



DIGITAL GOVERNMENT

BY GARY MARCHIONINI, HANAN SAMET, AND LARRY BRANDT, Guest Editors

Information technologies are being applied vigorously by governmental units at national, regional, and local levels around the world. The application of IT to government service is often termed “e-government” and the larger concept of government that depends upon IT to achieve basic missions is termed “digital government.” This distinction is, of course, lexically arbitrary, but serves to distinguish R&D specifically aimed at creating techniques for applying IT to government operations. Such R&D efforts also consider the long-term impact of these applications on citizens and government itself.

ILLUSTRATION BY MICHAEL WOLOSCHINOW

I n deed, digital government is a global phenomenon and public servants around the world are adopting novel ways to leverage IT to better serve their constituents. This special section focuses on efforts by the National Science Foundation (NSF) to address the challenge of helping government agencies adopt and adapt the fruits of basic research to the practical problems of government work. These initiatives also offer researchers the opportunity to work in an arena of unique and societally important governmental application areas and data. The stories in this section are exemplars of technology transfer from academic settings to the typical environments of government offices and agen-

cies and related efforts to understand the impact of these changes.

The NSF's Digital Government Program has strongly stimulated R&D initially in e-government and more recently in a general sense of digital government, including national conferences (www.diggo.org/). The applications of IT to government services can be divided into three categories: access to information, transaction services, and citizen participation.

The most common e-government application is clearly in providing citizens with access to information. Governments produce huge volumes of information and an increasing amount of it is now available through the Web and other electronic venues. In the U.S. there are thousands of government Web sites, several portals to related Web sites (for example, FedStats provides access to more than 100 federal units that provide statistical information), and several portals to government services (for example, the Government Services Administration's Firstgov service provides access to millions of federal Web pages). Tens of millions of citizens access information from the Library of Congress, download forms from the Internal Revenue Service, find out about benefits from the Social Security Administration, and plan vacations with information from the National Park Service. A recent Pew report (www.pewtrust.org/pdf/vf_pew_internet_e-citizens.pdf) states that 68 million Americans have used government agency Web sites. Given that 98% of the schools in the U.S. and well over half of the homes have Internet access, there are huge numbers of people accessing government information on a regular basis. This is clearly the government service that has most adopted IT and some of the first digital government R&D raises issues such as confidentiality and equity.

PEOPLE ALSO use government Web sites to complete transactions. According to an IRS news release of April 26, 2002, 39.5 million Americans filed their 2001 income taxes electronically in 2002, 6.6 million of these used home computers—a one-third jump from the previous year. People apply for passports and various licenses (for example, many states allow driver's license renewals via the Internet), and businesses apply for patents and permits, and supply wage reports and other required information to government agencies. Linked to direct deposit and other commercial transaction systems, increasing numbers of citizens are avoiding long lines, complicated phone menu systems, and postal delays by using government transaction processing systems. Transaction services are developing rapidly and pro-

vide good opportunities for digital government impact studies. For example, technical issues such as network security give rise to social issues such as trust. What is perhaps most crucial is establishing good baseline data at these early stages of development.

Perhaps the most controversial and certainly the least developed application of IT to government is direct citizen participation in government decision making. E-voting (see *Communications* Jan. 2001, including the debate on Internet voting) is perhaps the most high-profile application in this area. A widespread application of IT to participation is sending

email to government officials and representatives. Although there are millions of email messages sent each year, there is no evidence on their impact on decision making. Many special interest groups organize email campaigns and it is too soon to judge what effects these efforts

have on influencing decision making.

Another area of potential citizen participation is in rule making, where regulations that affect all aspects of life from food to transportation and the environment are open to comment and debate. These areas of IT application are difficult to assess at this time but it is important that social scientists begin to establish methods for monitoring impact from the individual citizen, organizational, and governmental perspectives. At present, opinion leaders and the media serve influential roles in selecting specific issues/decisions and linking citizens to them. How information flows are changed by digital government is an important area of R&D for social scientists.

These different types of applications will, over time, surely change the way that citizens worldwide interact with their governments and will change the work that government agencies do. It is important to consider these changes are interdependent and that both citizens and government services change along with IT. In the case of individual citizens, general IT literacy changes as people gain more experience and IT permeates popular culture. This literacy goes beyond the use of computers to strategies and policies for information access and use, such as how we think about, seek, and use information in our

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lives. In the case of government units, IT provides new communication channels and styles that affect the daily activities of government workers. As agencies respond in different ways to these changes, citizens' strategies for interaction and their expectations about the agency and government in general will in turn be affected.

THIS SECTION brings together summaries from several of the projects funded through the NSF Digital Government Program to provide a snapshot of the current work being done to transfer technology to government service and form partnerships among academic and government personnel. Together they provide a glimpse into the kinds of changes we might expect as government applies IT to improving service. The section begins with stories that illustrate the range of government agencies adopting IT R&D. Chen et al. illustrate how advanced information management systems that support data interoperation across agencies are used by local police departments to enhance law enforcement. The COPLINK system incorporates advanced information retrieval and user interface research while maintaining awareness of the security and confidentiality issues such applications raise. Goddard et al. provide an example of how novel geospatial decision-support tools are applied to the critical agricultural problems related to drought. Such tools aim to help farmers, agribusinesses, and agricultural agencies to better monitor and plan for adverse weather conditions. Delcambre et al. describe their collaboration with natural resource agency personnel to develop metadata models that support interoperation across various agency systems and data sets. Dawes and Prefontaine provide a brief description of a multinational collaboration project, and Fountain offers a sidebar on the challenges and opportunities for electronic rule making.

The next set of examples focuses on how IT is applied to collection and dissemination of statistical information. Nusser et al. describe the challenges of collecting data in the field with mobile devices with special emphasis on data management issues. Using a prototype for energy data Hovy illustrates how the terminology agencies use can be organized into an ontology that supports better user access to data. Golubchik et al. provide an interesting sidebar on a system that supports concurrent large-scale data flow from many people to government agencies. Hert et al. describe novel user interface prototypes to allow nonexperts to access statistical tables. Dippo discusses the FedStats portal to U.S. government

statistics. Karr et al. provide an overview of an architecture for preserving the confidentiality of statistical data.

Illustrating the importance of spatial data for government applications, MacEachren et al. describe a data exploration system that supports highly interactive visual data analysis. The goal is to allow people to explore and mine multivariate data more easily and effectively. Samet et al. describe a spatial browser application that allows spatial queries to be easily expressed over the Web. The system is illustrated with queries about relationships among bladder cancer and chlorine emissions. Agouris and Stefanidis explore a technique to summarize spatiotemporal data with visual displays.

Giving background on digital government issues and the NSF Digital Government Program in particular, Scherlis and Eisenberg summarize the work of the National Research Council's Computer Science and Telecommunications Board over several years to develop a research agenda for IT and e-government. Ciment rounds out the section with personal reflections on the NSF program, providing rare insight into how research policy and practice interact.

We hope readers find this collection of digital government R&D snapshots of professional value. There are many other projects within this particular program that bring researchers and civil servants together and many other efforts within the U.S. and around the globe that aim to apply IT to make government service more efficient and effective. **C**

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