REPORT # 02-08

OFFICE OF THE LEGISLATIVE AUDITOR
STATE OF MINNESOTA

A BEST PRACTICES REVIEW

Local E-Government

APRIL 2002

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Preface

This report is a best practices review of e-government in Minnesota's counties, cities, and school districts. It is the seventh in a series of best practices reviews conducted by the Office of the Legislative Auditor. The 1994 Legislature established best practices reviews as a means of identifying effective and efficient practices in delivering local government services. The intent was to help local governments improve the delivery of services by learning about successful practices in use by similar jurisdictions elsewhere.

In May 2001, the Legislative Audit Commission directed our office to study best practices in providing local e-government services and managing local computer systems, based on a recommendation by the Local Government Advisory Council, which was established to recommend topics. Our report on managing computer systems is being released as a separate document.

We acknowledge and appreciate the help provided by many local government officials involved with planning and maintaining computer systems in general and e-government in particular. Their expertise represented a substantial contribution to this report. The Office of Technology in Minnesota's Department of Administration also provided assistance.

The report was researched and written by Jody Hauer (project manager), Jan Sandberg, Kathryn Olson, Carrie Meyerhoff, and Leah Goldstein Moses. For readers with Internet access, this report and related material are available over the World Wide Web at http://www.auditor.leg.state.mn.us/ped/2002/pe0208.htm.

St. Paul, Minnesota
April 30, 2002

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Summary

This study identified seven best practices for effective e-government provided by counties, cities, and school districts. The report recommends that local governments adopt these best practices if they offer e-government.

Recommended Best Practices:

- Before deciding to proceed with e-government, local governments should assess whether to offer it (p. 15).
- While planning, local governments should evaluate others' Web sites and look for opportunities to collaborate (p. 24).
- Local governments should plan the implementation of their Web sites, including identifying the dollars and personnel skills needed (p. 30).
- Commensurate with the level of risk, local governments need adequate security to protect Web sites and related equipment and databases (p. 35).
- Local governments should set policies to guide e-government, including policies on privacy and public access to data (p. 49).

- In designing Web sites, local governments should follow guidelines on format and presentation and test pages before releasing them (p. 58).
- Local governments should evaluate their Web sites and revise them based on user feedback (p. 64).

In addition to these recommended best practices, the review found that:

- Large jurisdictions were more likely than small ones to have Web sites. In 2001, about 63 percent of Minnesota counties and school districts offered some form of e-government compared with 29 percent of cities (most of which were larger cities) (p. 70).
- The proportion of residents using the Internet in 2001 was higher in Minnesota than in all states but Alaska and was tied with New Hampshire. The number of Minnesotans with Internet access in 2001 increased 10 percent over 1999 (pp. 81-82).

Local governments should get involved with e-government only after determining they have the resources to maintain a Web site.

Report Summary:

E-government is information or services provided on-line by local governments to individuals using the Internet and Web sites. It ranges from simple Web sites conveying only basic information to very complex sites that transform the customary ways of delivering local services.

Because successful e-government requires ongoing resources, local governments need to weigh the potential costs against likely benefits before implementing it. For effective Web sites, local governments should follow seven best practices.

1. Assess Whether to Offer E-Government

In preparing for e-government, local governments should set strategic goals and objectives. As part of their strategic thinking, they should decide which local services are suitable for on-line delivery. They also need to determine whether they have access to the technology, expertise, and funding that e-government requires over the long term. Local governments with multiple departments need to coordinate Web-related activities. From the beginning, local governments should identify the potential users of their Web sites and understand what they need.

Strategic thinking should guide the development of e-government.

A survey of Minnesota's local governments revealed that of those with Web sites, about 40 percent of school districts, and just 10 percent or less of counties and cities, had written strategic plans covering e-government. Most local governments reported assessing their readiness for e-government in certain areas before implementing it. Just under half of local governments reported at least some success in identifying potential users' needs.

Example: *In developing its Web site, the city of **Buffalo** collected information about potential users by surveying a sample of residents, analyzing the questions frequently asked at city hall's front desk, and working with city departments to identify information that users needed. On the Web site, the city invites users to offer ideas and feedback, and it includes a direct e-mail link to city staff responsible for maintaining the site.*

2. Assess Opportunities for Collaboration

To benefit from others' expertise and to share resources, local governments considering e-government should evaluate similar government Web sites and learn from others. By exploring partnerships with other entities, local governments may be able to share costs. Between 37 and 49 percent of local governments offering e-government reported working with others while either planning, implementing, or maintaining their Web sites.

Example: *In the **Red Rock Central School District** located in southwestern Minnesota's Redwood County, district staff teamed up with a nearby farmers' cooperative to develop infrastructure for wireless, high-speed Internet access that would connect residents of the district's five geographically dispersed cities. In exchange for financial backing and the use of its grain elevators to mount wireless transmitters, the farmers' cooperative receives ongoing technical support and high-speed Internet access to connect its remote office locations.*

3. Prepare to Execute and Fund E-Government

In preparing for e-government, local governments should detail the steps they plan to take and analyze the economics of their proposed initiatives. Web sites demand ongoing resources over time.

Consequently, local governments should examine their sites' "total costs of ownership," including costs for maintenance, training, and equipment disposal. Knowing the full costs of e-government initiatives, local governments should develop a strategy to fund them. They should also assign responsibility for e-government to a central department or individual.

Only about 17 percent of local governments reported that they formally planned the implementation of e-government once they decided to proceed. One-third of local governments reported estimating life-cycle costs for items such as contracts with Internet service providers, but fewer did so for other expenses. Nearly two-thirds of local governments offering on-line information or services were at least somewhat successful in assigning e-government responsibility to a specific project manager or department.

Example: *In 1999, **Blue Earth County** created a position for a public information coordinator whose job duties included keeping the Web site current and viable. Although the county had developed a Web site two years earlier, the site had not been consistently updated. Working with individual county departments, the public information coordinator ensured that the Web site described each department accurately, contained current information, and better met citizens' needs.*

4. Provide Security

Security is essential to e-government.

All jurisdictions offering e-government need to implement security measures to protect against external and internal threats, and higher risk sites will require greater security than others. Local governments should assess risks to their Web sites and related equipment and databases. Based on that assessment, they should develop security policies to protect their investments. Local governments should install "firewalls," use up-to-date antivirus programs and be prepared for security incidents. They should manage employee access to the Web site and related data. Local governments should test security measures and provide for outside parties to assess whether security is sound.

Less than half of local governments offering e-government reported having conducted a partial or full risk assessment. Nearly 53 percent reported that they had fully developed plans for Web-site data backups and disaster recovery. About 31 percent had fully reviewed the adequacy of their security, and 11 percent provided for a full third-party assessment of security controls.

Example: *The **Minneapolis School District** has prepared disaster-recovery plans for its information technology systems. In its plan, the district analyzes the scope of possible disasters that could interrupt computer services, designates a disaster recovery team, and assigns each team member specific tasks under various disaster scenarios. Agreements with outside organizations allow the district to continue computer processing at remote sites should a disaster strike.*

5. Set a Policy Framework to Guide E-Government

To manage e-government, local governments should adopt policies that govern how employees use the Web sites to conduct business, control which data will be published on-line, and determine how the Web sites will be marketed. Local governments should also set a privacy policy and display it prominently on their sites. They need to determine whether their Web sites are sufficiently accessible to users with disabilities and those who do not speak English.

Of local governments offering e-government, 43 percent reported that they had written policies to delineate

the purpose of using the Web site to accomplish their business. Very few had developed policies to market their Web sites, and few had privacy policies governing what information would be collected from site visitors. About 14 percent indicated that their sites complied with guidelines to make Web sites accessible for people with disabilities, but most simply did not know whether their sites complied.

Example: *At the bottom of each page on the **Stearns County** Web site is a link to the county's privacy policy. The county states its purpose for collecting information (such as e-mail addresses) from visitors and declares that it will not sell or transfer the information to third parties unless required to by law or court order. The policy also makes clear that the county intends to keep confidential any sensitive information collected from site visitors.*

6. Make the Web Site Function Optimally

Local governments need to provide ongoing maintenance of their Web sites.

Local governments should design their Web sites to meet user needs and their own e-government objectives. This includes following accepted practices on the visual style of Web pages, such as identifying the jurisdiction on each page and using uncluttered pages with consistent headers and fonts. Before launching Web pages, local governments should test and make sure that they function as intended. They must also plan for ongoing maintenance.

About 78 percent of the local governments offering e-government indicated that, in developing their Web sites, they defined the likely target audience for the site. High percentages of local governments reported meeting certain guidelines that make Web sites readable, such as displaying contact names, addresses, and telephone numbers. About 67 percent of local governments offering e-government reported that they had assigned responsibility to test Web pages. Only 8 percent had written plans describing procedures for Web site upkeep.

Example: *In a recent redesign of its Web site, **Ramsey County** made changes to better meet its users' needs. The county conducted an on-line survey, querying users about what information and services they wanted. Staff also analyzed statistics showing which Web pages had the highest level of interest among users. The redesigned site presents viewers with subjects listed by users' likely interests, such as "recreation." The site's appearance is more consistent from page to page than previously, and the home page changes frequently depending on users' interests and the season of the year.*

7. Evaluate E-Government

Local governments should evaluate their Web sites to determine how well they meet e-government goals. They should also identify enhancements and revise their Web sites periodically. Just 19 percent of local governments offering e-government reported that they had evaluated their Web sites. However, half reported that they had revised their sites based on feedback from users.

Example: *Although the city of **Plymouth** has had a Web site since 1996, staff view it as a service that needs ongoing revisions. Over time, staff have made minor revisions based on reactions to the site and their analysis of usage patterns. In addition, staff are planning a major redesign in an effort to expand the site, make it easier to navigate, and make it easier to manage with city departments providing updated Web content. In response to feedback, the city is considering on-line utility information with the possibility of on-line utility payments.*

Introduction

This report examines best practices for e-government by Minnesota local governments. Broadly stated, e-government refers to government agencies using the Internet, Web sites, and e-mail to exchange information, do business, and provide public services electronically.[1] In this report, though, we focus on how Minnesota counties, cities, and school districts use Web sites to provide information or services to citizens. Because e-government is a relatively new mode of delivering local services, the question of how best to provide it is an important one.

On-line information and services are still evolving. Yet, the experience gained to date has yielded many practices that are necessary for effective e-government. In May 2001, the Legislative Audit Commission directed our office to study best practices in providing local e-government. The study addresses these research questions:

- **What is e-government, and what infrastructure is necessary to facilitate it?**
- **What are the potential costs and benefits of e-government?**
- **What best practices are necessary to fulfill the goals of e-government?**
- **What are the obstacles to e-government?**
- **How are local governments paying for e-government?**
- **How widespread is citizen access to computers that tap into e-government?**

To answer these questions we studied the literature and reviewed Web sites on e-government. We identified guidelines for planning, implementing, and maintaining e-government. To learn more about the status of e-government in Minnesota, we surveyed counties, cities, and school districts around the state. After identifying local governments that have adopted best practices for e-government, we visited a small number of them, interviewing local officials about the practices they follow to make their Web sites effective communication vehicles. During the course of the study, we met with a technical advisory panel of local officials involved with e-government in their own jurisdictions. This

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1 The *Internet* is a global collection of computer networks connected together to form a single, interconnected network for communications. *Web sites* are collections of related files (commonly with a beginning file called a "home page"), available over the World Wide Web, which is the "universe" of network-accessible information. *E-mail* refers to the exchange of computer-stored messages, most often using the Internet.

panel offered feedback to us as we conducted the research. More information on the methodology of the study is available in Appendix A.

This report has three chapters. Chapter 1 describes e-government and provides basic background information about it. Chapter 2 recommends best practices that local governments should take to achieve the goals of e-government, if they decide to proceed with it. This chapter also offers examples of Minnesota counties, cities, and school districts that have used best practices in their e-government efforts. In Chapter 3, we describe what we learned about e-government in Minnesota and obstacles to it. We also provide information on the extent of individuals' access to the Internet.

1 Background

SUMMARY

In this study, e-government is defined as information or transactions provided on-line by local governments to citizens using the Internet and Web sites. The complexity of Web sites ranges from those that merely provide information to others that allow electronic financial transactions. Costs of e-government vary but include the expertise and time needed to develop and maintain Web sites as well as the recurring costs of acquiring and replacing technology equipment. Benefits of e-government also vary but range from adding convenience, to enhancing citizen interactions with local government, to transforming the way certain services are delivered. Because Web sites require ongoing resources, local governments should assess the potential costs against likely benefits before proceeding with e-government.

This chapter provides background on electronic government, or e-government, in Minnesota.[1] In this chapter we address the following research questions:

- **What is e-government?**
- **What are the potential costs and benefits of adopting e-government?**
- **What infrastructure is necessary to facilitate e-government?**

To answer these questions, we conducted a literature review and reviewed information from Web sites pertaining to e-government. We also spoke with local government officials involved with developing Web sites for their jurisdictions. Additional information on the methodology for this study is in Appendix A.

WHAT IS E-GOVERNMENT?

E-government means different things to different people. For this study, we used the following definition:

1 At the same time this study was underway, we conducted research on best practices in managing local computer systems. Although these two studies covered some similar ground, each was distinct enough to warrant separate reports. The report on managing computer systems is available at www.auditor.leg.state.mn.us/ped/2002/pe0209.htm.

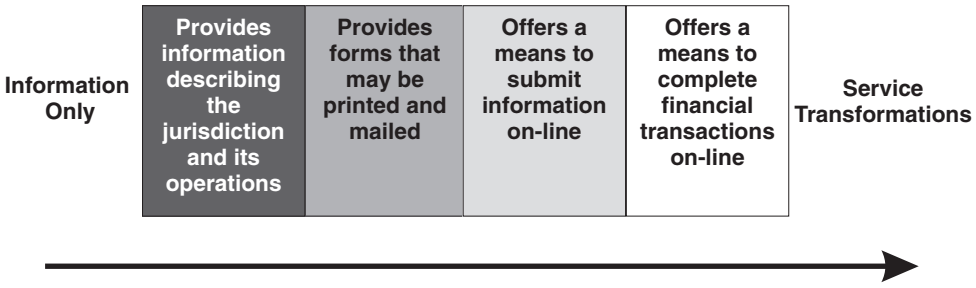
- **E-government refers to information or transactions that local governments provide on-line to citizens using the Internet and Web sites.**

Our focus is on the electronic communications between *citizens* and the counties, cities, and school districts in which they live and interact. This definition excludes communications between and among government agencies, such as local governments reporting data to the state, or communications between local governments and businesses, such as that for procuring supplies on-line. This study excludes e-government at the state level, although the state of Minnesota has an increasing number of e-government services and is involved in a project to improve access to such services.[2] Services such as e-mail, on-line training, and employee telecommuting also rely extensively on the Internet and information technology systems. While these types of services are related to e-government, they are not this study's focus. Nor do we discuss *intra*nets, the electronic networks that are based on Internet technology but are internal to users within an organization and not accessible by outside users.

