchandise. In most cases, dispute resolution takes place over the web. Similarly, parties in disputes in small claims courts might submit ideas for resolution via electronic mail to judges.

3.6 Networked Governance

As networked governance develops, the need to understand, analyze, and influence governance in networks, rather than simply in hierarchies and markets, takes on greater importance (Kamarck and Nye, 2002; Meier and O'Toole, forthcoming). Research on networks is vitally important to the future of government as bureaucracies internally develop networked

features through the use of cross-functional activities and teams and as bureaucracies interact with one another in networked arrangements. Normative, or prescriptive, models of networked governance have yet to be articulated. (Regarding some of the anomalies of diffusion of innovation in networked governance systems, see Lazer, 2002). Networks encompass both social and technical systems and their interaction.

The concept of a network should be expanded to include interactions between human and technical agents. Social scientists typically have ignored technological questions, and information systems researchers have treated social issues exogenously. Little research and theory exist concerning interorganizational behavior and technology diffusion and implementation across organizations or interest groups (e.g., Attewell, 1992; DiMaggio et al., 2001; Kettinger and Grover, 1997; Kraut, Rice, Cool, and Fish, 1998; Parthasarathy and Bhattacherjee, 1998; Robertson, Swan, and Newell, 1996; Schenk, Dahm, and Sonje, 1997; Swan, Newell, and Robertson, 1999). Such theories are likely to be developed and validated using network perspectives.

A pressing research and policy issue for digital government research is **network stability**. This topic relates to the creation of knowledge that would allow building stable networks to maintain high performance in case of attack or other disruption. Distributed data networks using packet switching, developed in the 1960s, provided stability through redundancy and recomposability. The analog for distributed social networks has yet to be well articulated. Intelligence and enforcement agencies require research on methods to destabilize and disrupt networked activities. Information technology could be used to develop greater transparency of networked activities. Pattern recognition tools might be used to detect aberrant patterns in network activity that would provide an early warning system. Questions of network stability and reliability in both social and technology networks extend beyond intelligence and enforcement policy domains to all policy areas given the requirement that

government data and networks provide high reliability and security to the public. Thus, network mapping and analytic tools not only would enhance research but also would improve practice by putting elements within networked structures under the control of decisionmakers.

Empirical research on government networks is important to build a set of findings based on the public sector and its distinctive environment. Although reports have recommended that private sector **best practice** in IT be identified and transferred to government, the transfer process is not always a straightforward one. Government is responsible for multiple "bottom lines," thereby rendering its calculations of interest more complex and different from those in the private sector. Government decisionmakers cannot freely and strategically choose their network partners as private firms can because they must interact with some entities such as particular agencies and state and local governments by law. Moreover, risk assessment in government differs from private sector calculations due to higher required levels of reliability, access, and security. Public sector networks and their dynamics differ along some fundamental dimensions from private sector networked activities. It is critical, in this case as in others, to scrutinize private sector "best practices" carefully to determine precisely how private sector practices apply to public policy settings.

Network research strategies also might improve understanding of **joint production processes** in government. Traditionally, researchers have focused on interaction between the nodes in a system. But the various units of analysis in different government networks have different programs running through them. Research on vertical and horizontal integration, discussed above, has been one response to this analytical complexity. Research on the interaction of different policy networks and sub-networks holds the promise to illuminate network dynamics that are obscured when other approaches are used.

Networks also imply **communities of practice**, or epistemic communities, in policymaking and governance. Research in which computer and information scientists might work in partnership with social scientists includes building tools to enhance the development and productivity of communities of practice across agencies. Communities of practice develop when trust exists in sufficient quantity to enable information exchange across jurisdictional boundaries. Ultimately, the search may be not for best practice in the private sector but simply for better practices within the public sector, given its distinctive environment and constraints.

The salience of networked governance highlights the importance of developing improved **methodologies to capture network data**. Advances in network mapping strategies would benefit researchers as well as government practitioners seeking performance improvements. For example, decisionmakers responsible for service implementation networks often lack access to data needed to measure and create value. Typically, network researchers collect data on the frequency and characteristics of interactions in part because these data are available, analytic tools exist to aid calculations, and theories using such variables form the mainstream of social network analysis. Yet not every interaction is of similar value and interaction content and context are important although more difficult to characterize and measure. Research on digital government and organizations should include attention to methodologies and techniques to generate data and to map interactions. For example, transaction log analysis provides for content analysis of nodes and allows researchers to collect data in time slices that allow for examination of variation diachronically. Analysis of content is as important as measures of relationships among nodes. Tools generated by computer and information scientists might help to answer social science questions, thereby providing opportunities for constructive partnership between information and social scientists.

4. STRATEGIC AREA 2: INFORMATION TECHNOLOGY, GOVERNANCE AND PEOPLE

A basic social science research program in digital government requires systematic research on human and social behavior in addition to a focus on structure and organization. Specifically, research is needed on citizens (individual and corporate), civic associations, those responsible for design and development of digital government, and those in political decisionmaking roles that bear on digital government. A research agenda should include attention to the influence of IT in government on these roles.

4.1 Citizens and Civic Associations

Greater use of IT in government organizations implies renewed attention to citizens and their relationship to e-government. Key empirical questions include:

- What information do citizens seek from government?
- What do citizens want to do with electronic government in terms of transactions and interactivity
- Where do users get their government information and services currently?
- Where would they like to access them? Do the actual observable patterns of e-government use differ from assumptions regarding use that designers employ when building interfaces?
- What are the specific subpopulations using digital and e-government?
- How do usage patterns differ among sub-populations?
- How do users search, navigate, and query in government websites and cross-agency web portals?

- What are the most important research needs for tools and architecture to improve citizen search, query, and navigation in government websites?

With respect to the questions posed here, there may be an emerging digital government gap between national and state capabilities in capacities such as transaction processing. Many local governments lack the capacity to develop sophisticated portals. Yet some market research has indicated that citizens prefer to interact with their local governments more than state or federal levels. This mismatch between capacity and citizen preferences may lead to a "digital provider divide," or an increasing gap between local capabilities and those at the state and federal levels. How decisionmakers will address this gap is an important applied research question.

Currently, most government information on the web is organized according to the classification systems of agencies rather than the **mental models** of users. (See Steckler, 2002 for a social psychological perspective on mental models and their effects on information sharing in government.) Hence, although the Internet and web, in theory, make government information more accessible to the public, organization online often replicates paper-based classification schemes and therefore merely automates the status quo. Professional services firms that develop e-commerce tools have begun to focus on intentions-based website design – meant to reflect the intentions of customers -- for e-government. Yet if one studies, for example, the emerging intentions-based portals of various U.S. states, one sees a vast array of intention-based designs that look very different from one another in design and function. Best practice in the development of intentions-based websites could be harvested and disseminated to government decisionmakers.

A set of related research questions bear on how citizens and interest groups use IT to **influence** those who govern. Often the "user" of digital government is a civic association or interest group rather than an individual. To note one example: many

policymakers are now overwhelmed with electronic mail from constituents. Yet the causal connections between ease of communication and influence in political decisionmaking are not well understood. Has the use of IT affected the relative influence of interest groups? Has it increased the influence of individual citizens relative to that of interest or advocacy groups by disintermediating interest articulation and communication? Or has electronic communication simply strengthened existing structures of influence? Such questions extend central social science topics, such as cognition, power, and organization to account for technological variables.

Political science and political sociology scholars have developed powerful theories and rich veins of research regarding civic associations, their development, maintenance, and roles (Skocpol and Fiorina, 1999). As the use of IT is woven into the fabric of civic life and the behavior of interest groups, theories that account for technology and its enactment by these groups gain in importance.

Citizens have special requirements for **trust and accountability** in their relationship to e-government. First, they must be able to trust in the fairness and universalism of government. Second, citizens seek systems that sustain their trust through reliable and secure provision of government information and services. New technologies necessary for adequate identification and authentication raise questions of citizen privacy and security in a democracy. For example, current attention to the use of social security numbers as a unique identifier throughout government and society points to the difficulties of managing the organizational and technical processes required to maintain trust and accountability.

The **digital divide** typically refers to inequality of access to hardware and telecommunications by the poor. Digital government initiatives should not exclude those government agencies located in poor states. Nor should it exclude those communities that do not have the telecommunications, hardware, software, or staff to modernize their information infrastructure.

Digital government initiatives may need to have resource components to allocate resources to poorer governments. Some states, such as Texas and Colorado, have taken an aggressive approach to ensuring equal access to telecommunications and IT resources for rural communities. It is essential to ensure that digital government does not exacerbate existing inequalities.

In addition to gaps in access to hardware, a significant skills gap exists in the population. Research indicates that citizens vary widely in their ability to use technologies and in the level of social support available to remedy these deficiencies (Norris, 2001). The skills gap suggests that equality of participation in online government processes requires design that ensures access by those with little technological experience. Information placed by government on e-government websites must be easy for an average user to locate and understand and locate. For example, many users have difficulty accessing political information or using the Internal Revenue Service website to obtain tax information. The users of e-government span the entire polity ranging across class, race, region, age, and disabilities. Inequality of access suggests the importance of design that makes government information and services accessible. Research is needed on existing inequality and means to minimize disparities in access to e-government.

4.2 Key Roles in Design, Development and Decisionmaking

There is a striking absence of empirical studies that examine the behavior of **developers and government users of IT**. Developers include the entire supply chain involved in the design, development, and deployment of digital government: public and private sector designers, planners, systems developers and those responsible for budgets and appropriations, policy, rulemaking, procedures, and systems. The respective roles, impact, and influence of these actors and the ways in which they

interact to produce e-government constitute a key area for research. Both descriptive and prescriptive research is needed on the role of business in the development and operation of digital government. The market for e-government, the size of government contracts, and the sunk costs involved when large-scale systems are built point to the need for unbiased, systematic policy research. The latter issue implies research questions for the fields of business-government relations, public management, political sociology and political economy.

Other key roles in the development of digital government are those of **public servants** acting as innovator, boundary spanner, risk taker and entrepreneur. Public servants are charged with more than efficiency enhancements; they are responsible for the creation of public value as they develop e-government (Moore, 1995; Osorio-Urzua, 2002). A central challenge for government is the fostering of these roles in an environment that must be conservative with respect to change and risk in order to guard the public interest. Research topics include knowledge transfer of existing research on innovation and entrepreneurship to the domain of digital government and case study research analyzing successful innovation and entrepreneurship in government agencies in order to identify the antecedents and conditions that foster success. Similarly, research is needed on the ways in which public managers are using IT to affect their policy environment and, in turn, the effects of such changes on the policymaking process.

The **mental models** shared within professional communities define and structure professional roles (Steckler, 2002). Mental models include assumptions, vocabulary, value determinations, operating rules, and standardized procedures for a range of professional behaviors. One of the challenges for organizational change required to leverage new IT includes modification of mental models that work against the productive development of digital government. But such models are often difficult to recognize and articulate and, hence, difficult to change. Research on the complementarities and disjunction among the mental

models of technical experts, policy experts, and other types of decisionmakers holds promise for illuminating key elements of organizational change.

4.3 Political Roles

Decisionmakers with significant influence over the shape of digital government include elected and appointed officials and their staffs. An elementary question to which no clear evidence has yet been collected is: What organizations or which groups are enabling e-government or furthering its development? Elected officials and their staffs make critical decisions regarding digital government, yet little research has examined the information sources used by decisionmakers or their role in the development of digital government. Legislative staff play a critical role in digital government decisionmaking, yet it is difficult for most staff to understand and convert the information they receive regarding technology issues into policy.

A constellation of actors – including career civil servants, elected officials and their staff, lobbyists, interest groups, and vendors – are shaping the contours of digital government. (To note one extended analysis of these roles in state governments, see Rethemeyer, 2002a; 2002b.) For example, H&R Block, a financial products and services firm well known for tax preparation services, developed the architecture for online tax filing. The sunk costs involved in wide use of their system have influenced government decisionmaking and the architecture of online tax filing. From one perspective, this form of public-private interdependence may be viewed as an example of gains to government from innovative business practice. From a different perspective, one might conclude that key decisions regarding enterprise architecture for one of the most basic transactions in government, filing taxes, has been pre-empted by decisionmakers without legitimate authority. In sum, political and governance issues related to technology transfer and

diffusion of innovation across public, private, and nonprofit sector boundaries is a significant and pressing area for research.

4.4 Design to Strengthen Democracy

Early e-government projects sought to provide citizens with web-based government information and services. However, as the implications of networked governance become clearer, designers might develop digital and e-government systems that encourage civic participation in ways that strengthen democracy. For example, it is technically possible to increase the frequency and use of referenda voting. However, this may not result in an improvement to American democracy. It is technically possible for citizens to email their elected representatives. But there is as yet insufficient capacity to respond to this volume of electronic communication. Insufficient response by elected officials may exacerbate perceptions of government inadequacy.

Research issues at the intersection of IT, politics, and governance abound. The following are a small sample of significant, pressing questions:

- How would citizens who interact with government primarily through intentions-based portals learn and understand how government works?
- What is the responsibility of digital government designers (whether elected officials or other decisionmakers) to ensure that citizens understand the governance behind the seamless interfaces increasingly available online?
- How might government and governance be made more transparent through the use of technology?
- As access to elected, appointed, and career officials increases through electronic mail and interactive websites, how are policymakers integrating information received via the Internet in contrast to influence attempts made through other channels?

- Given that digital government makes direct democracy, in particular referendum voting, less costly, is the development of digital government leading to systems that are technically feasible but socially suboptimal?
- What impact is the development of digital government likely to have on jurisdictions and political boundaries?
- To what extent does the web and availability of visual and mapping information through geographic information systems affect citizen or decisionmakers' perceptions of appropriate jurisdictional boundaries?
- How should decisionmakers balance questions of access with the need for security?

Empirical research is critical to gain a clearer understanding of what citizens want from e-government, and how e-government initiatives can improve or enhance citizen engagement in the provision of public goods. It may be that citizens value increased possibilities for participation as much as faster, smoother transactions with government. For example, citizens may wish to interact with state or local government units before contacting a federal agency. Outcomes related to governance and citizenship differ from outcomes stated simply in terms of transaction cost reductions, efficiency, and speed.

5. STRATEGIC AREA 3: CHANGE, TRANSFORMATION, AND CO-EVOLUTION

Technology is a catalyst for social, economic, and political change at the levels of the individual, group, organization, and institution. Each technological and related change evolves in its own sphere, but it does not evolve alone. Technological and social changes co-evolve (Bach and Stark, 2002; Neff and Stark, 2003). New technologies generate learning and new expectations which, in turn, stimulate further technological change (Epple, Argote, and Devadas, 1991). Thus, research is needed that captures co-evolutionary processes involved in learning and transformation using models in which preferences and interests evolve over time and are treated endogenously.

Elements of a research agenda might include mapping evolutionary ideas with regard to IT and governance into entities that tend to co-exist and co-evolve in systematic ways. Relevant bodies of theory upon which to draw include social network theory, evolutionary theory, and perspectives on complex adaptive systems. Concomitantly, each of these bodies of theory is associated with tools and methods for research design and analysis.

5.1 The Two Systems Problem

Agencies building online capacity must manage investments in new capabilities while maintaining existing production and distribution channels. This dilemma is known as the "two systems problem." United States governments are likely to become providers of information and services across multiple channels, each of which possesses separate technical, functional, and operational requirements. Current private sector best practice indicates that firms engaged in e-commerce also operate

effective telephone, mail, and face-to-face channels. Indeed, e-commerce has led to increased use of call centers for customers to clarify and supplement online information. The dominant modality may be the telephone used in combination with websites rather than websites used for self-service. The dynamics of co-evolution, in terms of systems, requires research on costs, access, and service. It is important for a digital government research program to identify and articulate more clearly than presently available differences between the public and private sectors in terms of performance metrics, return on investment, requirements for equity and access, and feasible methods of adaptation to change.

A series of related issues provide further detail to the two systems problem in government. Most government information remains organized in **analog format** even as agencies have sought to build enterprise architectures. Files have traditionally been organized, stored, and archived in file cabinets and boxes. Documents have been paper based. Increasingly, information is being transferred to a **digital format**. Yet in most locations, files are organized and stored in both formats. It is not yet known whether both analog and digital systems are necessary. (For further discussion of this issue, see Schweik and Grove, 2002.) Many agencies hesitate to expend limited resources simply to digitize documents. Research is needed on transition strategies, costs and benefits of transition, risk assessment, and incentives to overcome bureaucratic inertia.

Research on the **politics of technology implementation** is also needed. Interest group politics in the United States means that new ideas and technologies require political support in order to move forward. Political power and the analysis of power and politics cannot be separated from the study of digital government, its development, and impacts. Technical questions are often decided by political actors. Technical specialists often make decisions of political importance, such as those regarding design criteria that affect access, reliability, and cost.