E-government ranges from information-only Web sites to those that transform service delivery.

Even though we confined our definition to electronic information and services between residents and local governments, a wide spectrum of services falls within this definition. Figure 1.1 depicts this spectrum. At one end is a basic Web page, which simply conveys information. It is an electronic brochure providing directories of employees, lists of departments, news about events, or information about services.

Figure 1.1: Spectrum of E-Government Web Sites



SOURCE: Office of the Legislative Auditor.

Further along the spectrum, Web sites offer limited ways of transacting business. For instance, in addition to job descriptions, the site may provide a job application form for someone to print, fill out, and return. At the next step along the spectrum, transactions between individuals and local governments are completed electronically. Job applicants would not only fill out applications electronically but also submit them on-line, even if the submission is then processed just as a mailed or faxed one would be. At the far end of the spectrum, the Web site enables a transformation of traditional service delivery. Job applications

2 For information on the state of Minnesota's effort to improve e-government services at the state level, see http://www.portal.state.mn.us/.

submitted on-line would be integrated into the human resources department's database where they would be automatically coded by basic eligibility standards and organized for analysis. Ideally, financial transactions would flow smoothly and securely allowing convenience to the front-end user and efficiencies in the back-office systems. At this stage, operations that were once labor-intensive become more efficient digital processes.

At each successive stage of the spectrum, the complexity of Web sites increases. In turn, the amount of planning, time for development, sophistication of the technology, and actions needed to maintain the sites also increase. For example, the extent of security needed to allow safe financial transactions over the Web is far greater than that for an information-only site.

E-Government Is a Matter of Local Priorities

In an October 2001 survey we conducted, many of Minnesota's counties, cities, and school districts indicated that they either already offer information or services on-line or expect to within the year. This pattern differed, however, by type of local government, as explained in Chapter 3, with some jurisdictions opting against on-line services. In this report, we do not presume that all local governments ought to provide e-government. Adopting e-government should be a local decision made in light of all other competing priorities. Its costs should be weighed against its benefits. Because e-government requires ongoing resources, local governments should have a clear understanding of what is needed before committing to it.

POTENTIAL COSTS AND BENEFITS OF ADOPTING E-GOVERNMENT

Costs and benefits typically increase as Web sites grow in complexity.

Local governments already offering e-government, or interested in doing so, should be aware that Web sites have life cycles with recurring phases for planning, implementing, and maintaining the sites. Ongoing commitments of time, equipment, and intellectual resources are necessary for successful Web sites. Consequently, to be realistic, costs should reflect these continuing cycles of activity. (Chapter 2 provides more details on the concept of estimating "life-cycle" costs when planning e-government.) Similarly, benefits of e-government accrue more over time as the user base expands and additional services go on-line.

Just as the Web sites in the spectrum described above evolved in increasingly greater complexity, so too will costs and benefits vary. As Web sites progress in complexity from information-only sites to offering business transactions, the potential for rising costs and benefits also increases. Complexity is a function of many interrelated factors: the range of services the Web site is intended to provide, need for additional security, level of customization, amount of information provided, need for outside expertise, use of e-mail, integration with back-office databases, and frequency of updates. Sites that allow the use of credit cards to pay for parks reservations, for instance, collect nonpublic data and need

higher levels of security than others. At the same time, benefits to the end user, in terms of saving time and reducing the hassles of making reservations, are also greater than those offered by a site that merely describes the availability of parks.

Potential Costs

This section lists the costs that governments are likely to encounter with e-government. It is difficult to list actual amounts of the costs for two reasons. First, the actual amounts will vary by the complexity of the site (as described above). Second, actual amounts will vary by what is already in place within a given jurisdiction; for instance, communities that have telecommunications infrastructure in place may not incur the expense of adding the cabling or other equipment needed to connect to the Internet for e-government. Despite the difficulties of making useful estimates, for illustration purposes we include cost estimates below based on a hypothetical, mid-size county (45,000 population) that recently released a basic Web site with the help of a private Web development and hosting company. The dollar amounts are estimates only, and costs for other jurisdictions will vary.

The ongoing expenses of maintaining Web sites are larger than the initial costs of developing a site.

- **Expertise and time for personnel, either in-house or contracted, to plan and implement an initial site, as well as to maintain and periodically revise the site.** The ongoing resources needed for maintaining and securing a Web site are typically greater than those for the site's development. They include the costs of maintaining a service that people will expect to be accessible at all times. As a Web site offers more services, a local jurisdiction faces the support costs to ensure continuous 24-hour-a-day operations.

  In our hypothetical example, the county contracts with a Web design firm that created the initial Web site for about $5,000. Now the county pays $5,500 a year for Web site upkeep, including posting new information and keeping the site secure. The county has a public information officer who spends about 15 percent of his time on Web-related duties, which include collecting information for the site and funneling it to the Web design company. In addition, a staff person in each of 18 county departments spends a nominal amount of time each month preparing Web site information. Ongoing expenses for the time of the public information officer and other in-house staff are estimated at $16,000 per year; this does not include the time for the initial Web site planning.

- **Resources for adding a process that parallels existing modes of delivering services.** Local governments that offer services on the Web cannot drop their customary methods of distributing information and handling business. Unless a time arrives when all households have Internet access and all citizens use that mode of service delivery, jurisdictions offering e-government need to support both the digital and traditional business environments. This cost includes time for staff who have assumed additional tasks as a result of the Web site, such as processing on-line applications, at the expense of other duties. Over time, widespread use of e-government services has the potential to create

E-government supplements, but does not replace, the customary methods of delivering services.

efficiencies that offset some costs, but it is far less likely to ever eliminate the need for customary service delivery methods.

In our hypothetical example, the county's Web site has shifted certain county employees' responsibilities to include responding to e-mail requests generated by Web site visitors. The county is paying for its usual ways of providing information as well as its new digital mode of Web-based information.

- **Information technology expenses** that occur by virtue of adding a Web site, above and beyond a jurisdiction's normal costs of using computers. These could include: (1) hardware, such as a Web server and router;[3] (2) software, such as that needed to develop Web pages, create databases, or monitor Web usage; (3) security and privacy measures to protect data, users, and the Web site from internal and external threats; (4) infrastructure for connecting to the telecommunication network, such as cabling; and (5) monthly charges for telephone company connections and Internet service providers. Items such as hardware and software represent more than initial, one-time expenses because of the costs for upgrades and replacements as well as software licensing. While this report does not focus on e-mail, many jurisdictions with on-line services also have e-mail, which adds costs for hardware, software, and maintenance. As features are added to the Web site, such as viewing property tax information on-line (which requires data from a jurisdiction's own databases), technology expenses will also increase.

  Because our hypothetical county relies on an external provider to host the county's Web site, the county did not incur additional costs for adding computer hardware, security, or Internet service provider charges, all of which were built into the annual fee paid to the Web hosting company. To help produce the Web pages, the county purchased two software packages for about $500, one for desktop publishing and the second for preserving printed documents as electronic images. One requires an annual licensing fee of $100 per user. The county also uses a digital camera and scanner for producing Web information, but it already owned that equipment for other purposes.

- **Training to develop and enhance technical expertise.** Training is necessary both for the information technology staff and the front-line staff whose jobs are affected by the Web site. Especially because of the rapid pace of changing technologies, technology staff need ongoing training to stay current. In the hypothetical county, the staff person most directly involved with the Web site attends a Web-related conference at a cost of about $380 annually.

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3 Servers are computers that share their resources, such as files and printers, with other computers on a network. They may be powerful personal computers with large hard-disk capacity, minicomputers, mainframe computers, or specialized computers designed specifically as servers. Routers are specialized computers that direct and transmit bits of data from one network to another. They control the flow of messages between networks.

Potential Benefits

As mentioned earlier, e-government benefits tend to accrue over time as more users visit a Web site and become more comfortable using it. Further, many benefits are difficult to quantify and cannot easily be assigned a dollar value. Measuring citizen satisfaction with the Web site, for instance, is not a trivial task. As with costs, the nature and degree of the benefits will vary by the complexity of the Web site. They will also vary depending on how effectively the site is used as a communications vehicle. Web sites that are infrequently updated, for instance, may lose users' interest and stand to reap fewer benefits.

In addition, the benefits may vary depending on the characteristics of a given jurisdiction. For instance, a small city that is staffed only two days a week may be able to realize larger benefits per user for on-line city ordinances than a slightly larger city that is staffed five days a week. Without adding to staff hours, the smaller city's on-line codes provide residents with information about municipal ordinances on days when staff are not available.

Benefits listed first are those more likely to be noticed by individual users and arise with even the simplest Web sites. Those listed last more directly benefit the governmental units and occur with more complex sites.

Web sites allow citizens to receive information 24 hours a day.

- **Expand availability of information.** Because users may access the Internet at any time of the night or day, they can retrieve information when it best fits their schedule. They are not limited to the customary 8 a.m. to 5 p.m. business hours.

- **Add convenience.** The Web provides an easily accessible way of retrieving information from the comfort of users' own homes and offices. It provides a single access point for those who seek information provided by more than one division or department.

- **Add a new mode of service delivery.** Web sites offer an additional way of delivering information and services that supplements the telephone, mail, and travel to a jurisdiction's headquarters. Individuals may choose the mode that works better for them.

- **Improve the speed of delivering information or services.** Using the Web site takes far less time than traveling to and parking at a government or school office or waiting for documents to arrive via the postal service.

- **Improve timeliness and accuracy of information.** Using a Web site allows the posting of up-to-date data, which is especially useful for information that changes quickly. Of course, data have to be entered accurately in the first place, but omissions and inaccuracies may often be corrected quickly on-line. On-line data may be more prone to correcting simply because they are on public view. At the same time, Web pages that are not kept current do not offer this benefit, and in fact, may be counterproductive if they offer inaccurate information.

E-government can enhance citizen involvement in local government.

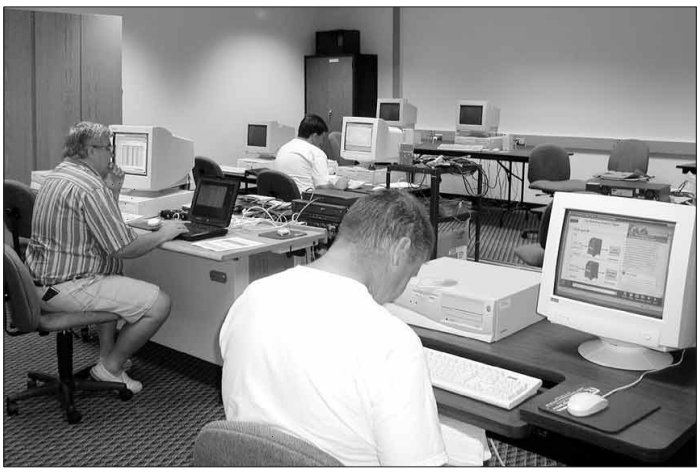
- **Expose users to new information.** As users visit Web sites, they are exposed to information that might not otherwise have caught their attention. For instance, a graphic display on the danger of radon in the home could attract the attention of a user who came to a site looking for the hours of the local recycling center.

- **Enhance civic participation.** The Web site can make local governments more transparent and understandable to their citizens. It has the potential to facilitate citizen involvement in local community issues, such as through on-line polling or soliciting participation on citizen task forces. Allowing citizens to interact with their local governments on-line gives them an added opportunity to participate as active members of the community. The city of Minnetonka's Web site (http://eminnetonka.com/) for example, provides opportunities for citizens to voice their opinions on city services, contact city staff or city council members, or participate in on-line polls. Greater transparency of local government can build trust between residents and local officials and enhance accountability.

- **Save printing costs.** Local governments may need to print fewer reports and other documents when files are maintained on-line.

- **Free staff to focus on more complex requests.** To the extent that Web sites provide the kinds of information most frequently requested by individuals, they allow government staff to focus on other tasks that require personal attention.

- **Transform public services.** With the Internet, local governments have the potential of fundamentally changing the ways they deliver services. For example, interactive distance learning via the Internet affords school districts an opportunity to educate nontraditional students or provide courses to remote sites. As another example, during Webcasts of board or council meetings, viewers may interact in real time by responding to issues and asking questions on-line. A third example might be social services



E-government can transform the way local governments deliver some services.

Local goverments can improve services with e-government.

agencies using the Web to educate their clients. Web-based licensing systems are a fourth example. An on-line guide could take restaurant managers, for instance, through a series of questions related to restaurant inspections, identifying the appropriate measures they need to take. Instead of relying exclusively on regulatory actions, local governments could offer recommended practices, thereby paving the way toward effective licensing.

- **Integrate data processes**. The Internet could be used to integrate processes across departments, such as the processes of collecting data, providing information, and conducting business transactions. One example is collecting information for building permits on-line, integrating it with the processes of paying permit fees, and transferring relevant building information to the property assessment office. If not integrated, these separate processes require redundant data entry. When integrated, they add efficiency.

INFRASTRUCTURE NECESSARY TO PROVIDE E-GOVERNMENT

In today's electronic world, almost anyone with a computer can have a Web site. Using Web sites effectively to facilitate e-government, however, requires thoughtful planning and execution (as is described by the best practices in Chapter 2).

In its most basic form, e-government requires the following physical components. Web sites with additional functions and services need additional devices, databases, and maintenance capabilities, such as higher levels of security. Because it is oversimplified, this list does not account for the many other types of equipment and systems needed for the Internet to operate, such as the "domain name" system.[4] Figure 1.2 illustrates some of the basic components.

- **Computers and Web servers**, first for developing the Web site and second for "hosting" it (making it available for others on the Internet). Although many local governments own Web servers, others contract with a business or another public agency to host their Web pages.

- **Software** for developing Web site pages and for protecting against computer viruses.

- **Firewalls**, which are devices to protect computer networks from unwelcome or unauthorized outside access.

- **Routers** to control the flow of data between computer networks.