Recently, the U.S. Office of Management and Budget E-government Working Group, under the direction of Mark Forman, initiated a "best practice" group whose task is to search for, identify, and promote transfer of "best practice" from business to government. Such benchmarking is valuable for practitioners. Associated systematic research would aid understanding of technology transfer and could strengthen it. Research in this area should employ descriptive approaches as well as longitudinal, quantitative analysis of adoption and diffusion patterns using time-series techniques.

5.2 Incentives for Change

The incentives to build digital government must be aligned with citizen preferences. Citizen preferences should provide the basis on which partially to structure outputs for which incentives would be devised. Private sector firms, including those that develop and sell digital government tools and services, conduct market analysis. Government agencies must assess a broader range of views than the preferences of direct clients for services and information if they are to serve the public interest. Private firms identify markets that can pay for services and products. Government agencies must provide products and services to all citizens without regard for financial or political leverage. The equity issues central to democratic governance raise a set of ethical questions and potential conflicts of interest in the development of digital and electronic government as the boundaries between public and private sector decisionmaking and management become increasingly interdependent. Public and private sector organizations possess fundamentally different incentives for decisions.

Incentives extend beyond those in markets to include rewards and penalties within political and bureaucratic processes. The "best practices" circulated in a policy domain provide information and incentives for decisionmakers to imitate. Attention by highly visible agencies, like the National

Science Foundation, and by university researchers to key research "hotspots," can provide visibility and support for innovative projects and programs and, in turn, create incentives for others to follow. An understanding of incentives and their use is at the core of research on change and transformation.

Markets create incentives, and government can create markets and incentives. For example, the Environmental Protection Agency created a market for clean air by designing instruments, such as tradable permits, that firm decisionmakers use to make rational choices regarding acceptable levels of pollution according to a pricing structure within a market. Government has the potential to create incentives to encourage or discourage innovation, cross-agency collaboration and system-building, and a variety of behaviors designed to strengthen development of digital government.

6. STRATEGIC AREA 4: SYSTEMATIC RESEARCH DESIGN

A basic research program for digital government must provide a foundation so that findings accrete over time. A foundation on which researchers can build, therefore, requires more systematic attention to research design. Researchers and practitioners should be able to locate their particular proposal or problem within a matrix whose dimensions delineate the problem space of digital government research. Such a matrix is outlined and explained below.

The dimensions of the matrix include problem or performance criterion on the x-axis; technology on the y-axis; and theory or, in the case of problem-based research, functional management area on the z-axis. Each dimension is analytically distinct but, in practice, the dimensions are highly interdependent.[11] Systematic research design located within a space that could be conveyed clearly to other researchers and practitioners would foster a portfolio approach to research, clearer identification of gaps in digital government research, stronger accretion of research results, and improved development of a community of researchers.

[11] The three-dimensional representation is a simplification; several more dimensions are important and flagged in this paragraph.

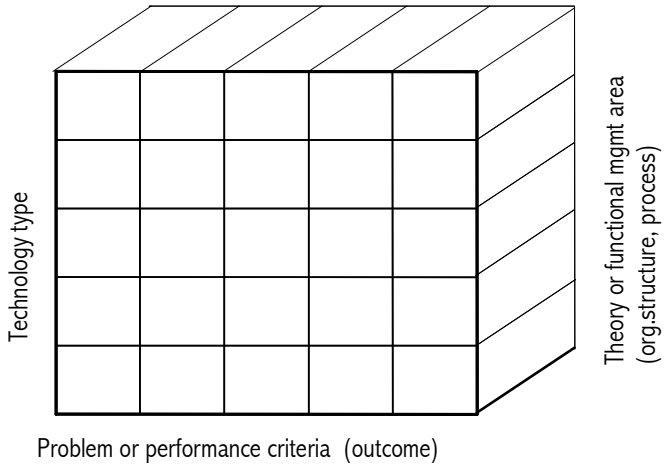

Figure 1: A Matrix for Research Design in Digital Government

6.1 Technology

Information technologies (IT) vary extensively from desktop computing to geographical information systems to wireless systems and nanotechnology. In fact, ecologies – or coherent systems -- of several technologies are in use in government. It is insufficient for social scientists and public management experts merely to conduct research on "information technology." Different technologies, systems, and applications vary in their characteristics and effects. Yet little classification is

found in social science research at the intersection of IT and complex organizations. This is an area in which partnerships between information and social scientists might advance precision in terminology and conceptual apparatus.

Thus, a key recommendation is to define "information technology" with more precision in social science and management research and to begin to classify research projects more precisely with respect to the technologies studied.

6.1.1 Technology Fit with Government Needs

Workshop participants emphasized that technology to be deployed in digital government must be appropriate to agency needs and priorities. Technologies should be designed and developed to support government mission and objectives rather than modifying program objectives to align with technologies. Government decisionmakers require tools and expertise to evaluate the match between their strategic needs and available technologies. Workshop participants called for research on the role of private sector firms and their role as providers of suitable technologies for government. Communities of practice across sectors may be a fruitful source of practical design. To note one example, customer relationship management implies managers determine desired outcomes using input from customers and, using customer information, work backward to identify key information needs and the development of standards and interfaces. In sum, key research questions include: Is an architecture or application appropriate for an agency to address high priority challenges? How should agencies evaluate fit? Who evaluates fit?

The Bush administration has launched twenty-four key IT initiatives in the federal government to build cross-agency enterprise architectures and systems. A key assumption of the initiative is that the development of enterprise architectures and systems will transform governance. Research is needed on specific applications of enterprise architecture that might serve

as catalysts and enablers of tools for transformation. Government decisionmakers require systematic understanding of the collection, dissemination, and use of information across government agencies to design and develop cross-agency enterprise architecture. It is critical for research to analyze and describe information requirements and the technical infrastructure required to advance an enterprise strategy.

6.1.2 Preparing for Future Technologies

Most social science research on technology, organizations, and government focuses on technologies that are currently available and in use. A basic research program should also "future-proof" government information systems to the extent possible by forecasting emerging technologies and by providing studies and results on near-term advances and their likely governance impact. The NSF Digital Government Program typically funds work well beyond currently available technologies. Thus, it may help move the orientation of social science research outward in time as well.

Studies that illuminate the present and future by examining past technology may also deepen the research agenda. For example, there may be no significant difference between the move from email "documents" to instant messaging and the experience during the mainframe era in which many organizations used both email and messaging. An orientation toward the future may obscure important lessons retrievable from the past. To note another example: the Internet and World Wide Web as storage and delivery mechanisms are likely to be replaced, at least partially, by wireless technologies and text messaging, which are increasing in use. Documents may become less important as messages, including instant messaging, become more important for several types of communication and interaction. These trends have implications for the architecture of information delivery as well as a host of governance questions

including those related to accountability, preserving, archiving, and the form and content of public information.

6.2 Theory or Functional Management Area

The z-axis on the matrix portrayed above indicates the theory that is to be tested in a study. This dimension also includes functional management areas to account for research focused on a management problem rather than development of theory. In both cases, equal rigor is required for the development of inferences, the objective of research.

A wide range of important and equally scientific methods should be employed in a research program that deals with complex, dynamic, and disjunctive technologies in equally complex, dynamic and rich social settings. A research agenda for digital government requires a portfolio of disciplines and practical fields, theoretical approaches, and research methods. Useful models and analytical frameworks of three types would strengthen the basic research program:

1. Explanatory (predictive);
2. Descriptive; and
3. Normative (prescriptive).

A range of theories from the social and applied social sciences are relevant to digital government research, including theories of accountability; institutional design and behavior; the social behavior of individuals, groups, and organizations; bureaucracy; and democracy. A broad literature on scientific inquiry, research methods, and knowledge generation is available to researchers. Those **features of research design** of particular importance for building a basic research program for digital government are noted here.

Theories range in scope from medium-range, practical accounts of systematic relationships to abstract, general accounts of, for example, liberty, justice, and equality. The level of generality at which a researcher poses questions varies greatly. Political scientists, to note one example, often espouse theories of the middle range, or relationships among variables of concern that shed light on classes of fairly well defined practical issues. Examples include theories of interest group activity, formation of international organizations, and technology enactment. More general, abstract theory is probably pitched at too high a level for use in a research program on digital government. At the broad, abstract level are general theories of, for example, social behavior, markets, and hierarchies. At the other end of the continuum lie more narrowly focused theories – or accounts of the relationship among a set of variables under certain boundary conditions –for example, the facilitators of interagency collaboration in democratic governments or the optimum means of budget preparation using the web.

Scholarly social science research utilizes both deductive and inductive methods. **Deductive research** typically begins with theory and deduces from it a set of propositions to be tested in an empirical setting. In the case of deductive research, the researcher takes theory as a starting point and finds a setting, or a set of conditions, in which to refine or test theory. Research questions are deduced from theory. Researchers use an **inductive approach** when theory to explain or predict a particular phenomenon either is not well developed or when a researcher assumes that existing theory is incorrect or misspecified. Inductive research begins with a problem or phenomenon and is used to generate a set of hypotheses that may then be tested in other settings.

In instances of problem-based research, the z-axis of the research design matrix represents structure and function, what applied management researchers call **functional management areas**. Several specific structural, functional, and management challenges have been highlighted in this report, particularly

under the first strategic area. This subsection focuses on methodological and design issues. In some cases, the development of theory has not kept pace with developments in organizational structure and function. For example, emergent organizational structures that are temporary, project-based, and interjurisdictional fit poorly with traditional bureaucratic theory and are only partially explained in network theories. Traditional communication or reporting functions in bureaucracies are undergoing transformation in environments in which real-time, networked communications and data sharing are becoming the norm. In this case, also, theory lags behind current and emergent phenomena. For this reason, the z-axis includes structure and function as well as theory.

6.3 Rigorous Problem-Based Research

Problems and performance outcomes (criteria) lie along the x-axis of the research design matrix. One promising avenue for generating generalizable, cumulative research that is also problem-based is case-based, scholarly research. Researchers in this case focus on particular problems or challenges faced by government decisionmakers rather than testing theory. Most practical problems in government exhibit multiple, complex characteristics that cut across theoretical approaches, well defined streams of research, and structural elements of organizations or functional management areas. Gaining purchase on such problems demands an approach to research that is rigorous and systematic, but outside the traditional scientific method of deductive research on artificially bounded research problems. Researchers might identify particular loci or occurrences of a definable problem in a government agency or in multiple agencies. The problem would be described in terms of functional management areas. Comparisons across multiple empirical sites would be an improvement over single case studies and allow for greater generalizability of findings.

Proposals for problem-based research would include a statement of a problem that is practical, sufficiently broad to yield generalizable findings of importance, and likely to result in findings from which evaluation criteria can be derived. Examples of high priority, multi-dimensional problems that lend themselves to an inductive research approach include:

Data sharing. This topic encompasses a number of critically important issues: confidentiality, privacy, legal barriers to sharing data, organizational barriers, incommensurate definitions or categories, difficulties of standardizing measurement or classification, political pressures and sensitivities, citizen distrust of government leading to pressures to promise confidentiality.

Development of data systems to serve multiple functions within organizations. Integration of internal and external needs for data is required, so that databases are organized to serve managers, workers, and clients. Can data for continuous improvement emerge from budget/accounting/operational data? What are the technical and organizational challenges to achieving this integration?

Exploiting new opportunities for government/citizen interaction. The above problems generally related to the production of government outcomes. However, e-government can also enable government to be more open with citizens and responsive to citizen input. Issues include new channels of communication from government out to constituents, and, in the opposite direction, from citizens in to government, data availability for concerns citizens have, data usability to citizens of differing levels of knowledge and skill, access to IT among citizens and equity of access so that citizens can participate in e-government, assessing the risks and disadvantages of increased citizen input as well as the advantages.

Evaluating the impact of technology. Participants discussed the importance of measuring costs, agency performance, productivity, human capital requirements, and one-time versus recurring costs or benefits.

Equity across different kinds and levels of government agencies. Digital government initiatives should not exclude those government agencies located in poor states or local communities that cannot afford the hardware, software, or staff to modernize their IT. Digital government initiatives may need to have resource components (as well as design and technical components) to allocate resources to poorer governments.

Opportunities to reallocate responsibilities across levels of government. New IT creates the capability to decentralize some policy and program activities. What are the data infrastructures and computing systems that enable decentralization through monitoring and feedback? Other issues include need for standard-setting, consistency of data input and availability, support for field units, empowerment of field units, design of incentives for higher levels of government to devolve responsibility to lower level units. This process can happen within organizations as well as between organizations. But the major policy significance of this aspect of digital government is devolution at a more macro policy level than decentralization within an agency.

Problem-based research, the norm in applied fields, typically takes as the dependent, or outcome, variable an important criterion of management or program performance. Research results are expected to lead to performance improvements. Criteria are multiple and interdependent and include accuracy, timeliness, reliability, responsiveness, or some other dimension of system performance. The "system" here might denote an agency, program, process, or information system.

Practitioners at the workshop emphasized the need for researchers to remember who the "client" is. Applied research serves both the academy and practitioners. Research must be grounded in practical problems and current challenges if findings are to be relevant to the policymaking community. Practitioners emphasized the importance of ensuring that research is

communicated to decisionmakers in government. Decisionmakers often lack ready access to current research findings. Moreover, elected officials and their staff make critical decisions regarding digital and electronic government. Without strong ties to the digital government research community and its output, decisionmakers receive most of their information regarding new IT and their implications from lobbyists. Workshop participants suggested compiling research into summaries and toolkits for distribution to governor's offices, municipal entities, legislative staff and Congress.

6.4 Expanding Research Methods

A powerful, robust research program should encompass a variety of methods. Among those emphasized by the workshop participants were computer modeling, economic modeling, case study methodologies, network analysis, survey analysis, content analysis, transaction log analysis, and mapping techniques. Participants concurred that the combination of quantitative analysis and qualitative fieldwork is particularly powerful for examining complex research questions in emerging fields of research.

A variety of comparative research strategies would strengthen capacity to understand and influence digital government. First, systematic comparative research on public and private sector differences offer a window into differences in environment, context, incentives, reward systems, career paths, and a host of other critical building blocks for information-based organizations. A stream of writing in public administration and management compares and contrasts the public and private sectors. Given the ubiquity of computing in the state and economy, a resurgence in this stream is called for.

Within the United States, the 50 state governments, currently at various stages of development with respect to digital and e-government, present a ready source of rich comparison. (State and local government websites, for example, are compared

in West, 2001. Typically, innovations in government have begun at the state and local levels, primarily in response to environmental shifts and citizen demands. These innovations then diffuse to the federal level. It is not clear that this pattern is being replicated in the case of digital government. A rich vein of theory and research on the diffusion of innovation, structural isomorphism, and technology adoption offer promising avenues for systematic research of benefit to government.

Increasingly, the work of government is conducted in the public and non-profit sectors. Use of the Internet and web make sectoral boundaries even more amorphous and difficult to entangle. Yet research on patterns of contracting, cost-benefit analyses, and the relationship of vendors to the fundamental developments in government would illuminate inter-sectoral relationship and the political economy of current transformation.

Finally, cross-national comparisons have become increasingly important as states seek to embed their cultures, values, and practices in web-based systems. In addition to cross-national comparisons is the need for systematic research on the effect of the Internet and related IT on international and nongovernmental organizations, and on international relations generally.

6.5 Measurement and Evaluation

Evaluation of the impact of technology on several dimensions of governance is a key element of the basic research agenda. Systematic evaluation is particularly important in the face of pervasive hyperbole and marketing efforts in the digital government domain and, more generally, with respect to the Internet and its potential. Absent strong capacity for unbiased evaluation, government decisionmakers lack information and analysis beyond that supplied by those who sell enterprise architectures and technologies. Pervasive use of industry surveys and data, often of questionable validity and reliability, characterizes even scholarly research on IT and organizations.

In clearest terms, evaluation research should illuminate the type and extent of change attributable to IT use in government. Evaluation research, based on systematic empirical analysis, is a chief requirement of the research agenda. Moreover, measurement of risk is central to the management of large-scale IT projects.

Two elements of measurement are critical for a digital government research agenda. Systematic research design includes careful selection, definition, operationalization, and measurement of independent and dependent **variables**. Research oriented toward practice will necessarily include performance measures or metrics which are, in fact, variables to be measured. An indicator of the early stage of digital government research is the relative lack of well-defined variables and measures for use by researchers and practitioners. One of the important contributions of a basic research is generation of **concepts**, conceptual frameworks, and variables (or measures) to describe and predict phenomena of interest.