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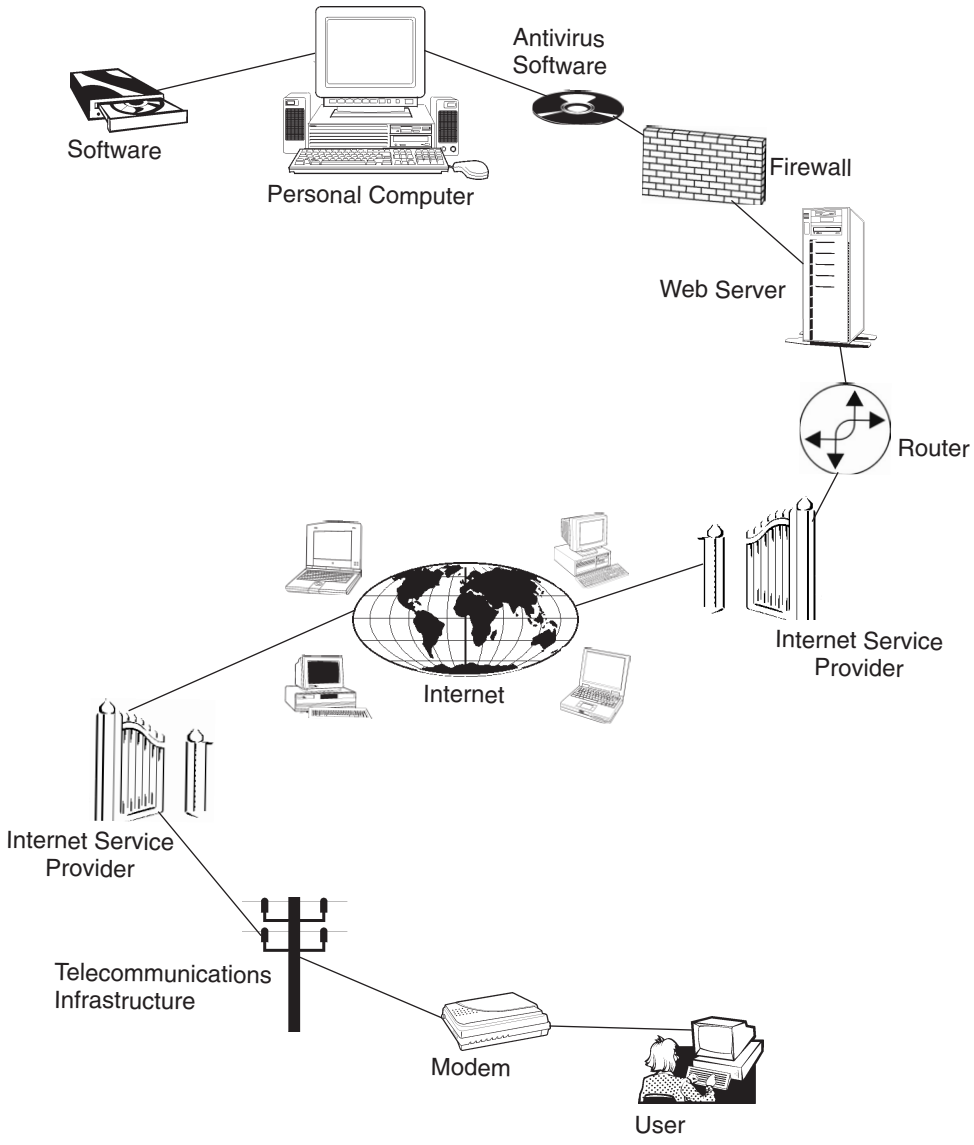
4 Domain-name servers translate text, such as "Microsoft.com," into computer-readable numbers that map to specific computer addresses. The domain name indicates where to forward a request for a Web page.

Figure 1.2: Basic Components Needed for Web Sites



NOTE: The first set of components at top are for jurisdictions with basic Web sites hosted on their own servers. Nearly all computer systems will have additional components including computer networks, database servers, and multiple firewalls. Web sites with added features require additional components for functionality and security.

SOURCE: Office of the Legislative Auditor.

- **Internet service providers** (referred to as ISPs), which offer a "point of presence" or gateway connecting to the Internet.

- **Internet browsers**, which are software programs allowing users to navigate through files on Web sites.

- **Modems**, which provide a means to send digital data, typically over telephone lines, allowing communication with other computers on the Internet.[5]

- **Infrastructure** for connecting to and interacting on the Internet, such as telephone wires, cabling, or wireless systems.

- The **Internet** and the **World Wide Web**, which comprise, respectively, the collection of interconnected computer networks that span the globe and the compilation of digital information accessible via the Internet.

Chapter 3 provides more information about the extent of telecommunications infrastructure in Minnesota.

5 A modem is a device that modulates and demodulates data, i.e., converts data, into a signal compatible with transmission over cable or telephone lines. Wireless modems convert data into radio signals for wireless transmissions.

2 Best Practices in Local E-Government

SUMMARY

Local governments should get involved with e-government only after determining that they have the wherewithal to develop and, more importantly, maintain a Web site. They must think strategically about what e-government can do, decide which services are suitable, and assess their readiness for it. In the planning stage, local governments should look for partnership opportunities and explore work done by others. They have to plan how to implement and fund e-government. Security measures are essential; they should be based on a thorough assessment of security risks and tested. Local governments also need to set policies that will guide decisions on privacy, marketing, protecting sensitive data, and using the Web site to conduct business. In developing the site, local governments should focus on fulfilling users' needs and meeting their own e-government objectives. Local governments should evaluate their Web sites and be prepared to revise them periodically.

This chapter describes best practices for e-government. It lists the main goals of e-government as well as best practices and actions needed to reach those goals. The chapter also features local jurisdictions that demonstrate best practices in offering on-line services. In this chapter we ask:

- **What are the primary goals of providing on-line information and services?**
- **What best practices are necessary to fulfill the goals of e-government for citizens? What is necessary for adequate security, integrity, and privacy of electronic data?**
- **What actions now used by Minnesota counties, cities, and school districts demonstrate those best practices? How feasible is it for other local governments to adopt the practices?**

We based the goals and best practices on guidelines from leading organizations and agencies involved with electronic government. To validate the goals and practices, we discussed them with a technical advisory panel of 16 people involved with technology issues in counties, cities, and school districts. Appendix A provides additional information on the technical advisory panel for this project as well as the methodology we followed for the study.

Data reported in this chapter come from surveys on e-government we conducted in the fall of 2001 of Minnesota's 87 counties, a sample of 521 out of 854 cities, and a sample of 310 out of 345 school districts. About 90 percent of counties, 82 percent of cities, and 88 percent of school districts responded. The high number of jurisdictions responding to the survey suggests that the results fairly represent the state as a whole. The data were self reported and we did not independently verify them. The world of e-government is changing rapidly, but our survey could capture information only about a single point in time. Additional information on survey methodology is available in Appendix A, and survey results are available via the Internet at www.auditor.leg.state.mn.us/ped/2002/pe0208.htm.

Information describing specific local governments and their best practices came from interviews we conducted while visiting a small number of counties, cities, and school districts. We selected the jurisdictions based on their answers to our survey questions about e-government best practices. Because we were interested in a mix of jurisdictions, we also considered size and geographic location in making the selection. The examples come from interviews in Aitkin County, Birchwood Village, Blue Earth County, Buffalo, Fergus Falls, Grand Rapids, Minneapolis School District, Pine Island School District, Plymouth, Ramsey County, Red Rock Central School District, Rosemount-Apple Valley-Eagan School District, and Stearns County. In instances where we mention examples of specific products during the course of describing best practices, we do not mean to imply endorsement of the products.

GOALS

Successful e-government should aim to meet three primary goals:

- Improve the quality, cost, accessibility, and speed of delivering government information and services.[1]

- Make government more accountable by increasing the opportunity for citizen participation in the governance process and bringing citizens closer to elected officials and public servants.[2]

- Organize the production and distribution of public information and services in new ways, that is, to transform government services to meet citizens' needs in an automated world.[3]

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1 Council for Excellence in Government, *E-Government: The Next American Revolution* (Washington, D.C.: Council for Excellence in Government, 2001), 4, 36.

2 *Ibid.*, 36.

3 Harvard Policy Group on Network-Enabled Services and Government, *Eight Imperatives for Leaders in a Networked World* (Cambridge, MA: John F. Kennedy School of Government, 2000), 3, 6. View on-line at http://www.ksg.harvard.edu/stratcom/hpg/.

BEST PRACTICES AND ACTIONS FOR E-GOVERNMENT

Seven best practices are necessary for effective e-government. Local governments that fail to consider all of these best practices may not reap the benefits of effective Web sites and run the risk of posting Web sites that are counterproductive. The best practices are cyclic in nature because e-government is not a discrete, one-time initiative. As shown in Figure 2.1, the seven best practices are:

Effective e-government requires seven best practices.

1. **Assess whether to offer e-government**
2. **Assess opportunities for collaboration**
3. **Prepare to execute and fund e-government**
4. **Provide security**
5. **Set a policy framework to guide e-government**
6. **Make the Web site function optimally**
7. **Evaluate e-government**

The following text defines these seven best practices and describes what actions a government should take in fulfilling each practice. Although listed in numerical order, many of the best practices and their related actions need to be done simultaneously, not sequentially. The section below also provides examples of local jurisdictions that have put the actions into use. By featuring these examples, we do not mean to imply that these local governments have the most visually impressive Web sites or that they are the only jurisdictions using the best practices. Rather, we want to illustrate how, even in the relatively new era of electronic services, some local governments have embodied the best practices related to e-government.

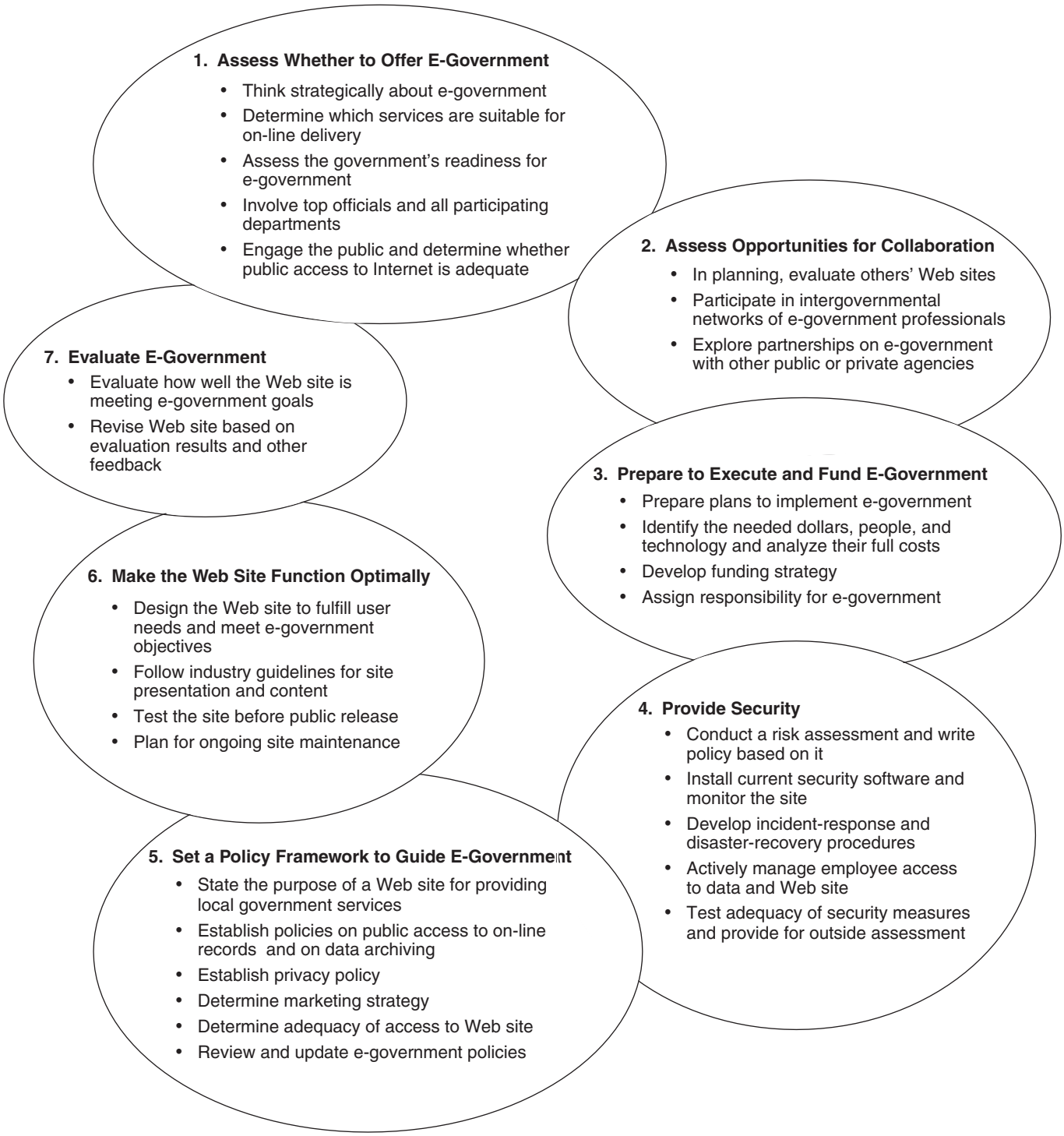
1. Assess Whether to Offer E-Government

Before deciding to proceed with e-government, jurisdictions should establish their vision for how e-government will work and serve citizens. To prepare for the decision, they should assess what resources they have available and what they would need.

RECOMMENDATION

In preparation for e-government, local governments should set strategic goals and objectives and determine whether they have the technology, skills, and funding for e-government over the long term. Local governments need a central authority for managing e-government, and they should align their effort with identified needs of those likely to use their Web site.

Figure 2.1: Best Practices and Actions Needed for Successful Local E-Government



NOTE: Although shown in numerical order, many of the best practices should be done simultaneously, not sequentially.

SOURCE: Office of the Legislative Auditor.

Think Strategically About E-Government

Thinking strategically means a local government asks itself what it envisions e-government could do. In strategic plans, the jurisdiction should define its vision for how e-government will work and serve citizens.[4] Such plans force a local government to consider how it can use the Web site strategically to accomplish its goals. The plans should contain the government's objectives for e-government, which will subsequently guide the design, implementation, and management of the Web site. Throughout the strategic planning, a local government should consider the needs of its potential Web-site users. Over time, the strategic plan will need updating because e-government is a cyclic, ongoing process.

A local government's e-government objectives should guide Web site development.

Strategic planning paves the way for setting performance measures, which are important for determining later whether the Web site is meeting its goals.[5] Measuring things such as timesaving for personnel, waiting times for customers, and user satisfaction, help a local government track whether e-government is providing better, cheaper, or faster services. Using performance measures is part of the evaluation process described later in this chapter.

In our survey, few local governments reported having written strategic plans that include plans for e-government. We found that:

- **Of the local governments that provided on-line information or services, 40 percent of school districts, 10 percent of counties, and 8 percent of cities, had written strategic plans covering e-government.**

An additional 23 percent of jurisdictions indicated they had plans for e-government, but they were unwritten.

As an example of strategic planning, the **Pine Island School District**, a district of 1,200 students in Goodhue County, has prepared and updated a "Technology Integration Plan," which includes the district's goals for its Web site. (The Technology Plan is a requirement to be eligible for state and federal technology grants.) According to the plan, one of the district's goals is to have a Web site that provides information on daily announcements, academic and sports activities, and daily assignments.