A critical research area includes assessment of **cost savings** as the well as the **true costs** of development and implementation of digital government and e-government. Among the elements of costs and savings of importance are quality, cycle time, customer satisfaction, and employee satisfaction. Although transaction costs are relatively simple to measure, it is more complex to measure the costs and cost savings associated with agency transformation. In fact, the likelihood that agency and program missions will change in response to changes in infrastructure and capacity means that the outcome variables will continue to change.

Measurements of **change, transformation, and co-evolution** are difficult to define and capture. Measurement of events and problems that are prevented - or measuring the null set - is particularly difficult. For example, how can researchers and evaluators measure the extent to which intelligence and enforcement agencies have used technology to prevent breaches of security? Among the more difficult metrics, how are outcomes

such as social capital and collaboration measured? How does one measure whether the right information is shared across agencies as opposed to an overload of undifferentiated, unfiltered information?

The Government Performance and Results Act and, more broadly, current emphasis on **performance** management has driven renewed interest in measurement, a key element of evaluation. Similarly, agency report cards leverage the transparency that IT can help provide. A query system that performs a cross-section comparison of similar programs, such as schools, and reports the results on the World Wide Web might help increase agency or program responsiveness and efficiency by leveraging information transparency and accessibility.

Performance metrics are many, complex, segmented and, ideally, outcome based. Government is characterized by co-existing and conflicting bottom lines including equity, efficiency, effectiveness, accountability, and responsiveness. Reasonable degrees of performance on all of these dimensions are expected and required.

7. CONCLUSIONS

Recommendations for critical research topics, design, and methods have been enumerated throughout this report. Four strategic areas categorize the central recommendations for a basic digital government research program that draws from and energizes the social and applied social sciences. First, research on the relationship between IT and the structure and organization of governance is key to understanding and influencing the impacts of technology in government. Second, empirical research is needed on the key stakeholders and users of digital government. Citizens and civic associations form the central users of digital government. The Digital Government Program might consider proposals in which civic associations are partners of scholarly researchers. In addition, research is needed to illuminate and clarify the roles and relationships of those in the supply chain and political decisionmaking processes that produce digital government. Third, digital government implies by its very nature change, transformation and co-evolution. Research on these processes is a strategic priority. Fourth, a research program in digital government requires sound, scholarly research design and methods. Attention to improvements in the design of research on digital government would strengthen the validity and reliability of results and make it possible for findings to accrete over time.

The Digital Government Program should continue to require high-quality research design, as do all National Science Foundation research programs. It should encourage systematic deductive and inductive approaches as well as confirmatory and exploratory research given the range of research questions and lack of scholarly, including applied, research in the domain of digital government.

The Digital Government Program should sponsor workshops held in cooperation with the social science research programs to continue to develop connections between major social science theories, concepts, and studies and research questions in the domain of digital government. Small incentives

to social and applied social science researchers and doctoral students are likely to have a large payoff in terms of building the community of researchers and the knowledge base.

The Digital Government Program should develop a portfolio approach to research funding that explicitly incorporates social science and applied social science research in the service of understanding and influencing technological design, development and use in governance. A portfolio should include technical, social, and socio-technical projects; short-, medium-, and long-range projects; and research focused on the topics and issues described in this report, including emergent organizational forms, inter-organizational (specifically, government-to-government or cross-agency) arrangements, civic engagement and interest group behavior as well as studies of individual citizen behavior related to digital government; and explicit study of dynamic systems including models of change, transformation, co-evolution, and learning.

Comparative research should be encouraged as one means to move beyond single case study design to improve generalizability of results. Comparative research, in a second sense of the term, should also include cross-sectoral and cross-national studies. Cross-national studies are important as a means to promote technology and knowledge transfer. Moreover, cross-national research is necessary to build an understanding of the relationship between state structure, in terms of policymaking instruments, history, and culture, and the development of digital government.

The Digital Government Program should consider development of two major studies: a long-range, panel study focused on state governments and a large-scale comparative study of state structure and digital government across a sample of major, developed nations. A focus on state government exploits an opportunity to promote technology and knowledge transfer among state governments during a critical time in the development of digital government. Comparative study at the state level would complement the comparative study of the

Quicksilver initiatives already funded through the National Center for Digital Government at Harvard. Comparative, cross-national study would begin to build scholarly comparative research in digital government as well as increase the probability that innovative practical solutions to governance challenges will be harvested.

Practitioners remain in urgent need of unbiased information to inform current decisionmaking concerning technology and its use in government. The requirement by the Digital Government Program that researchers partner with government agencies in order to ground research in practical, current problems should continue. In addition, the Program should explicitly encourage research and tools to promote practitioner access to knowledge and knowledge, as well as technology, transfer across governments. The academy tends to discourage research products written for practical audiences. Therefore, the National Science Foundation might partially offset these disincentives with "counter" incentives to support such products for the benefit of the nation.

Finally, the workshop reaffirmed the important role played by the Digital Government Program in the development and support of a digital government research agenda. The Digital Government Program within the Directorate for Computer and Information Science and Engineering pioneered support for research on the technologies and applications required for digital government. The program requires researchers to work with government agency partners in order to ground research in current, practical challenges faced by government. In addition, it has employed a network-building approach not only funding research, but also building the community of scholars and practitioners necessary to produce a sustainable, coherent research agenda. The logic is compelling for a natural extension of these efforts to include central research questions of organization and governance in the portfolio of research topics associated with a digital government research agenda for the nation.

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APPENDIX A: WORKSHOP PARTICIPANTS

Executive Committee members:

Eugene Bardach, is Professor of Public Policy at the Richard & Rhoda Goldman School of Public Policy, University of California, Berkeley. He focuses primarily on policy implementation and public management, and most recently on problems of facilitating better interorganizational collaboration in service delivery, e.g., in human services, environmental enforcement, fire prevention, and habitat preservation. He also maintains an interest in problems of regulatory program design and execution, particularly in areas of health, safety, consumer protection, and equal opportunity.

Lawrence E. Brandt, is the Program Manager of Digital Government Program at the National Science Foundation. The program has been developed to explore R&D opportunities in Federal information services with collaboration between academic researchers and government agencie. He was also one of the original managers of the NSF supercomputing initiative.

Paul DiMaggio is Professor of Sociology at Princeton University, as well as faculty associate at the Woodrow Wilson School and Research Coordinator of the Princeton University Center for Arts and Cultural Policy Studies. DiMaggio has written extensively about issues in social organization and about the arts and cultural policy. His research and teaching interests include organizational analysis, sociology of culture, social stratification, economic sociology, network analysis, sociology of art and literature, and nonprofit organizations.

Jane Fountain, principal investigator and Chair of the workshop, is Associate Professor of Public Policy at the John F. Kennedy School of Government, Harvard University. She is also the principal investigator and Director of the National Center for Digital Government supported by the National Science Foundation. Her current research focuses on the

relationship between organizations and institutions, information technology, and governance.

Stephen Goldsmith, Professor of the Practice of Public Management at the John F. Kennedy School of Government, Harvard University, served as mayor of Indianapolis from 1992 until 1999. He is a management consultant with Lockheed Martin IMS and a Special Advisor to President George W. Bush on faith-based and not-for-profit initiatives.

Valerie Gregg is Program Manager for the Digital Government Program at the National Science Foundation. Building on over 20 years working in the U.S. Census Bureau, she managed the development of one of the earliest and most successful web portals, fedstats.gov.

Eduard Hovy currently heads the National Language Group at the Information Sciences Institute, University of Southern California. In general, he is interested in all facets of communication, especially language, as situated in the wider context of intelligent behavior.

Steven Kelman is Albert J. Weatherhead III and Richard W. Weatherhead Professor of Public Management at the John F. Kennedy School of Government, Harvard University. Kelman's research focuses on public sector operations management, with a focus on organizational design and change. He is currently researching the spread of procurement reform innovations at the working levels of government organizations.

Sue Stendebach is a Program Manager in the National Science Foundation's Digital Government Research Program, on assignment from the Environmental Protection Agency's Office of Atmospheric Programs. In her NSF role, Sue's primary objective is to build an environmental component to the Digital Government Research Program, catalyzing new collaborations between academia and EPA, as well as other environmentally oriented government programs.

Workshop Participants:

Stuart Bretschneider is the Director of the Center for Technology and Information Policy and Professor of Public Administration at the Maxwell School of Citizenship and Public Affairs, Syracuse University. His research interests include information management in public organizations, revenue forecasting, technology transfer and the diffusion of new technology, and administrative delay and red tape in public organizations.