Further, the district envisions using technology to increase parental involvement. It specifically addresses the need for parents to be able to communicate electronically with teachers and the administration. The district also lays out the objectives it hopes to achieve with the Web site. For instance, the district wants the community to be able to obtain up-to-date information and students to be able

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4 National Electronic Commerce Coordinating Council, *E-Government Strategic Planning* from the NECCC Symposium 2000 held in Las Vegas December 13, 2000 (Washington, D.C.: National Association of State Auditors, Comptrollers and Treasurers), 20, (available on-line at http://www.ec3.org/InfoCenter/12_Conference_Information/2000_Conference/Documents_Released_in_Vegas/Planning_Document.doc); John O'Looney, *Local Government On-Line: Putting the Internet to Work* (Washington, D.C.: International City County Management Association, 2000), 7-8.

5 Center for Technology in Government, *Developing and Delivering Government Services on the World Wide Web* (Albany, NY: Center for Technology in Government, 1996), 32. View on-line at www.ctg.albany.edu/projects/inettb/pract2.pdf.

to obtain class assignments from school Web pages. The Technology Plan guides the district's use of its Web site, including training students in Web master skills to maintain the site and keep it updated. For more information, contact Janice Thompson, Pine Island School District Technology Director, at jthompso@pineisland.k12.mn.us or 507/356-8581.

Determine Which Services are Suitable for On-Line Delivery

Part of thinking strategically is deciding what local information and services are suitable for digital delivery. Not every bit of local government information, nor every locally provided service, can or should be provided via the Internet. When considering suitability, local governments should think how the Web site could improve delivery of both existing and new services.[6] Consequently, one of the first steps a local government must take is to answer what it wants to deliver over the Web, to fulfill which audience needs, and for what purpose.[7] As mentioned in Chapter 1, local governments that opt to offer services on-line still have an obligation to deliver services using their customary methods of delivery.

E-government should support a jurisdiction's fundamental functions.

All of the strategic planning should relate e-government to the jurisdiction's core services so that e-government supports the government's fundamental functions.[8] Offering e-government simply because the technology is available ignores the need to be cost-effective and can lead to poorly thought-out uses.

Grand Rapids is an example of a city that studied what information and services would best meet its Web-site users' needs. For the initial planning of the Web site, a committee of city staff was convened with membership from each department. Among other things, the Web committee developed a mission statement for a Web site, laid out a plan for implementation, and identified a list of the likely audiences that would use a Grand Rapids site. With city council approval to continue the Web work, the committee sent a survey to all city department heads, asking about questions they typically fielded from citizens. Based on what it knew about likely audiences and commonly asked questions, the committee developed a directory of city services to be provided via the Web. The services include applying for permits related to zoning, burning, or utility cuts; issuing dog licenses; registering for golf passes and tee times; making park reservations; and using library services. Knowing that the city could not implement all the desired on-line services at one time, Grand Rapids is instead bringing the services on-line incrementally as time and resources allow, following the plan developed by the Web committee. For more information, contact Marilyn Isaac, IT System Administrator, at misaac@ci.grand-rapids.mn.us or 218/326-7620.

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6 Center for Technology in Government, *A WWW Starter Kit* (Albany, NY: Center for Technology in Government, 2000), 1. View on-line at www.ctg.albany.edu/projects/inettb/startkit.html.

7 Center for Technology in Government, *Developing and Delivering Government Services on the World Wide Web*, 26.

8 Ronald J. Raumer, "Strategic Planning for Technology Investments," *Government Finance Review* (December 2001), 32-35. National Electronic Commerce Coordinating Council, *E-Government Strategic Planning*, 12.

Assess the Government's Readiness for E-Government

Local governments should ask whether they are ready for e-government.

Before deciding whether to embark on e-government, local governments should determine how ready they are to do so.[9] Assessing readiness means asking what will be needed to offer e-government and determining the jurisdiction's current capacities to fill those needs. Understanding the true costs of a Web site is important because, as described in Chapter 1, measuring its benefits is difficult, which prevents jurisdictions from quantifying a return on their e-government investment. Perhaps the three most obvious items to assess are (1) whether the jurisdiction has access to the necessary hardware and telecommunications equipment, (2) how available staff or outside experts are and what their competencies are in planning and maintaining e-government, and (3) what funding is available to pay for the needed equipment, staff, and training.

Staff competencies include not only technological skills, but also administrative skills, such as those needed for good contract management. To the extent jurisdictions rely on vendors for Web-site development or maintenance, they need contract management procedures, such as examining vendors' financial statements for financial stability, requiring performance bonds, or designing an exit strategy in case the vendor fails to perform as expected.[10] This is necessary to protect local governments against substantial losses should vendors go out of business or fail to meet expectations.

Perhaps less obvious, local governments should also assess their readiness in terms of adequate leadership support. A jurisdiction's leaders must support the e-government effort in order for it to succeed, as discussed more below.

Further, local governments should consider their legal readiness. That is, they need the capacity to resolve legal issues, such as: what electronic data need protection because of their nonpublic nature; whether to enforce ownership rights (copyrights) of information published on the Web; and under what circumstances the Web space will be available for commercial advertising.

Combined with strategic planning, assessing readiness in these areas prepares governments to decide whether to proceed with e-government. They should proceed with planning only if these initial analyses suggest the jurisdiction has the wherewithal to continue.

We found that:

- **Most local governments reported assessing their readiness for e-government in certain areas before implementing e-government.**

According to our survey, 74 percent of counties, cities, and school districts that provided on-line services had assessed the availability of computers and other technical equipment; 73 percent had assessed their own staff competencies to plan and maintain the Web site; and 66 percent had assessed their ability to fund equipment and staff. Fewer governments assessed their readiness by appraising

9 National Electronic Commerce Coordinating Council, *E-Government Strategic Planning*, 20.

10 Public Technology, Inc., *Local Government Checklist for Developing a Partnership With an E-Government Vendor* (Washington, D.C.: PTI, June 2000), 3.

the leadership support that would be needed, their ability to articulate citizen expectations for e-government, and their capacity for dealing with legal issues. Table 2.1 shows the number of local governments that assessed their readiness for these factors.

Table 2.1: Areas in Which Jurisdictions Assessed Readiness for E-Government, 2001

	All Jurisdictions (*N*=339)		Counties (*N*=49)		Cities (*N*=123)		School Districts (*N*=167)	
Readiness Assessed	#	%	#	%	#	%	#	%
Availability of computers and equipment	251	74%	35	71%	80	65%	136	81%
Staff competency	248	73	33	67	85	69	130	78
Funding for equipment and staff	225	66	30	61	80	65	115	69
Legal issues	169	50	26	53	39	32	104	62
Leadership support	143	42	20	41	46	37	77	42
Ability to assess citizen expectations	97	29	14	29	36	29	47	28

NOTE: The question read: "Before implementing e-government, did your [jurisdiction] assess its readiness for e-government in any of the following areas?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Involve Top Officials and All Participating Departments for an Enterprise-Wide Effort

Local governments need support from top-level administrators and elected officials for planning e-government. This is important in order to set clear objectives for use of a Web site and to reach agreement on the funding and staffing for it.[11] Support of top officials also sets direction that brings other staff on board. A study of local Web site managers indicated that they believe one of the key factors in successfully developing and launching Web sites is obtaining support from top officials.[12] As part of the planning process, staff may need to inform elected officials about how e-government can be useful locally. The point at which elected officials are involved will vary from jurisdiction to jurisdiction. In some cases, a mayor or board member might actually instigate e-government efforts; in others, elected officials might be consulted only after an initial proposal is under consideration.

Obtaining support from top officials is key.

Most local governments comprise numerous departments, each with varying levels of interest in e-government. Successful Web sites, however, require coordination among these multiple departments.[13] Although not every department

11 International City County Management Association, "Local Government and the Internet," *Management Information Service Report* 28, no. 9 (September 1996): 2.

12 Center for Technology in Government, *Untangle the Web: Delivering Municipal Services Through the Internet* (Albany: Center for Technology in Government, 2001), 2. View on-line at www.ctg.albany.edu/resources/pdfrpwp/utw.pdf.

13 Center for Technology in Government, *Untangle the Web,* 2.

may be involved to the same degree, a strong network of staff involvement is needed to develop a comprehensive and cohesive Web site that accurately reflects the public services each department provides. Even in small jurisdictions where one person is responsible for Web design and maintenance, input on content needs to come from others to avoid an incomplete or disjointed result.

Jurisdictions with multiple departments need to coordinate staff involvement for cohesive Web sites.

According to our survey,

- **More counties and cities than school districts reported they were successful in seeking support for e-government from their top elected and administrative officials.**

About 71 percent of counties, 82 percent of cities, and 48 percent of school districts indicated they were either "successful" or "somewhat successful" in seeking top-level support. A relatively large share of school districts, 38 percent, reported that they have not attempted to seek such support.

Further,

- **About 63 percent of counties but just 49 percent of cities and school districts reported success in using staff from multiple departments to coordinate their e-government efforts.**

Sixty-three percent of counties, 49 percent of cities, and 44 percent of school districts indicated they were either "successful" or "somewhat successful" in coordinating staff from different departments for e-government.

Aitkin County, with 15,300 residents near north central Minnesota, uses a Web committee with members representing most county departments to coordinate its Web-related activities. Originally the committee was formed to decide what the community at large might need from a county Web site. Now the committee also ensures the site is updated, reviews ideas for adding new functions to the site (such as putting the property tax database on-line), and occasionally evaluates the site by reviewing other county sites. All county departments are invited to participate in the Web committee's monthly meetings (although active members may vary from meeting to meeting). Support for the Web site from the county administrator has encouraged department involvement.

To promote a consistent look on the Web site, the county's department of Management Information Systems controls the overall Web design, but committee members from each department decide the content for their pages, based on what they know from community members' inquiries and requests. Department representatives may choose to either use the county's Web design software or forward their material to the Web master who converts it. The Web committee has been instrumental in keeping the various departments involved without overburdening them. For a relatively small county like Aitkin, the committee is a vehicle for maintaining a coordinated Web site without hiring a staff person dedicated solely to that purpose. For more information, contact Steve Bennett, Management Information Systems Coordinator, at sbennett@co.aitkin.mn.us or 218/927-7373 or Cindy Bistodeau, Web Master, at mis@co.aitkin.mn.us, or 218/927-7345.

Engage the Public and Determine Whether Public Access to the Internet Is Adequate

Web sites should meet the needs of likely users.

Focusing on organizational needs is only one part of strategic planning and assessing readiness for e-government. Equally important, local governments should identify the potential consumers of e-government and gather input from them to understand what likely users will need and want from the Web site.[14] Doing this from the beginning will help in defining the purpose and objectives of an e-government effort. Successful e-government is measured in part by how many people use the Web site over time. To attract users and keep them coming back, local governments have to continually think about what makes sense from users' vantage points. At the same time, they should take care to avoid creating expectations for electronic services that cannot be fulfilled.

According to our survey,

- **About 48 percent of all the local jurisdictions offering e-government reported that they believe their jurisdiction was either "successful" or "somewhat successful" in identifying potential users' needs and desires, enabling them to orient their Web site around citizens.**

As part of looking at "customer readiness," the local government should assess whether it needs to take steps to widen public access to the Internet, such as increasing the availability of computer terminals in libraries or other public locations.[15] Ensuring that citizens have sufficient access to computers and the Internet is not ordinarily a local government responsibility. Jurisdictions that would like to use their Web pages as major communication vehicles, however, have to consider in their strategic planning the extent of citizen access to the Internet.

Only about a quarter of the local governments we surveyed said they had written strategic plans for e-government. But we learned that:

- **Of those local governments with strategic plans for e-government, 44 percent said their plans considered how citizens might gain access to their Web site.**

In building a Web site for **Buffalo**, a city of 10,000 residents located in Wright County, city staff collected information about potential users in several ways. One was a survey of city residents. Staff mailed a survey to a sample of citizens asking them about services they would like to find on the city's Web site. They learned that many citizens wanted on-line information about applications for services such as zoning permits. Second, staff developed a list of the questions most frequently called or faxed in to the city office's front desk. A third method was working individually with each of the city department heads to identify what information they thought would be of most use on-line. One criterion was putting on the Web

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14 National Electronic Commerce Coordinating Council, *E-Government Strategic Planning*, 21; O'Looney, *Local Government On-Line: Putting the Internet to Work*, 27.

15 Public Technology, Inc. and National League of Cities, *E-Government: City Hall Without Walls* (Washington, D.C.: Public Technology Inc., 2000), 7. View on-line at www.pti.org/links/PTI_NLC_egovkit.doc.

the kinds of information that would allow department staff to focus their time on other issues that demanded personal attention. A second was stressing the quality of the on-line information as opposed to its volume.

A computer kiosk in city hall increases public access to the city's electronic information.

With a direct e-mail link on the Web site to the information systems coordinator, the city invites users to provide their ideas for the site or describe difficulties they may have encountered. Since the Web site has been launched, information systems staff set time aside each month to examine in depth one segment of the site, looking for accuracy, timeliness, and possible additions. In addition, the city council was concerned about Internet access for residents who did not own computers. Using a $10,000 donation from a local business, the city installed three computers in the library and ran a fiber connection to the library building, providing on-line access. The city also installed a computer kiosk in city hall offering visitors on-line access to city information. For more information, contact Merton Auger, City Administrator, at merton.auger@cityofbuffalomn.org or 763/684-5406, or Chris Shinnick, MIS Coordinator, at chris.shinnick@cityofbuffalomn.org or 763/684-5402.

Some local governments have broadened public access to the Internet.

The **Rosemount-Apple Valley-Eagan School District 196,** located in Dakota County with 27,000 students, offers another example of developing a Web site with community members in mind. Although the district has had a Web site since 1996, its earlier sites gave the district a Web presence but lacked the perspective of users. To revamp the site, in 2001 the district convened a five-member staff group consisting of some technology and graphics experts and others with expertise in communications and public administration. Based on the objectives of the school board and superintendent, the planning group's intent was to orient the site around information that parents commonly needed.

The planning group used several sources of information. From e-mails and telephone calls generated by earlier Web users, the planning group had a good idea of what information those users wanted and what they could not find on the old sites, such as student eligibility for bus service. The communications

department knew from numerous telephone callers the kind of information people moving into the district typically requested. In addition, members of the school board offered input; they wanted a site that would keep district residents better informed and offer a means for residents to respond on district issues. The planning group also used software tools to monitor search engine queries for frequent searches and look at which Web pages were most heavily visited. Information from these various sources, combined with information from other jurisdictions' Web sites that the planning group had analyzed, gave staff the direction they needed to redesign the content of the district's site. For more information, contact Tom Voigt, Information Systems Coordinator, at tom.voigt@district196.org or 651/423-7797.

2. Assess Opportunities for Collaboration

Especially because e-government is still an evolving means of public service, there is great value in working with others and learning about what works from others. Local governments need not rely only on their own resources to build effective Web sites.

RECOMMENDATION

To benefit from others' expertise and to share resources, local governments considering e-government should evaluate others' Web sites, learn from other local governments' staff experiences, and explore formal partnerships for e-government.

In Planning for E-Government, Evaluate Web Sites of Other Local Governments

Local governments can learn from others' Web sites.