Noshir Contractor is Professor of Speech Communication and Psychology at the University of Illinois at Urbana-Champaign. He is currently investigating factors that lead to formation, maintenance, and dissolution of dynamically linked knowledge networks in work communities. He is the Principal Investigator on a major three-year grant from the National Science Foundation's Knowledge and Distributed Intelligence Initiative to study the co-evolution of knowledge networks and 21st century organizational forms.

David Lazer, Assistant Professor of Public Policy at Harvard University's John F. Kennedy School of Government, teaches courses on management and executive branch politics. Lazer has written on the spread of innovation and communication within government and between governments, and is currently studying the integration of DNA technology into the criminal justice system. He is the Co-principal Investigator of the National Center for Digital Government Research and Practice.

Norman Lorentz joined the Office of Management and Budget on January 2, 2002 as Chief Technology Officer, the principal e-government architect for the Federal government. A senior executive with a thirty-year track record for innovative solutions, Lorentz is responsible for identifying and developing support for investments in emerging technology opportunities that will improve the government's technical, information, and business architects.

Gary Marchionini is the Cary C. Boshamer Professor at the University of North Carolina's School of Information and Library Science where he teaches courses in human-information interaction, interface design and testing, and digital libraries. His research interests include information seeking, human-computer interaction, digital libraries, information design and information policy.

Brinton Milward is the McClelland Professor of Public Management, College of Business and Public Administration and Professor of Public Administration and Policy (jointly appointed in the Department of Management and Policy) at the University of Arizona. His research interests include governance, public and nonprofit organizations, health and mental health service systems, and interorganizational theory.

Carlos Osorio is a doctoral student at the Massachusetts Institute of Technology and a former government manager in Chile where he developed the government's e-procurement system. His research interests include the study of alignment of readiness factors for e-government in developing countries, policies for diffusion of technologies, and privacy-enhancing technologies in digital environments.

Laurence O'Toole is the Margaret Hughes and Robert T. Golembiewski Professor of Public Administration in the School of Public and International Affairs at the University of Georgia. He also serves as senior research associate in the Carl Vinson Institute of Government there. He is the author or coauthor of many studies focusing on policy implementation and public management in complex institutional settings, policy networks, and environmental policy and management. His most recent book is *Advancing Public Management* (Georgetown University Press, 2000, co-edited), and he is co-editor of the new Johns Hopkins Series in Governance and Public Management, with the Johns Hopkins University Press.

R. Karl Rethemeyer is Assistant Professor of Public Administration and Policy at SUNY-Albany's Nelson A. Rockefeller College of Public Affairs and Policy. Rethemeyer's

research focuses on the Internet's effect on state-level policy networks, interorganizational networks generally, and social capital.

Maria Christina Scharf is a Research Fellow of the National Center for Digital Government and a Fellow of the Center for Business and Government at the John F. Kennedy School of Government and a PhD candidate at the University of St. Gallen, Switzerland, where she previously coordinated the Center of Excellence for Electronic Government. Her research focuses on the relationships between knowledge transfer and the use of information technology in government agencies.

Charles Schweik is Assistant Professor with the Department of Natural Resource Conservation and the Center for Public Policy and Administration at the University of Massachusetts, Amherst. He has two main research interests: (1) the human dimensions of environmental change, specifically applying Geographic Information Systems (GIS) and satellite image analysis to study human incentives, actions and environmental outcomes, and (2) information technology use and management in public sector organizations. Prior to academia, he worked as a programmer and project manager for IBM and as a consultant to the U.S. Department of Energy.

David Stark is the Arnold A. Saltzman Professor of Sociology and International Affairs at Columbia University, where he directs the Center on Organizational Innovation. He is an External Faculty Member of the Santa Fe Institute. A major contributor to the new economic sociology, Stark examines problems of worth and value in various organizational contexts.

Nicole Steckler is Associate Professor of Management in Science and Technology at the OGI School of Science & Engineering at the Oregon Health & Science University. Her research interests include information sharing across organizational boundaries; leading organizational change; interpersonal communication and influence in organizations; and tools for diagnosing and improving leadership effectiveness.

Anthony Townsend is a Research Scientist at the Taubman Urban Research Center at New York University's Robert F. Wagner Graduate School of Public Service. Currently, he is completing a Ph.D. dissertation at Massachusetts Institute of Technology, focusing on the geography of digital communications networks and their implications for urban development.

James Van Wert currently works for the U.S. Small Business Administration as Senior Advisor for Policy Planning and E-Government with principal responsibility for implementing the Results Act and Electronic Government. His primary tasks are to implement the Administration's five part management reform agenda, coordinate the Agency's efforts at building e-government applications for small and medium enterprises, and lead the cross-agency, intergovernmental effort to create a Business Compliance Assistance One-stop.

Richard Varn is the Chief Information Officer for the State of Iowa and Director of the Information Technology Department. He is responsible for information technology operations and policy for the state and works directly for Iowa Governor Tom Vilsack. In this role, he has become a nationally recognized leader in information technology management, privacy issues, and digital government.

Janet A. Weiss is the Mary C. Bromage Collegiate Professor of Organizational Behavior and Public Policy at both the University of Michigan Business School and the School of Public Policy. Her research is focused on public management and public policy.

Darrell West is the Director of the A. Alfred Taubman Center for Public Policy and American Institutions and the Center's Public Opinion Laboratory at Brown University. He is also the John Hazen White Distinguished Professor of Public Policy and Political Science. His current research focuses on e-government and policymaking; he is also studying the effect of television advertising and mass media on election campaigns.

APPENDIX B: WORKSHOP AGENDA

Thursday, May 30 Reception	
7:00 - 7:30 p.m.	Allison Dining Room, Taubman Building, Kennedy School
7:45 - 9:00 p.m.	Dinner, Welcoming Remarks and Introductions Jane Fountain, Principal Investigator Ira Jackson, Director of the Center for Business and Government Dinner speaker: Lawrence E. Brandt, Digital Government Program Manager, National Science Foundation
Friday, May 31	
8:00 - 8:30a.m.	Continental Breakfast Malkin Penthouse, Littauer Building, Kennedy School
8:30 - 12:30 p.m.	Opening Comments: Participants
12:30 - 1:30 p.m.	Working Lunch
1:45 - 3:15 p.m.	Small Group Discussion: Agenda-Building
3:15 - 3:30 p.m.	Break
3:30 - 5:30 p.m.	Plenary Session: Small Groups Report Out
Evening	An informal dinner will be held at a local restaurant
Saturday, June 1	
8:30 - 9:00 a.m.	Continental Breakfast Malkin Penthouse, Littauer Building, Kennedy School
9:00 -10:45 a.m.	Small Group: Drafting of Report Sections
10:45 - 11:00 a.m.	Break
11:00 -12:30 p.m.	Plenary Session: Constructing the Report
12:30 - 2:00 p.m.	Lunch and Wrap-Up

APPENDIX C: PRELIMINARY AND PARTIAL LIST OF TOPICS FOR DISCUSSION CROSS-AGENCY AND INTERORGANIZATIONAL, NETWORKED, GOVERNANCE

- Governmental portal creation and management
- Online government services
- Electronic procurement
- Tools including governmental document handling and directory systems, intelligent language systems, easy-to-use online databases and other public information systems, decision-making assistants

Related structural, process, administrative, management, and governance changes implicit in the development of networked organizational and technical systems

- Fundamental Change in Information and Decisionmaking
- Distributed authority
- Rapid decision making
- Evanescent web-based material
- Greater transparency of government processes and decision making
- Infrastructure
- New forms of IT-based access and infrastructure to replace postal system, phone access, and other social leveling institutions
- Integration of other forms of communication into the digital age: fax to digital, phone to digital, handwriting to digital,

TV and radio to digital, etc. If all documents can now be manipulated and changed, what is authentic?

- Government role in protection of citizen privacy versus government need to collect data and pressures for privatization

Effects of networked arrangements on the policymaking process, on decisionmaking in government, and on a variety of political, organizational and institutional issues including power, interest group processes, federalism

- Interest groups and civic participation
- New IT-enabled forms of citizen interaction, with each other and with government at all levels
- IT-enabled, geographically distributed communities of interest (including transnational)
- IT-enabled quality of life indicators as tools for democracy
- Possibilities for IT to aid in educating the electorate
- As citizen education on issues is enabled, will citizen engagement increase as a result of on-line learning?
- IT-enabled internationalization and globalization
- Implications of new communications for fostering democracy globally
- Direct access to government data in digital form - how will citizens and interest groups use new material?
- Citizen-oriented, standard, vetted and widely agreed-upon models and visualizations intended for the lay public
- Disintermediation: direct citizen interaction with government
- New forms of campaigning
- New roles of "the press" as information source for citizens
  - Are libraries prepared for new roles as government service kiosks? What are the new challenges for them?