Both newcomers and those with well-established Web sites can observe and learn from what others have done. By evaluating other governments' Web sites, a jurisdiction can judge what works well, and what does not work well, and decide what features to adapt for its own uses.[16] Governments should structure questions to ask about each site they evaluate, such as: Does the local unit appear to know who its primary users are? Can users easily contact the jurisdiction? How easy is it to navigate around the site? How useful is the information provided on the site? Is the site one that users are likely to revisit? Most of the 12 local governments we visited for this study indicated they took time to research and analyze other entities' Web sites before designing their own.

Local governments can also learn from organizations that have studied and compared Web sites. For example, an annual Brown University study assesses city Web sites based on the presence of 28 features that could aid average citizens logging onto a government site, including: contact information on who to call or write at the city, availability of search engines to make sites searchable, features to facilitate access by the handicapped and non-English speaking users, and

16 Center for Technology in Government, *Untangle the Web*, 4.

statements to reassure citizens worried about privacy and security over the Internet.[17] The National Association of Counties has information about planning Web sites, including links to multiple resources and electronic discussion groups for staff working on Web sites.[18] As another example, in the past two years, the Center for Digital Government joined with *Government Technology* magazine to judge "Best of the Web" local government Web sites. Among other criteria, the center judged sites based on: amount of on-line information available, ability to fully complete transactions on-line, time saved for citizens, ease of navigation, and innovation in delivering services to citizens.[19]

Web site templates can reduce development costs.

Minnesota jurisdictions also have local resources available. These resources have done much of the legwork needed to initiate a Web presence. They offer products that local governments can use to both reduce costs and simplify the Web design process. As one example, in 2001, the League of Minnesota Cities launched a "Web for Cities" project, a tool designed to help cities build and maintain Web sites.[20] The tool provides a template for Web sites and it is intended to allow cities with computers and Internet connections to create their own sites, even without programming or Web design expertise. To use it, cities up to 60,000 in population pay one-time licensing fees ranging from $200 to $2,000 depending on size and monthly maintenance charges ranging from $20 to $80.

Another resource compiled on behalf of Minnesota local governments is the University of Minnesota Extension Service's "Access E-Government" curriculum.[21] In partnership with the Association of Minnesota Counties, the Extension Service developed the curriculum in 2001 to describe what local governments need to consider when offering e-government. The curriculum covers criteria for judging Web sites, suggestions on Web site content and design, discussions of privacy and disability issues, and numerous links to additional resources.

A third example is a Web page tool for teachers, developed by Technology and Information Educational Services (TIES), a nonprofit consortium of Minnesota school districts focusing on technology.[22] The tool offers a template allowing teachers to create their own Web pages and communicate with parents and students without having Web design training. TIES members pay nothing extra for the service. Even teachers who are in districts that are not TIES members may use the tool for a fixed cost of $50 per year or $2.50 per student per year if all teachers in a school or district want their own pages.

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17 Darrell West, *Urban E-Government: An Assessment of City Government Websites* (Providence, RI: Brown University, Taubman Center for Public Policy, September 2001), 2-3. View on-line at www.insidepolitics.org/egovt01city.html.

18 View these resources at http://www.naco.org/programs/infotech/website/index.cfm.

19 Center for Digital Government, "Best of the Web Contest," (2001); www.centerdigitalgov.com/center/bow01/; accessed January 25, 2002.

20 View information about the "Web for Cities" project at www.lmnc.org/services/webforcities.cfm.

21 View the "Access E-Government" site at http://www.egov.umn.edu.

22 View information on the TIES Web page for teachers at www.informns.k12.mn.us/schoolties.

Birchwood Village is one of the Minnesota cities with a Web page developed through the "Web for Cities" project. Birchwood Village has fewer than 1,000 residents and employs two office staff working 10 to 20 hours a week. Because of its limited staff hours, the city wanted a Web site to provide information for residents when staff were unavailable. City staff did not have Web development expertise, but using the "Web for Cities" templates, they put together a Web site with minimal training. Working with the mayor, staff planned in advance what information the city wanted to display (such as the city's code book), making it easier for staff to pull together material for the site's content. Other cost estimates the city had received for developing and maintaining a Web site were higher than what the city could afford, but Birchwood Village is paying a manageable $360 per year hosting fee for its current site. Although the "Web for Cities" tool does not currently have all the functions that Birchwood Village would like, the city believes it would not otherwise have a Web presence. The same approach, however, may not be as desirable for larger communities with needs for highly customized Web sites. For more information, contact Jackie Hildebrand, Deputy Clerk, at bwood@spacestar.net or 651/426-3403.

The template allowed city staff to post a Web site with minimal training and expense.

Participate in Intergovernmental Networks of E-Government Professionals

Staff who have responsibilities for e-government should take part in electronic discussion groups or other associations of e-government professionals, both Internet-wide and more locally within the state. Such networks offer a vehicle for sharing information, discussing common problems, learning what to avoid, and staying current on topics that change rapidly, such as security issues in

information technology.[23] For instance, the League of Minnesota Cities offers "listservs," or electronic discussion groups, including two focused on computer security and telecommunications.[24]

We also learned about networking groups of local government staff around the state. One example is the Western Area City County Cooperative in west central Minnesota. This cooperative serves many functions beyond technology, but it also allows members with similar technology interests to jointly discuss issues of concern, such as how to collect payments via the Internet. Numerous resources like this around the country provide opportunities for local governments to avoid "reinventing the wheel" by capitalizing on what others have learned.[25]

Explore Partnerships on E-Government With Other Public or Private Agencies

Partnerships offer opportunities to share resources.

In the early stages of the planning effort, local governments should explore whether resources can be shared for planning e-government and implementing or maintaining the Web site. Joining in partnership with other local governments may offer opportunities to reduce costs for technology and personnel.[26] For example, in exchange for other services, some jurisdictions just starting their Web presence have hosted their sites using Web servers owned by nearby jurisdictions. Partnerships between cities and school districts or counties and cities may also help build regional alliances that bridge traditional local government boundaries.[27] In addition, working with private agencies can provide necessary expertise that a government need not develop on its own, such as subscribing to an on-line check processing service to accept electronic payments.

At the same time, partnerships and contract arrangements may require a give-and-take approach among participants. When working jointly with others, local governments need to be aware that the different decision-making structures and organizational arrangements of other jurisdictions will likely require additional time for planning and meeting. It will be important to define up front the objectives for the partnership and each participant's roles and expectations. To the extent that substantial resources are shared, or when local governments contract for particular services, formal agreements detailing the arrangements are

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23 Harvard Policy Group on Network-Enabled Services and Government, *Eight Imperatives for Leaders in a Networked World Imperative 5: Protect Privacy and Security* (Cambridge, MA: Kennedy School of Government, 2001), 6.

24 Information on the League's listservs is at www.lmnc.org/forms/listserv.cfm. A national listserv on state and local government Internet information is GovPub with archives at http://listserv.nodak.edu/archives/govpub.html.

25 Some organizations offer useful on-line information on e-government, including: the Center for Technology in Government at www.ctg.albany.edu/index.html, the National Academy of Public Administration's Center for eGovernance at http://www.napawash.org/pc_egovernance/, Public Technology, Inc.'s e-government Web page at www.pti.org/links/e_government.html, the National Electronic Commerce Coordinating Council at www.ec3.org/, and the Institute for Electronic Government at www.ieg.ibm.com/. Useful on-line magazines are: the *E-Gov Digest* at http://www.e-government.com/, *Government Technology* at www.govtech.net, and *EzGov Bulletin The Newsletter of E-government* at http://www.ezgov.com/contact_newsletter.jsp.

26 Center for Technology in Government, *Untangle the Web,* 8.

27 Public Technology, Inc. and National League of Cities, *E-Government: City Hall Without Walls*, 9.

necessary. This underscores the need for good contract-management procedures, as described above.

Partnerships require defining expectations and managing contracts.

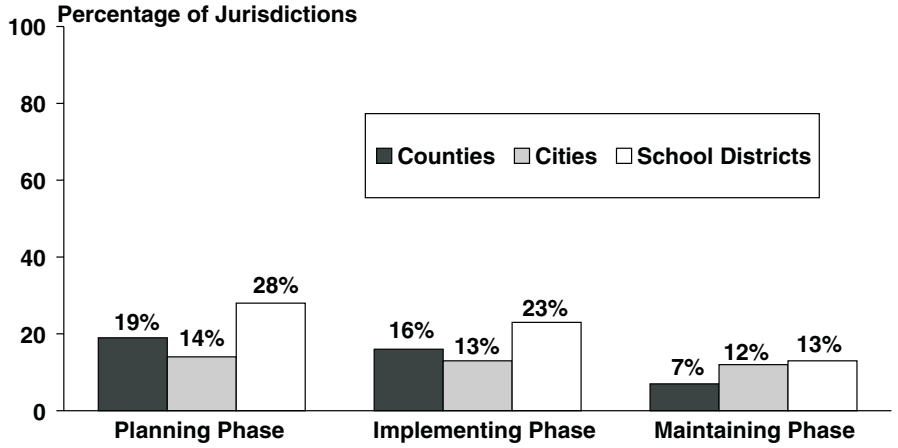
Our survey suggested that local governments, especially school districts and counties, were more likely to work independently than in partnerships on e-government. Majorities of school districts and counties reported working independently on e-government in any of three phases from planning, to implementing, to maintaining e-government. For instance, 64 percent of school districts had worked independently during the planning of e-government, compared with 56 percent of counties, and 44 percent of cities.

At the same time, between 37 and 49 percent of local governments reported working with others while either planning, implementing, or maintaining e-government. Some of the partnerships were with public agencies, some were with private-sector partners, and some were with both.

- **Although a majority of all local governments undertook e-government independently, many others developed partnerships with similar or nearby public jurisdictions to plan, implement, or maintain e-government.**[28]

As shown in Figure 2.2, most of the partnerships with similar or nearby jurisdictions occurred in the planning and implementing stages of e-government. Fewer such partnerships were reported for maintaining e-government on an ongoing basis.

Figure 2.2: Partnerships With Public Entities for E-Government, 2001



NOTES: The question read: "In undertaking e-government, did your [jurisdiction] work independently or with others?" "Public entities" includes counties, cities, school districts, local libraries, community colleges, technical colleges, and universities. Partnerships with private universities may be reflected.

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

28 "Similar or nearby public jurisdictions" included cities, school districts, counties, libraries, or post-secondary institutions.

Some local governments developed partnerships with businesses, consultants, or nonprofits. About 34 percent of jurisdictions reported working in partnerships with businesses, consultants, or nonprofits in the planning phase of e-government, 36 percent in the implementing phase, and 25 percent in the maintaining phase of e-government. Some of these jurisdictions also had partnerships with other public entities at the same time.

A partnership's combined purchasing power can lower overall costs.

Stearns County provides an example of a working partnership with the city of **St. Cloud** and the **St. Cloud School District**. Each entity wanted a tool to allow on-line payments through its Web site. The three jurisdictions had previous experience working together on joint projects, such as a file server shared between the city and school district, and technology solutions for a law enforcement center operated jointly between the county and city. The technology directors of the three jurisdictions reviewed vendors' proposals for payment engines and jointly chose one that met each one's needs. In so doing, their combined purchasing power lowered their overall costs; the vendor was eager to negotiate with them knowing that multiple customers were involved. Because of the partnership, Stearns County received on-line payment technology and a property tax payment application for $5,000 less than it would have otherwise paid on the first year of its three-year vendor agreement. Similarly, St. Cloud saved about $5,000 in its first year of implementing a mechanism for on-line utility payments. While effective partnerships are possible for other jurisdictions, the success of this partnership was due in part to previous working relationships the participants had established. For more information, contact George McClure, Information Services Director, at george.mcclure@co.stearns.mn.us or 320/656-6051.

In another example, the **Red Rock Central School District** in Redwood County developed partnerships to provide the telecommunications infrastructure needed for e-government services. The Red Rock Central School District has a small student body, but the 600 students are widely dispersed geographically due to past consolidations of four school districts. The school district wanted a way to connect residents of its five dispersed communities to the district's Web server in Lamberton, but no private firm was offering Internet access and support in the area. Teaming up with a local farmers' grain cooperative that provided financial backing, the school district developed a

The partnership allowed the school district to mount wireless Internet transmitters on the cooperative's grain elevators.

wireless, high-speed Internet access network. The farming cooperative also provided space on its grain elevators to locate the wireless Internet transmitters; because the elevator silos were the highest structures around the area, they proved useful for transmitting signals. In exchange, the cooperative received technical support and high-speed Internet access connecting its remote office locations around the county. The Storden City Council also participated by providing an Internet access site at the Senior Citizen Center. The Red Rock Central partnership worked because a large group of community members was committed to its success, and the school district had employees and students with the technical expertise to guide the project along. For more information, contact Leonard Runck, Red Rock Central Net System Administrator, at runckl@rrcnet.org or 507/752-7361.

3. Prepare to Execute and Fund E-Government

Once the decision to offer e-government is made, a jurisdiction has to prepare itself to develop and fund it.

RECOMMENDATION

To prepare for e-government, local governments should develop an implementation plan, analyze the full costs of e-government, and plan a funding strategy to pay for the needed people and technology.

Prepare Plans to Implement E-Government

Implementing e-government requires planning.

In contrast with strategic plans that lay out a vision for what *should* be done, implementation planning describes what actually *will* be done.[29] An implementation plan is important because e-government affords many opportunities, but not all can be accomplished at the same time. With implementation plans, local governments set priorities for their e-government projects.

To plan implementation, local governments should document the steps they need to undertake. For instance, a city may decide it wants to first use its Web site to provide basic information about the city's organization and services. It wants to progress to having users participate in on-line polls that may help set priorities among certain pending projects. Eventually, it wants to use the Web to allow on-line registrations for parks and recreation programs. Each of these steps should be laid out in a schedule that shows the order in which they will be done.

The implementation plans should include an economic analysis of the different initiatives' costs over a specific time horizon. In these plans, the costs would be more specific than those estimated during strategic planning. To be complete, costs must take into account equipment purchases, staffing resources, and needs for outside expertise, and they should include both initial and recurring costs. Along with costs, the plans should propose funding sources to detail what revenues will be used to pay for the initiatives.

29 National Electronic Commerce Coordinating Council, *E-Government Strategic Planning*, 21-22.

In addition to costs and funding, the implementation plans should describe how the initiatives are expected to change the entity's processes for delivering services. In most cases, a jurisdiction cannot simply drop its customary way of providing a service. For instance, a city that offers parks registrations on-line has to decide which staff person has the duty to respond to on-line registrations and how to coordinate these registrations with those phoned or mailed. Therefore, implementation planning should consider how to integrate new ways of doing business in parallel with current methods. It should determine how the government may have to modify or reengineer existing business processes for electronic delivery, as well as the costs for doing so.