Economics

- Models for supporting new costs associated with IT-enabled government
- Models for supporting costs to address Digital Divide
- New payment and partnership models - e.g. contracting out for routine, standard financial transactions and information gathering
- New forms of tax bases as sales tax disappears.
- What are the IT-enabled linkages between economic well-being and democracy?

Broader implications of networked governance for democratic theory, accountability, jurisdiction, privacy, civic engagement, business-government relations, and the institutional structure of government

- What new forms of governance (gathering and disseminating info, shaping public opinion, forming social consensus) outside of conventional political process are engendered by IT (communities of interest, NGOs)?
- New forms of transparent data- and simulation-driven government decisionmaking
- New forms of regulatory processes
- Government is intended to be conservative - how can it be effective in fast-moving IT waters?
- Government role in the digital divide?
- What new forms of social control will be developed via Internet equivalents to public control of airwaves and print media?

Based on a list of items compiled by Lawrence Brandt, Program Manager, Digital Government Program, NSF, and forwarded to the principal investigator.

APPENDIX D: SUMMARY OF PARTICIPANT INPUT ORGANIZED BY TOPIC

Participants were asked to answer several questions prior to the workshop. This appendix comprehensively documents their responses in a theme format.

1.What are the most important impacts of information technologies on the structure and processes of government organizations? Which impacts are already discernible? Which are likely to emerge during the next decade?

Governance

- Consider the political environment that government organizations operate in.
- Increasing the number of participants increases the politicization of the process.
- Focus on "government," not "digital"
- Look underneath structure of government. Note governance across jurisdictions.
- Devolution
- Optimization in government is frequently impossible or very difficult
- Political cycles make the nature of planning for public information systems less strategic than in business
- Project or problem based governance

Internal organizational performance issues

Revised Matrix – technology x criteria x functional management area
Technologies

- Smart cards
- Intranet
- Video conferencing

Performance Criteria (Consider tradeoffs between criteria)

- Fairness
- Efficiency
- Effectiveness

Functional Management Areas

- Strategically managing human capital
- Managing procurement

Research on stakeholders (including users, citizens, and other roles)

Information roles in design, diffusion, evaluation

- What are information roles?
- Who creates information?
- Who needs information?
- Users vs. sharers and other "roles"
- Role of "boundary spanner"
- What roles do individuals play in influencing others?
- What are small group dynamics with regard to experimentation with technology?
- How do individual roles fit into the bigger context, e.g. organization?

Civic associations

- How do civic associations shape the use of IT?
- How do citizens and civic associations use technology to influence government?

- What are best (and worst) practices from non-profit and for-profit sectors?

Citizens

What do citizens want with respect to e-government?

- What do citizens want to do?
- Don't assume citizens want better service or information or communication
- Perhaps citizens want to participate
- Citizens should be able to intervene in the regulatory process
- Interactive citizen-to-government relationships may emerge, e.g., e-rulemaking

Other E-government issues

- How can we develop e-government that encourages other forms of participation?
- Online conflict resolution is promising
- What are negative impacts of moving to the digital state?
- What role does DG play in ensuring that the polity understands what is going on behind the screen?

E-voting

- Scientists think e-voting is a non-starter for elections
- E-voting is very vulnerable to hackers
- There may be hope for e-voting with publicly monitored machines

Inequality

- Who pays and who benefits from DG?
- What is government's role where market fails?
- There is a gulf between skilled and unskilled technology users
- Differences in social support

- Users have difficulty accessing political information, tax information
- Design of e-government is important; design can enhance access
- Is infrastructure available in poor and remote communities to allow access?
- Is universal access the correct model?
- What is minimum access level?

Trust and Accountability

- Users require trust in the fairness and universalism in government
- Users require trust in the reliable provision of service by government

Technology

Technology Neutrality

- Conceptualize what IT will look like 15 years from now
- Technology is likely to change
- Technology may become more interactive
- Wireless vs. wired; desktop vs. wearable computers
- How to future-proof e-government?

Technological Fit

- Every technology serves a certain set of interests
- Fit between technology and agency needs and priorities?

Research on costs and cost savings

- Agencies don't want to spend for "just" better service if no cost savings
- Two systems problem: how to finance transition from analog to digital

Risks and Innovation

- Do not allow risk takers/innovators to be marginalized
- How does use of technology promote or inhibit innovation?

2. Reversing the causal arrow, how are public managers and policymakers using information technologies to craft new organizational forms or to make important modifications to present forms? What decision-making and problem-solving processes are emerging as the principal means of mutual adjustment?

Boundary/interface

- Consider the interface between government and the public
- The interface is the border, not the boundary where people and technology meet
- Interface is always socio-technical, i.e. passwords
- How do users access e-government information?
- New metaphors are replacing desktop as interface
- How does interface and changes in its metaphors effect relations between agencies, civic associations and citizens?
- Consider axes of variation regarding government interface with public
  - Criteria of fairness
  - Criteria of representativeness

Public/private sector divergences

- It is difficult to map customer service into public sector
- It is difficult to consider issues of equity in private sector
  - In private sector exit is more important

  - In public sector voice is more important
- In government, you can have great projects and terrible policy as well as great policy and poor project performance
- Private and public sector differ with regard to alternatives
- Private sector uses "knowledge management" for sustainable competitive advantage
- There are multiple bottom lines for the public sector
  - Government has multiple bottom lines which must all attain a certain level of achievement
  - Participants debate regarding public/private split:
  - One view is that most managers manage to a budget: they are not profit and loss oriented
  - Another view is that in truly excellent companies in the private sector, success is tied to profit and loss

Incentives to use IT

- Public sector disincentives to use IT
- Incentives are created by markets, politics, organizational structure, laws and regulations
- Incentives are mechanisms for change
- Incentives can be used to change the way IT is used in government

Users vs. sharers and other roles

- Information users
- Solution oriented
- Answer a question
- Information sharers
- Integrate complex disparate information and transform into knowledge

Managing Change: Dynamics of co-evolution

- Technology shapes people and people shape technology
- There are feedback loops: people adapt to technology and vice versa
- How do learning and expectation evolve?

Performance management

- How to use technologies with organizations to enhance performance?
- Tracking
- Assessment
- Changing how organization is structured?

Performance metrics

- How do you measure good performance or bad performance?
- Quality
- Cost
- Cycle time
- Co-existent and conflicting bottom lines. All require reasonable performance levels.
- Equity
- Efficiency
- Effectiveness
- Accountability
- Responsiveness
- Performance is subjective
- Branding
- Stickiness is a performance criterion in private sector: come to site and stay.
- Public sector needs different measures
- Does site help people get the information they need?
- Activity
- Number of hits

- Difficulty of using cookies on public sites
- Alternative: record transactions on site
- Reduced cycle time

Diffusion of technical solutions

- Europe subsidizes users, increasing technology diffusion.
- US does not subsidize. Implications of different systems?

Knowledge Transfer and Information Flows

- Identify organizational disincentives for knowledge sharing
- What are vectors of trust regarding information exchange within an organization?
- Examine the micro politics of knowledge sharing
- Who is giving information and getting it and why?
- There needs to be a filtering function so that information that is passed on is good
- Much of the information the government might need is actually in the private sector
- Information must flow more smoothly between local, state and federal levels
- Paradox: Information can be standardized, and therefore made manageable across databases, yet raw data itself cannot be standardized

Centralized Access to Data

- Many agencies work on common problems.
- Agencies need to access centralized database in a timely but decentralized manner

3. What is the impact of increasing use of information-based, networked forms of organization on the institutional structures? For example, oversight, budgeting, accountability systems -- that regulate governance?

Knowledge Management

- Can knowledge be managed?
- Strategic management should pave the way to a culture of knowledge sharing and innovation (creation of new knowledge)
- Knowledge is deeply embedded in public sector organizations
- Technologies allow communication across decentralized units at different times
- Concern is that data processing leads to massive loss of content
- How to convey categories people use to categorize knowledge

Normative models of network governance

- Knowledge transfer happens through networks
- Who should be talking to/interacting with whom to encourage such transfer?
- Think about the decentralized governance of an IT system
- Networks are in part emergent structures
- What are the micro-processes by which networks emerge?
- Functional versus dysfunctional networks
- The decentralized state is constitutionally fixed. This is a constraint.
- Why is it that we maintain, create and dissolve our social network linkages, particularly with regard to communications?
- How robust are these networks in the face of destabilization?