Implementation plans should also discuss marketing plans and customer relations. As discussed more below, although some may view marketing as less important, e-government will not succeed if citizens are not aware of it. Potential users must also be comfortable using the Web site, which requires local governments to plan for customer-relations activities. Such planning will detail what activities are necessary to respond to users' questions and problems. As discussed in greater detail later in this chapter, part of implementing Web sites involves testing them before their release.

Of those offering e-government in the fall of 2001,

- **Only a small number of local governments reported that they had written plans for implementing e-government once they decided to proceed.**

About 26 percent of school districts, 11 percent of cities, and 6 percent of counties replied that they had developed such written plans. About half of school districts and counties, and 43 percent of cities, indicated they planned implementation of e-government but had not documented the plans. The remaining jurisdictions had not specifically developed plans for how they would implement e-government. Table 2.2 illustrates the extent to which local governments planned implementation.

Table 2.2: Local Governments That Planned for E-Government Implementation, 2001

	All Jurisdictions (*N*=335)		Counties (*N*=48)		Cities (*N*=123)		School Districts (*N*=164)	
	#	%	#	%	#	%	#	%
Yes, we had written plans	58	17%	3	6%	13	11%	42	26%
We planned, but did not write it down	160	48	24	50	53	43	83	51
We did not plan implementation	117	35	21	44	57	46	39	24

NOTE: The question read: "Did your [jurisdiction] plan how it would implement e-government, once it decided to proceed?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Stearns County planned a systematic approach to implementing its Web site. County staff researched effective Web sites, consulted with experts, formulated a plan, and prepared a strategy for communicating with county board members. The county's Web implementation plan contained a list of the features and services staff envisioned for the site, a timeline for implementing different phases of Web services, and projected costs for implementation. Through a series of six presentations to the county board over about 18 months, staff discussed objectives for the Web site and what was needed to achieve them. After receiving board input, staff implemented various features of the Web site during this time. At each successive meeting with the board, staff demonstrated the progress that had been made and solicited board members' feedback. With this measured approach, staff engaged the support of elected county officials and have been able to implement improvements to the site over time as outlined in the plan. For more information, contact George McClure, Information Services Director, at george.mcclure@co.stearns.mn.us or 320/656-6051.

Identify the Needed Dollars, People, and Technology and Analyze Their Present and Future Costs

As mentioned above, implementation plans for e-government should assess what resources (dollars, people, and equipment) the government will need to build and operate an effective Web site. Some researchers have estimated that the ongoing maintenance and operations costs of electronic business projects through their life cycles can be from 40 to 60 percent of their initial implementation costs per year.[30] Therefore, when estimating costs, local governments should examine the full life cycle of the expenses to understand their total costs. This gives them the information needed to help make wise investments.[31]

Local governments need to understand the full costs of e-government, not just the initial expenses.

Also known as recognizing the "total costs of ownership," the concept requires analyzing, not just an item's initial purchase price, but also its costs for maintenance, energy usage, and disposal over its expected life span. For instance, in considering computer application software, a local government should include upfront purchase price, the user support needed to make the program usable, ongoing licensing costs, likely updates needed to keep the software functional, and whether it has resale or reuse value. When considering staffing, local governments should include the cost of not just salaries and benefits, but also training, recruitment, and hiring. Table 2.3 lists items for which jurisdictions planning e-government should consider total costs of ownership.

According to our survey,

- **Although the use of life-cycle costs was not common, local governments most frequently reported analyzing life-cycle costs when estimating costs for specific items, such as contracts with Internet service providers.**

30 Barb Gomolski, "The Cost of e-Business," *InfoWorld* (December 10, 2001), 12.

31 Information Technology Resources Board, "Practical Strategies for Managing Information Systems," 2001; http://www.itrb.gov/; accessed August 27, 2001.

Table 2.3: Items for Which Total Costs Should Be Estimated

- Hardware and software
- Research and development
- Staff salary, overtime pay, benefits, recruitment, hiring, and training
- Infrastructure (such as cabling and telecommunications lines)
- Contracts for technology services and with Internet service providers
- Ongoing maintenance, security, data preparation, and software updates

SOURCE: Center for Technology in Government, *Untangle the Web: Delivering Municipal Services Through the Internet*, 2001, 8.

Other items for which life-cycle costs were estimated included ongoing maintenance and software upgrades, hardware and software, and staff time needed for maintaining the Web site. School districts were more likely to report using life-cycle costs than either cities or counties. This may be in part because the technology plans required of school districts to apply for certain technology funding ask school districts to include life-cycle planning when assessing how they will manage their technology operations. Table 2.4 displays the frequency with which local governments reported estimating life-cycle costs.

Table 2.4: Items for Which Local Governments Estimated Life-Cycle Costs, 2001

	All Jurisdictions		Counties		Cities		School Districts	
Items	#	%	#	%	#	%	#	%
Internet service provider contracts	103	33%	6	14%	34	30%	63	40%
Maintenance and software updates	95	30	6	14	34	30	55	35
Hardware and software	82	26	7	17	25	21	50	32
Staff time to maintain site	82	26	8	19	30	26	44	28
Staff time for technical work and Web site content	74	23	5	12	25	22	44	28
Infrastructure (telecommunication lines, etc.)	73	23	2	5	17	15	54	34
Research and development	25	8	2	5	11	9	12	8
Opportunity cost of staff time	25	8	0	0	7	6	18	11
Likely overtime pay	19	6	3	7	5	4	11	7

NOTES: The total number of respondents, or *N*, varies by item for which costs were estimated. For all jurisdictions, *N* ranges from 311 to 317; for counties, 40 to 42; for cities, 113 to 117; and for school districts, 156 to 159. The question read: "When planning for e-government, did your [jurisdiction] estimate expenses using 'life-cycle' costs?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

The **Minneapolis Public School District** updated its "Master Technology Plan" in 2001 and estimated total costs for three years of its identified technology needs including its e-government services. The estimates included costs for (1) hardware and software; (2) facilities needs (such as wiring upgrades to accommodate computer uses); (3) curriculum to assist teachers in developing digital classroom curricula; and (4) staffing, in terms of support personnel in school buildings, network support personnel, and technology training for teachers and other users. For each of three years, the district laid out its goals for the current year, described how those annual goals fit into the three-year goals, and estimated costs for the actions needed to achieve the goals. Staff developed the cost estimates to make clear to policy makers the significance of the ongoing costs involved with e-government plans. They believed it was important to identify the total costs of technology goals even though the district was unlikely to be able to afford all of the actions needed to reach those goals. For more information, contact Suzanne Kelly, Public Affairs Executive Director, at suzanne.kelly@mpls.k12.mn.us or 612/668-0230.

Develop Funding Strategy

Local governments should set criteria to determine budget priorities for e-government.

Based on the cost estimates described above, local governments need to determine what combination of funding sources will pay for e-government operating and capital expenses and then budget for them. Good budgeting practices, such as following rational methods to set priorities, are important.[32] For capital purchases and replacements, government units should use capital planning to tie their technology investments to their business objectives.[33] Capital planning is more likely to be successful if it follows specific criteria laid out to rank and select projects. When done effectively, capital planning for e-government will help the government achieve the performance it seeks at the lowest life-cycle costs.

In our survey,

- **Most counties and cities reported paying for the set-up and running of e-government with general fund or other local tax dollars. School districts, on the other hand, most often reported using a mix of revenue sources.**

The mix school districts used included general fund money, capital improvement program dollars, and state and federal grants. Chapter 3 provides additional information on how Minnesota local governments pay for e-government.

Assign Responsibility for E-Government

Local governments need to assign responsibility for e-government to a central authority, whether that is a manager, information officer, or governance

32 Roland Calia, "Priority Setting Approaches for Government Budgeting," *Government Finance Review* (August 2001), 18-19.

33 Federal CIO Council, *Smart Practices in Capital Planning* (October 2000), 7, 32; http://www.cio.gov/Documents/smart%5Fpractices%5Fbook%2Epdf; accessed August 10, 2001.

council.[34] This sets a unified direction for the e-government initiative. It makes clear who is in charge and who can be held accountable for initial development as well as ongoing operations of the Web site. Plus, it helps minimize the influence of any one department, thereby helping to focus the Web site on users' needs.

Assigning responsibility will help ensure that e-government is done well.

According to our survey:

- **About 64 percent of local governments offering e-government considered themselves "successful" or "somewhat successful" in assigning e-government responsibility to a specific project manager or department.**

In **Blue Earth County**, the public information coordinator has the responsibility for updating and improving the county's Web site. Although the county has had a Web site since 1997, early versions of the site were incomplete, outdated, and failed to meet citizens' needs. In part to make the Web site effective, the county board approved a position for a public information coordinator whose specific job duties included keeping the Web site current and viable. Once this position was filled in 1999, the new coordinator worked with county departments on changing the site, which soon contained descriptions of each department, information about commissioners, a frequently updated news page, and a feedback feature for citizens to submit their views on county services. With a population of about 55,000, the county did not feel it was large enough to warrant a full complement of technical and design Web staff, so the county continues to contract with a local vendor for Web development and hosting. The public information coordinator, though, has become the individual identified with both making Web site material consistent and relevant and searching for new Web-based services and information. For more information, contact Charles Berg, Data Processing Director, at charles.berg@co.blue-earth.mn.us or 507/389-8204 or Katie Nerem Roth at katie.nerem.roth@co.blue-earth.mn.us or 507/389-8286.

4. Provide Security

All jurisdictions offering e-government need to implement security measures, although the level of security required will vary depending upon the degree of risk that each Web site faces. For instance, agencies where Web servers are connected to other production servers could be susceptible to hacker intrusions that result in disruptions to the agencies' entire computer networks. As another example, a Web site that allows the use of credit cards has higher security needs than others. Each jurisdiction has to identify the point where the costs of security measures balance out the acceptable risks.[35]

The actions described below apply to information technology in general, not just that used for Web sites. Yet because Web sites are by definition connected to the Internet, wherein many security vulnerabilities lie, security actions are especially

34 National Electronic Commerce Coordinating Council, *Critical Business Issues in the Transformation to Electronic Government* (Washington, D.C.: NECCC, December 2000), 5-6. View on-line at http://www.ec3.org/InfoCenter/12_Conference_Information/2000_Conference/Documents_Released_in_Vegas/Critical_Business_Issues_Paper.doc.

35 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 72.

important. For some of the security practices, a local government may wish to rely on vendors with expertise in those areas instead of relying entirely on internal resources.

RECOMMENDATION

To protect their e-government investments, local governments should develop, follow, and test security policies that are based on identified risks that their data and computers face. They should follow well-documented security steps, such as using antivirus software, and develop procedures for responding to security intrusions.

Conduct a Risk Assessment and Write Policy Based on It

Security risks for computer systems arise from accidental causes, such as the unintentional severing of an underground communications cable, and from deliberate causes, such as the malicious propagation of computer viruses. The degree of harm that risks pose varies. An attack might result in a defaced Web page, altering what appears to the user.[36] It might destroy or delete computer files, rendering the correct information unavailable. Or it might cause computers to crash, preventing services from being delivered. Figure 2.3 is an example of a Minnesota local government's home page that was defaced in 2001.

Higher risk Web sites require greater security.

The greater the likelihood of a threat, and the larger its negative impact, the higher risk it presents.[37] Because computer security threats abound, and because a breakdown in service from such an attack can potentially be very costly, local governments should assess the risks to their Web sites and to the related databases, servers, and other equipment.[38] Risk assessments help local governments understand their vulnerabilities by identifying what is at risk and developing appropriate strategies to manage the risks.

Managing the known risks is an essential part of realistic security strategies.[39] Based on the results of the risk assessments, local governments should adopt security policies that identify what can go wrong, determine measures to reduce the likelihood of problems, lay out steps for detecting and responding to security

36 Hackers deface thousands of Web sites each month, according to one Web site that tracks and mirrors defaced pages: Alldas.de; http://defaced.alldas.mirror.widexs.nl/; accessed March 25, 2002.

37 Risk is a function of (1) the probability that a security threat will cause a negative outcome and (2) the size of the impact that negative outcome would have on a government's ability to perform its duties.

38 Center for Technology in Government, *Internet Security Seminar* (1996); www.ctg.albany.edu/projects/inettb/security.html; accessed October 24, 2001. Information Systems and Audit Control Association, *Control Objectives for Information and related Technology COBIT Management Guidelines 3d ed.,* (Rolling Meadows, IL: IT Governance Institute, July 2000), 56-58. The National Institute of Standards and Technology has a guide for conducting IT risk management at http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf.

39 Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow: Pay Now or Pay Later* (Washington, D.C: National Academy Press, 2002), 14; http://books.nap.edu/books/0309083125/html/index.html; accessed January 30, 2002.

Figure 2.3: Defacement of Local Government Web Page

SOURCE: Alldas.de at http://defaced.alldas.mirror.widexs.nl/; accessed March 25, 2002.

Hackers deface Web pages and take over computer bandwidth.

breeches, and specify who will undertake the steps when needed.[40] The security program should address prevention, detection, and response to potential incidents. How extensive the security program is depends on the degree of risk to which the jurisdiction's information systems and networks are subject.[41] If unable to afford adequate ongoing security required by more complex Web sites, a local government should reconsider adding those features.

The adequacy of security relates both to the technology assets and the ability of the government to do its work. Consequently, security specialists should not make security policy decisions alone. Because of the need to balance security, privacy, access, and costs, it is important to have senior officials of the organization involved with setting security policy.[42]

40 Chief Information Officers Council, *Securing Electronic Government*, 5 (January 19, 2001); www.cio.gov/Documents/secure_elec_govt_Jan_2001.html; accessed August 10, 2001.

41 Federal Deposit Insurance Corporation, *Risk Assessment Tools and Practices for Information System Security* (1999); www.fdic.gov/news/news/financial/1999/FIL9968a.html; accessed October 2, 2001.

42 Harvard Policy Group on Network-Enabled Services and Government, *Eight Imperatives for Leaders in a Networked World Imperative 5: Protect Privacy and Security*, 9.

According to our survey:

- **Less than half of local governments that offer e-government reported having conducted a partial or full risk assessment of their Web sites' security.**

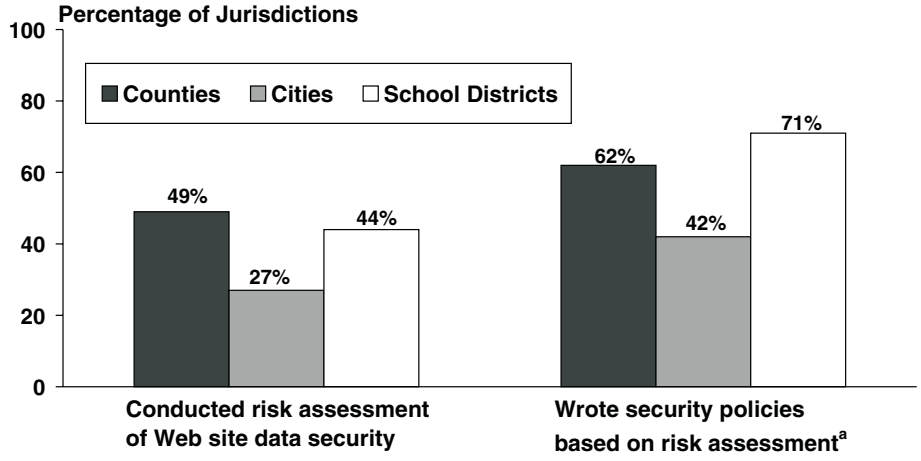
About 49 percent of counties, 44 percent of school districts, and 27 percent of cities had conducted partial or full risk assessments. More school districts than counties or cities reported having written security policies and procedures based on the results of their risk assessments. Figure 2.4 illustrates the proportion of local jurisdictions that conducted risk assessments and wrote security policies based on them.

Install Current Security Software and Monitor the Web Site

Firewalls and antivirus software are essential.

As part of the prevention component of a security program, local governments should install "firewalls," apply security patches as they become available, and use current antivirus programs and updates.[43] Depending on the configuration of a jurisdiction's computer systems, it may need multiple firewalls, one to protect the organization's internal servers and another for its Web server. Firewall installation is by itself inadequate unless staff test firewall security as part of their ongoing

Figure 2.4: Local E-Government Security Risk Assessments and Policies, 2001



[a]Percentages are of those who reported conducting risk assessments.

NOTES: The question read: "Which security measures, if any, has your [jurisdiction] taken for its Web site?" Percentages reflect those reporting that the measures were "done fully" or "done partially."

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

43 Firewalls, which may be hardware or software, protect information systems from unwelcome or unauthorized outside access. Information and guidelines on firewalls are available from the National Institute of Standards and Technology at http://csrc.nist.gov/publications/nistpubs/800-41/sp800-41.pdf. Readers who want periodic bulletins on technology security, such as firewall policy and IP security, may subscribe at http://csrc.nist.gov/publications/. Plus, free on-line sources are available to test firewalls once installed, such as at www.grc.com.

monitoring. Because new security risks arise as attack methods evolve and as new bugs are detected in existing software and hardware, information technology staff need to stay abreast of the new security threats and vulnerabilities.[44] Table 2.5 lists five common Internet security vulnerabilities.

Table 2.5: Five Common Internet Security Vulnerabilities

- Relying on default settings when installing operating systems and applications
- Using information systems with no passwords or weak passwords
- Failing to backup information-system data, making incomplete backups, or never verifying that backups are working
- Keeping open unused "ports" that connect the system to the Internet
- Failing to filter information "packets" coming into the computer network to prevent the "spoofing" (deceptively gaining access) of IP addresses (which uniquely identify each computer on the Internet)

SOURCE: SANS Institute, *The Twenty Most Critical Internet Security Vulnerabilities (Updated): The Experts' Consensus*; (October 2001); www.sans.org/top20.htm; accessed October 29, 2001.

Trained staff should monitor security.

Detection requires knowledgeable staff to monitor the information system for possible intrusions during installations and beyond. For example, one of the more common vulnerabilities is relying on default settings when installing applications (and operating systems).[45] If staff do not proactively control the defaults, an application will likely have extraneous components that are not used; unused software components are unlikely to receive patches when needed, thereby leaving paths for attackers to take over computers. Beyond installations, trained staff need to analyze available information to determine if an information system has been compromised. Especially for high-risk Web sites, local governments should install intrusion-detection systems that monitor for intrusions and unusual activities.[46]

Vulnerability assessment software is a tool that scans systems to detect security flaws and known software or hardware bugs. Before launching a Web site to the public, a local government should assess its site's security vulnerabilities. Hackers use these software tools to look for ways to infiltrate computer systems; public agencies should be prepared to use at least the same tools to identify flaws that could otherwise be manipulated for malicious purposes.

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44 One on-line resource for reports on frequent, high-impact security alerts comes from the CERT® Coordination Center at Carnegie Mellon University at www.cert.org/current/current_activity.html. Another is from the Symantec Corporation at http://securityresponse.symantec.com/.

45 SANS Institute, *The Twenty Most Critical Internet Security Vulnerabilities*, (October, 2001), 3; www.sans.org/top20.htm; accessed October 29, 2001.

46 National Automated Clearing House Association, *NACHA Rules for Secure Internet Payments from Consumer Checking Accounts* (March 2001); www.nacha.org/news/news/pressreleases/2001/PR031601/pr031601.htm; accessed March 29, 2001. Federal Deposit Insurance Corporation, *Risk Assessment Tools and Practices for Information System Security* (1999); www.fdic.gov/news/news/financial/1999/FIL9968a.html; accessed October 2, 2001.

We learned that:

- **Local governments were more likely to report using antivirus programs, testing firewalls, and installing security patches than intrusion-detection systems. Only about 27 percent of local governments reported assigning specific responsibility for ongoing security monitoring.**

Awareness of security needs may have increased following the September 11, 2001 terrorist incidents, and additional security may be in place than was the case in the fall of that year. According to our survey, about half of local governments reported having installed and tested firewalls fully and another 17 percent had done so partially; 48 percent had fully installed current security patches while 16 percent did so partially; and 63 percent had fully used current antivirus programs with another 18 percent doing so partially. Just 14 percent reported having installed intrusion-detection systems, and another 15 percent indicated they had done so partially. Overall, 27 percent reported that they had fully assigned responsibility for ongoing security monitoring to trained employees or consultants, and 25 percent had done so partially. Table 2.6 shows what shares of counties, cities, and school districts reported fully or partially taking these various security measures.

Table 2.6: Security Software and Monitoring, 2001

	All Jurisdictions		Counties		Cities		School Districts	
Security Measures	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially
Used current antivirus programs	63%	18%	71%	7%	58%	9%	64%	27%
Installed and tested firewalls	50	17	43	20	41	6	58	23
Installed current security patches	48	16	58	16	33	10	57	20
Assigned responsibility for monitoring	27	25	34	27	18	19	32	29
Installed intrusion-detection software	14	15	23	9	10	7	14	22

NOTES: The total number of respondents, or *N*, varies by security measure. For all jurisdictions, *N* ranges from 316 to 327; for counties, 44 to 45; for cities, 112 to 117; and for school districts, 159 to 166. The questions read: "Which security measures, if any, has your [jurisdiction] taken for its Web site?" and "Has your [jurisdiction] taken any of the following security steps to protect your site's data?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

The city of **Buffalo** protects its computer network in a variety of ways. Using firewall software, the Web server is secured in what is known as a "demilitarized zone," a neutral area between the Internet connection and the rest of the city's network. The demilitarized zone allows outsiders access to the Web page but inhibits them from gaining access to any of the rest of the city's network. The city has provided security training for its information systems staff person, and he is charged with actively monitoring the computer system. Due to many software application holes that could lead to security problems, staff routinely looks for

Security requires ongoing diligence.

patches from the software makers' Web sites to fix application problems. Every night the antivirus software used by the city searches for fresh virus updates, which are then automatically pushed out to users' computers. Additional security measures include disaster-recovery planning, as described below. For more information, contact Merton Auger, City Administrator, at merton.auger@cityofbuffalomn.org or 763/684-5406, or Chris Shinnick, MIS Coordinator, at chris.shinnick@cityofbuffalomn.org or 763/684-5402.

A firewall protects the city's computer network.

Develop Incident-Response and Disaster-Recovery Procedures

Local governments need to be prepared to respond when security is breached. Consequently, they should prepare a response program to handle incidents once detected. Having concrete fallback procedures designed in advance is important for instructing users and system administrators what to do when incidents occur.[47] The incident-response plan should identify possible incidents (from hackers to internal misuse to natural disasters), list effective responses to them, and specify who is to undertake what procedures in the event of an incident.

Advance planning is necessary to respond to computer incidents.

Procedures for responding to incidents should include those to (1) identify the problem to determine its severity and impact on system resources, (2) notify technicians, administrators, and users about what occurred and what they should do, (3) contain the problem starting with the highest priorities to minimize disruptions, (4) document the events and evidence for analysis and to permit forensics if needed later for prosecution, and (5) remove the problem, allowing recovery to commence.[48] To be truly effective, it is important to rehearse the procedures so that when an attack occurs, the personnel involved know what to do.

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47 Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow*, 17-18, 20.

48 Center for Technology in Government, *Internet Security Seminar* (1996), 5; www.ctg.albany.edu/projects/inettb/security.html; accessed October 24, 2001. Other resources on incident response include: the Carnegie-Mellon University's CERT Coordination Center at http://www.cert.org/csirts/csirt_faq.html, the SANS Institute at www.sans.org/newlook/publications/incident_handling.htm and the Computer Security Resource Center of the National Institute of Standards and Technology at http://csrc.nist.gov/csrc/incidhand.html.

Once a security breach has been eradicated, the appropriate personnel can begin recovery by assessing the remaining risks and taking steps to prevent recurrence of the problem. Disaster-recovery plans detail the steps to restore data, equipment, and services. Recovery means, for instance, retrieving data from backups and installing new equipment when replacements are needed.

In addition to recovering data and technology, local governments should be prepared to deal with potential interruptions to their core functions whether those are teaching students, responding to public safety incidents, or collecting tax revenues. As with disaster-recovery planning, jurisdictions should (1) understand what incidents (e.g., power failure, fire, hardware malfunction) could occur, (2) measure the impacts such incidents would have on various business processes, (3) set priorities among which business processes need to be restored first, and (4) define the tasks that need to be undertaken to restore business processes to predisaster levels.[49]

According to our survey,

- **Regarding Web-site security, local governments were more likely to report conducting data backups and planning for disaster recovery than developing procedures for responding to security incidents.**

Nearly 53 percent of Minnesota's local governments reported having fully developed plans for Web-site data backups and disaster recovery; 24 percent more had done so partially. Table 2.7 illustrates how many counties, cities, and school districts had fully or partially developed such procedures. On the other hand, only 10 percent of Minnesota's local governments reported having fully prepared procedures for responding to Web-site security incidents, according to our survey; another 22 percent had done so partially.

Backing up Web site data is an important precaution.

Table 2.7: Use of Incident-Response and Disaster-Recovery Procedures, 2001

	All Jurisdictions		Counties		Cities		School Districts	
Security Measures	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially
Developed data-backup and disaster-recovery plans	53%	24%	51%	29%	40%	21%	62%	25%
Prepared incident-response procedures	10	22	14	20	6	11	13	31

NOTE: The total number of respondents, or *N*, varies by security measure. For all jurisdictions, *N* ranges from 317 to 326; for counties, 44 to 45; for cities, 113 to 117; and for school districts, 160 to 164. The questions read: "Which security measures, if any, has your [jurisdiction] taken for its Web site?" and "Has your [jurisdiction] taken any of the following security steps to protect your site's data?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

49 Gartner Research, "Top Concerns of Government Business Continuity Planners," *Research Note* QA-13-5355, June 19, 2001, 2-3.

Plans should specify who would perform needed tasks if computer services are interrupted.

The **Minneapolis Public School District** is an example of a jurisdiction that has prepared disaster-recovery plans for its information technology systems. In its disaster-recovery plan, the district documents the scope of likely disasters that could interrupt its computer services and the procedures that personnel would follow in the event a disaster occurred. It designates a "disaster recovery coordination team" and assigns specific recovery tasks to each team member under various disaster scenarios, such as total loss of the district's computing facility. The plan outlines procedures for notifying the appropriate administrators in the event of disasters affecting software, computer room hardware, or school building hardware. In addition, the district has agreements with a number of outside organizations owning similar hardware and software that would allow the district to continue certain computer processing at remote sites following a disaster to the computer room. To facilitate those contingency plans, the district designated priorities among its various computer processing services to ensure that the most important functions are completed first. The disaster planning process took time and involved staff from several departments, but district staff believe that the advance preparation will allow it to continue functioning should disaster strike. For more information, contact Suzanne Kelly, Public Affairs Executive Director, at suzanne.kelly@mpls.k12.mn.us or 612/668-0230.

In **Buffalo**, the city has taken several steps to prevent technology disasters and prepare for recovery in the event of disaster. Its security plan includes keeping complete documentation of the servers, conducting daily data backups, and storing monthly backup tapes in an off-site vault. Buffalo's computer servers and other network components are connected to uninterruptible power supplies (UPS) to keep them running for a short time if the primary power source is lost. Should the UPS be activated, a power generator in a locked room would kick in within five minutes, providing power for another 30 minutes. The room in which computer components are stored is located away from foot traffic, monitored by motion detectors, and controlled for heat and humidity. For more information, contact Merton Auger, City Administrator, at merton.auger@cityofbuffalomn.org or 763/684-5406, or Chris Shinnick, MIS Coordinator, at chris.shinnick@cityofbuffalomn.org or 763/684-5402.

Locked rooms, controlled for temperature and humidity, protect computer systems.

Actively Manage Employee Access to Data and Web Site

Security incidents are as likely to originate within an organization as they are to come from outside. Local governments should have controls in place over internal access to the Web site database and hardware.[50] The extent of the internal controls should be commensurate with the Web site's identified risks.

Computer passwords should be difficult to "crack."

Internal-access controls authenticate users and restrict access to Web site files. For instance, because of the prevalence of password-cracking software, passwords should meet some threshold of difficulty, such as requiring a minimum number of characters and combination of letters and numerals. Access controls protect the Web site from unauthorized users. Restricting access includes limiting who changes the Web site's structure or underlying databases as well as preventing free access to rooms containing Web servers. Table 2.8 lists some methods of authenticating users and managing access.

Table 2.8: Methods of Managing Employee Access to Web-Site Files

User Authentication
- Assign user names and passwords to personnel using Web files
- Because of password-cracking software, set standards for password difficulty, such as requiring a minimum number of characters and combination of letters and numerals
- Require new passwords on a periodic basis, for instance, every quarter
- Use a second method of authenticating users, such as a "smart card," particularly for high-risk Web sites
- Establish procedures for changing security clearances when employees leave the organization
- Use software tools to test the strength of passwords

Users should be required to change passwords periodically.

Access Controls
- Permit access to Web-related files only to those employees with a "need-to-know" for fulfilling their work tasks
- Adopt procedures to control who develops, tests, and implements changes to the Web site's structure or underlying databases
- Restrict physical access to data centers using locked doors

Employee Knowledge
- Adopt procedures to guide employees' use of the Web
- Train employees on use of Web-related security measures

NOTE: The extent to which authentication and access controls are deployed varies by the level of a Web site's risk.

SOURCES: Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow: Pay Now or Pay Later* (Washington, D.C: National Academy Press, 2002), 20. Information Systems and Audit Control Association, *Control Objectives for Information and related Technology [sic] COBIT Management Guidelines 3d ed.,* (Rolling Meadows, IL: IT Governance Institute, July 2000), 100-103.

50 Information Systems and Audit Control Association, *Control Objectives for Information and related Technology COBIT Management Guidelines 3d ed.,* 100-103.