- How does technology intervene in the network creation process?
- Alternatively, can technology help us model these processes?
- Networks are adaptive
- What are the political issues that should be considered?

Organizational barriers to virtual collaboration/Does e-government automatically lead to collaboration?

- How can e-government promote inter-organizational collaboration?
- How do new forms, such as virtual places, promote or inhibit online coordination?
- Collaboration is usually not funded, unorganized and temporary. How to sustain it?

Reducing Stovepipes

- The bureaucratic state was set up to be vertical
- The introduction of networks into the state is changing the structure of governance
- Do networks and IT reduce stovepipes?
- Stovepipes refer to functionally oriented sub-units of organizations that do not communicate with each other. They are data-silos one cannot query across
- Stovepipes are associated with political constituencies
- As each sub-unit builds its own database, it strengthens the stovepipe
- People thought IT would eliminate stovepipes automatically. This has not happened. Counter-intuitive.
- What impact does technology have on the formation of jurisdictions and political boundaries over time?

Control

- Technologies that allow you to monitor email are useful for control but less useful for responsiveness

Concerns Regarding Data Sharing

- Confidentiality
- Privacy
- Legal barriers to sharing data
- Organizational barriers
- Aligning categories and definitions
- The need to standardize measurement or classification

The Hollow State

- Does use of various competitive vendors in transmittal of public services result in some agencies becoming Cadillacs and some model T's ?

Social Capital

- Can you create social capital by using computer networks?
- How to measure social capital?

4. What perspectives, theories, conceptual frameworks, and methods seem particularly useful for the study of the developmental processes and organization of digital government?

Research strategy: comparative studies

- Comparative research is needed
- What are the distinctions between how public and private sector uses IT?

- Research should be conducted on E-government in all 50 states
- Cross national research is needed

Research Strategy: "hot spots"

- High Priority Problems
- Data sharing
- Fit Between technology and agency needs and priorities
- Exploiting new opportunities for government citizen interaction
- Evaluating impact of technology
- Equity
- Devolution: opportunities to reallocate responsibilities across government
- Role of government in design, diffusion, evaluation
- Government accountability and performance
- Risks of IT in government
- Organizational barriers to virtual collaboration
- Promote a performance measurement or performance management point of view
- Research organizational change processes involved in users working with technology
- Research technology and knowledge management
- Network issues
- People issues
- Organizational change
- Don't just look at technology, look at people

Valuable Concepts and Processes

- Evolutionary models
- Agent based simulation models
- Interest group theory
- Leadership

- Change management
- Social psychology
- Social network theory
- Map the network

Research Methodology

- "Mental Models": recognize when an idea is coming from a different angle
- Case study method
- Models
- Explanatory models
- Descriptive models
- Normative models
- Public management: problem solving activities

Suggestions Regarding Variables and Measurement

- Collective action/public goods:
- Databases can be thought of as a public good
- Contribution to databases acts as a signaling device
- What kinds of organizational forms are created by and used by open source technology?
- Performance criteria for e-government
- Think about
  - Who knows what?
  - Who knows who?
  - Who knows who knows what?

Additional Arenas for Study and Key Data Sets

- Role of industry
- What are the good business models for e-government?
- Best practices

5. What forms and processes of collaboration between social, policy, and information scientists might further a research agenda for digital government? How might an organization like the National Science Foundation Digital Government Program provide incentives for the advancement of high-quality multidisciplinary research?

Elements of a DG Research Proposal

A Proposed Framework for Research (A Cube)

- Specify the technology you are using
- Ask what problems government faces
- Specify precisely concepts and processes

Problems

- Case Management: many public sector cases require inter-agency coordination.
- Consider Global vs. Local Optima
- Citizen Empowerment
- Optimal Devolution: Many Agencies operate from federal standard setting but state implementation.
- How can technology support optimal devolution?
- Performance Improvement
- Pattern Recognition: Currently government has decentralized data and decentralized organizational activity.
- Agencies must come together to work on pattern recognition, i.e. terrorist threats.

Technology

- Access
- Data
- Report cards

Concepts and Processes

- Differences Based on Domain Preferences
- Trust Building
- Political Control
- Accountability
- Organizational Learning and Change
- Efficiency

Proposed Objectives of a DG research program

- Make e-government better
- Diffuse e-government faster
- Reduce risk of negative consequences
- Create useful research outputs for practitioners

Proposal Regarding Multidisciplinary Teams

- A cross-disciplinary approach is needed.
- What is the best way to integrate technology with social science research?
- Integrate quantitative analysis with fieldwork
- Research should be both top-down and bottom up
- Each research team should include
- A political scientist,
- An expert in process flows,
- An IT expert and
- A government practitioner
- Every study should develop quantitative criteria for measuring success.

A Proposed Model for Conducting Good Research

- Support research with good theory
- Good measurement promotes good research
- Practitioner work and trial and error is valuable but only part of the picture
- Research should represent an improvement over trial and error
- Improve level of conceptualization, and then you can disseminate best practices or innovative ideas

APPENDIX E: BACKGROUND PAPERS, ARTICLES, AND REPORTS SUBMITTED FOR THE WORKSHOP

Required Reading from the National Science Foundation:

"Information Technology Research, Innovation, and E-Government," a National Academy of Sciences report (NRC-CSTB), requested by NSF

"Some Assembly Required: Building a Government for the 21st Century," a report by the Center for Technology in Government of the University at Albany, SUNY

Eugene Bardach, Graduate School of Public Policy, University of California at Berkeley
"Can Network Theory Illuminate Interagency Collaboration?"

Stuart Bretschneider, Maxwell School of Public Affairs and Citizenship, Syracuse University
"Does the Perception of Red Tape Constrain IT Innovativeness in Organizations? Unexpected Results from a Simultaneous Equation Model and Implications"

Noshir Contractor, University of Illinois at Urbana-Champaign
White Paper: A Multi-Theoretical, Multi-Level Framework for the Study of Organizing in Digital Government
Chapter 1, *Theories of Communication Networks*
Chapter 10, *Theories of Communication Networks*

Paul DiMaggio, Princeton University
White Paper: Digital Government
"Social Implications of the Internet"

Jane Fountain, Kennedy School of Government, Harvard University
"Introduction," *Building the Virtual State: Information Technology and Institutional Change*

Eduard Hovy, Information Sciences Institute, University of Southern California
White Paper: Some Comments

David Lazer, Kennedy School of Government, Harvard University
White Paper: How to Maintain Innovation.gov in a Networked World?

Gary Marchionini, University of North Carolina at Chapel Hill
White Paper: Digital Government Research: Understanding Co-Evolution of Government Service and Citizen Expectations

Carlos Osorio, Kennedy School of Government, Harvard University
White Paper: Public Ends by Digital Means: Some Thoughts on E-Government and the Creation of Public Value

Laurence O'Toole, University of Georgia
"Public Management and Educational Performance: The Impact of Managerial Networking"

R. Karl Rethemeyer, Nelson A. Rockefeller College of Public Affairs and Policy, SUNY-Albany
White Paper: Digital Government
"Internet as Change Agent: A Theory of Information Technologies' Impact on Interorganizational Networks"

Maria Christina Scharf, Kennedy School of Government, Harvard University and University of St. Gallen, Switzerland
White Paper: Digital Government
"Exploring The Interrelations Between Electronic Government And The New Public Management: A Managerial Framework For Electronic Government"

Charles Schweik, University of Massachusetts, Amherst
White Paper: Thoughts on Digital Governance
"Fostering Open-Source Research Via a World Wide Web System"

David Stark, Columbia University
"Collaborative Organization and Interactive Technologies"
"Crisis, Recovery, Innovation: Learning from 9/11"
"Innovative Ambiguities: NGOs Use of Interactive Technology in Eastern Europe"
"Link, Search, Interact: The Co-Evolution of NGOs and Interactive Technology"
"Permanently Beta: Responsive Organization in the Internet Era"

Nicole Steckler, OGI School of Science and Engineering, Oregon Health & Science University
White Paper: Digital Government
"Examining Information-Sharing Across Federal Agency Boundaries"

James Van Wert, Small Business Administration
White Paper: Questions About E-Government
"E-Government and Performance: A Citizen-Centered Imperative"

Darrell West, Brown University
"State and Federal E-Government in the United States, 2001"