Computer users should be educated on the importance of security measures.

Information system users must understand what they need to do to protect the system from inadvertent problems. Simply having security measures is insufficient; individuals must be properly trained in their uses.[51] Local governments should train employees on the importance of securing data. As described later in this chapter, local governments should adopt policies and procedures on appropriate employee use of the Web, and communicate them to all affected employees. This includes procedures to prevent the introduction of viruses and "worms," such as prohibiting employees from casually downloading files off the Internet.

Based on the results of our survey,

- **Local governments have undertaken a mix of security measures for controlling access to their Web sites, with counties and school districts more likely than cities to have certain measures in place.**

For instance, more than 40 percent of counties and school districts, and about a quarter of cities, had procedures that grant employee access to Web-related data only on a "need-to-know" basis. About 45 percent of counties, 30 percent of school districts, and just 14 percent of cities reported that they fully required employees to periodically change their passwords. Nearly 30 percent of counties and 20 percent of school districts reported that they fully trained employees on the importance of security for their Web site data, compared to 10 percent of cities. Additional local governments reported having taken these security steps partially; in each case, more counties and school districts than cities reported doing so. Refer to Table 2.9 for the percentages of local jurisdictions that reported having various access-control measures in place fully and partially.

Among the computer security measures in place at the **Rosemount-Apple Valley-Eagan School District 196**, the district follows certain steps to restrict unauthorized internal access to the Web site. First, it adheres to a set of authentication controls. Any staff working on Web pages must first gain access to the system using passwords that meet a threshold for a minimum degree of difficulty. Only certain staff are authorized to make changes to the databases related to the Web site. A limited number of staff have "super user" designations requiring very complex password codes, and for certain applications, the district requires double authentication. Authorized users are forced to change passwords every 90 days, and the system disallows users from reusing any of their eight most recent passwords. When employees leave the district, user accounts are immediately terminated. Another step that information systems staff take is training each of the district's school technology contacts about appropriate use of the system, including security protocols; in turn, each of the technology contacts is in charge of managing the user accounts and passwords for users in their buildings. Finally, for building and deploying its Web site, the district uses a set of software and hardware products that is difficult for users to access unless they are authenticated. The computer components themselves are in lockable racks, housed in a locked room with a controlled ventilation system and dedicated for computer purposes. For more information, contact Tom Voigt, Information Systems Coordinator, at tom.voigt@district196.org or 651/423-7797.

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51 Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow*, 20.

Table 2.9: Measures to Manage Employee Access to E-Government Data and Web Sites, 2001

	All Jurisdictions		Counties		Cities		School Districts	
Security Measures	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially
Internally controlled who changes the Web site and when	76%	11%	82%	9%	64%	10%	82%	11%
Restricted physical access to data centers	44	26	62	24	31	19	48	30
Changed security clearances when employees leave	42	13	62	16	28	5	47	18
Granted employee data access on "need-to-know" basis	35	19	43	17	24	10	41	26
Required periodic password changes	27	20	45	20	14	13	30	24
Trained employees on importance of securing data	18	42	30	41	10	29	20	52
Required second authentication factor	1	6	0	2	0	4	3	9

NOTE: The total number of respondents, or *N*, varies by security measure. For all jurisdictions, *N* ranges from 317 to 335; for counties, 42 to 49; for cities, 113 to 122; and for school districts, 159 to 166. The questions read: "Which security measures, if any, has your [jurisdiction] taken for its Web site?" and "Has your [jurisdiction] taken any of the following security steps to protect your site's data?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Users should be cautioned against writing down their passwords.

In 2001, **Ramsey County** updated its computer use policy in light of the county's increasing reliance on Web-based communications. The policy outlines controls on employee practices needed to help ensure technology security. Among the many aspects of the policy are "computer best practices" that the information services department published to help employees understand what they should do to protect the county's technology assets. One guideline covers authentication procedures, such as changing passwords every 30 days, and proscriptions against writing down passwords. Another recommends that employees log off their computers at each day's end to prevent unauthorized access. The policy also includes rules to minimize potential disruptions to the computer network caused by the Internet, such as downloading files from the Internet that could contain harmful viruses. Updating the policy took time and staff from multiple departments, including information systems, human resources, and the county attorney's office. However, the update was necessary to reflect the new vulnerabilities posed by "client/server" computing and network Internet connections (as opposed to the mainframe computing environment of the past, which was less susceptible to disruptions caused by employee uses). Periodic updating is expected in the future as needs of users and the county change. For more information, contact Fred Logman, Chief Information Officer, at fred.logman@co.ramsey.mn.us or 651/266-3483.

Test Adequacy of Security Measures and Provide for Outside Assessment

Constantly evolving threats mean that security measures need to be tested periodically.

Local governments should periodically review and test their security measures to ensure that the Web site and related information and databases are protected by adequate access controls and network and physical security.[52] Security review and testing is necessary because technology changes rapidly. Hackers and others with malicious intents look for new paths of attack when old vulnerabilities are corrected. Local governments that rely on outside vendors for security should review vendors' security practices to ensure they are commensurate with possible risks. Security procedures should be defined in the contract between the local government and the vendor.[53] On-line guides and lists of common security vulnerabilities are available to help jurisdictions understand the status of their security programs and identify areas in need of improvement.[54]

Because of the importance of identifying security vulnerabilities, local governments should obtain an independent, third-party review of their security system's capabilities.[55] This is particularly true for Web sites where the risks have been assessed to be high, such as those allowing electronic payments. Research indicates that the most effective way of understanding security vulnerabilities involves tests taken independently of the system when those being tested do not know the test will occur.[56] Because outside assessments of security can be costly (in the tens of thousands of dollars or more depending on the complexity of the system), local governments should be aware of the costs before initiating Web-site functions that increase their levels of risk, such as on-line payment mechanisms.

We found that:

- **About 31 percent of local governments reported that they had fully reviewed their security system's adequacy to protect their Web sites.**

Another 31 percent of local governments partially completed reviews of their security adequacy. Twenty-seven percent of counties reported that they had fully provided for third-party assessments of their security measures for Web site protection, while only about 9 percent of cities and 8 percent of school districts

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52 National Electronic Commerce Coordinating Council, *Critical Business Issues in the Transformation to Electronic Government*, 7. National Automated Clearing House Association, *NACHA Rules for Secure Internet Payments from Consumer Checking Accounts* (March 2001); www.nacha.org/news/news/pressreleases/2001/PR031601/pr031601.htm; accessed March 29, 2001.

53 Information Systems and Audit Control Association, *Control Objectives for Information and related Technology COBIT Management Guidelines 3d ed.,* 101.

54 See these examples: The Center for Internet Security's benchmarks for testing operating system security at www.cisecurity.org/; SANS Institute, *The Twenty Most Critical Internet Security Vulnerabilities*, (October, 2001); http://www.sans.org/top20.htm; accessed October 29, 2001; and National Institute of Standards and Technology, *Security Self-Assessment Guide for Information Technology Systems* (Washington, D.C.: U.S. Government Printing Office, 2001). Although intended specifically for federal agencies, the criteria described in this latter document apply more broadly to security for information technology at other government levels.

55 Thomas M. Siebel and Pat House, *Cyber Rules* (New York: Doubleday, 1999), 62-63. Information Systems and Audit Control Association, *Control Objectives for Information and related Technology COBIT Management Guidelines 3d ed.*, 130-134.

56 Computer Science and Telecommunications Board, *Cybersecurity Today and Tomorrow*, 17.

reported having done so. In Table 2.10 we show how many local jurisdictions had fully or partially assessed their security system's adequacy either internally or through an external review.

Table 2.10: Reviews of Web-Site Security, 2001

	All Jurisdictions		Counties		Cities		School Districts	
	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially	Done Fully	Done Partially
Periodically reviewed security system's adequacy	31%	31%	30%	35%	22%	19%	38%	39%
Provided for third-party assessment of security controls	11	12	27	14	9	11	8	13

NOTE: The total number of respondents, or *N*, varies by security measure. For all jurisdictions, *N* ranges from 318 to 321; for counties, 43 to 44; for cities, 113 to 114; and for school districts, 161 to 164. The questions read: "Which security measures, if any, has your [jurisdiction] taken for its Web site?" and "Has your [jurisdiction] taken any of the following security steps to protect your site's data?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Attempting to "hack" the computer network from the outside can test security.

Stearns County's technology staff periodically attempt to hack into the county's own network, using vulnerability tools available free or through shareware on-line. They do this to determine the adequacy of their security controls. As a way to double check security, the county contracted with a vendor to identify vulnerabilities in the security program. For about $12,000 (paid jointly by the county, city of St. Cloud, and St. Cloud School District), a contractor tested the jurisdictions' servers and firewalls. As part of the assessment, the contractor attempted to circumvent security controls and gain access to the networked servers. Results showed only minor vulnerabilities and the need for some fine tuning of firewall performance. Staff believe that yearly security assessments by outsiders would be helpful, but costs may be prohibitive. Regardless of their size, jurisdictions with Web sites, and especially those with high-risk sites, have to factor in costs of ongoing security testing. For more information, contact George McClure, Information Services Director, at george.mcclure@co.stearns.mn.us or 320/656-6051.

Blue Earth County maintains security for its own information technology system, but it contracts with a local vendor to host the county's Web page. In this arrangement, the vendor is responsible for securing the computer servers that host the county's and others' Web sites. However, in undertaking the contract, the county's data processing director reviewed the vendor's security program. This provided assurances that the vendor's security, including firewalls, access controls, incident-detection software, and disaster-recovery plans, would adequately protect the county's Web site. Verifying the adequacy of the contractor's security program helps assure that the county's e-government services remain operating 24 hours per day and 7 days per week. For more information, contact Charles Berg, Data Processing Director, at charles.berg@co.blue-earth.mn.us or 507/389-8204.

5. Set a Policy Framework to Guide E-Government

After local governments decide to proceed with a Web site, they need to adopt policies that will govern various issues related to e-government. The policy framework provides operating guidance as well as enhancements to privacy and security.

RECOMMENDATION

To manage their Web sites, local governments should adopt policies that govern how employees use the Internet to conduct business, control which data will be published on-line, and determine how the Web site will be marketed. Local governments also should set a privacy policy to protect site users. Over time, e-government policies need to be reviewed for possible updating.

State the Purpose of a Web Site for Providing Local Government Services

Local governments should adopt policies, based on their strategic planning, that explicitly state how they intend to use the Web site to accomplish their objectives. This extends to setting standards for the extent of employee or student access to the Internet as a work tool as well as acceptable employee and student uses of the Internet.[57] Such standards set parameters for Internet use, explain why the standards are necessary, define what violates acceptable uses, and state sanctions that violators should expect.[58] They also help users avoid practices that threaten the integrity and security of the government's data, as explained earlier.

We found that:

- **Of jurisdictions offering e-government, 60 percent of counties, 54 percent of school districts, and 22 percent of cities indicated that they had developed written policies to delineate the purpose of using the Web to accomplish their business.**

About a third of the jurisdictions reported that they followed certain practices in this regard, but they are unwritten. The share of local governments with written policies and those following unwritten practices are illustrated in Figure 2.5.

Pine Island School District provides an example of adopting policies that define both how the district should use its Web site and what is acceptable Web use by students. In its 2001 Technology Plan, the district outlines its objectives for the Web site including: (1) provide daily information to the community, (2) allow students to obtain classroom assignments electronically, (3) train students in Web

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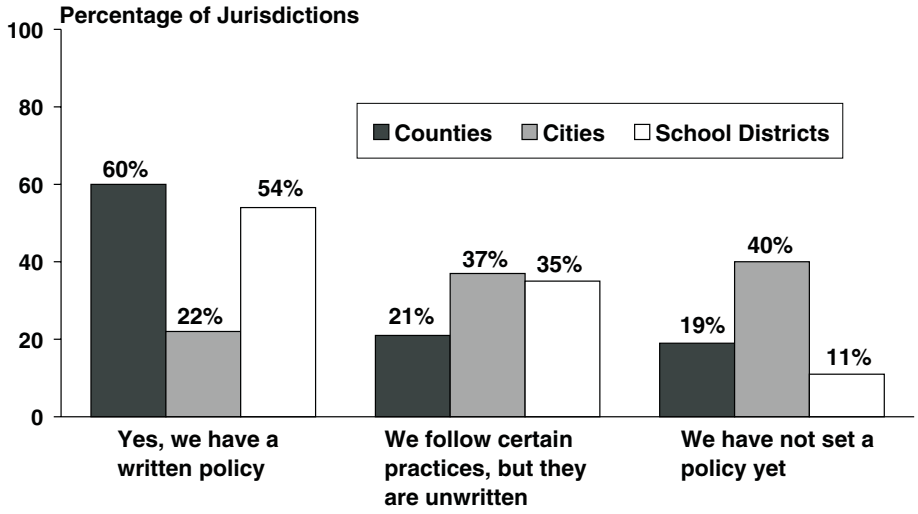
57 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 84-85.

58 International City County Management Association, "Local Government and the Internet," *Management Information Service Report* 28, no. 9 (September 1996): 7.

Figure 2.5: Local Governments With Policies on the Business Purpose of Web Use, 2001



NOTE: The question read: "Has your [jurisdiction] developed policies for . . . the purpose of Web use in [your jurisdiction's] business?"
SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

mastery skills under the guidance of the technology director, and (4) provide links to educational and community resources. Regarding acceptable usage, the district's policy extends beyond student use of its Web site to use of the Internet in general. The policy describes prohibited behaviors such as using someone else's password or intellectual property and transmitting obscene or sexually explicit language. It goes on to describe the sanctions to which violators may be subject. Before using the Internet in school, students must read and sign the use agreement as well as obtain a parent's signature. For more information, contact Janice Thompson, Pine Island School District Technology Director, jthompso@pineisland.k12.mn.us or 507/356-8581.

Establish Policies on Public Access to On-Line Records and on Data Archiving

Local governments need policies about what data to publish on-line.

Local governments may face a dilemma over which *public* data to publish on-line and which to make available only to people who request it in person. In Minnesota, the Data Practices Act determines which data are public and which must be protected. School districts have additional considerations when determining what data to publish on-line. Those school districts receiving federal funding must comply with the Family Educational Rights and Privacy Act pertaining to rights over children's education records. Generally, schools may not disseminate educational data unless parents provide written consent.[59]

59 34 CFR sec. 99.30 (a) (2001). Exceptions to this include summary data, such as statistical records in which individuals cannot be identified, and directory information, such as students' names, addresses, and telephone numbers, but only to the extent a district has complied with the law's process for designating directory information.

The policy defines acceptable Web use by students using school computers and how the district should use its Web site.

Although state statutes require local governments to have written procedures on public access to data, they do not specify whether public data should be made available on-line.[60] Beyond determining what data are public, it is incumbent upon local governments to set standards on whether to publish that public information electronically. This decision may vary from jurisdiction to jurisdiction, but one potential criterion is determining the potential for harm and the magnitude of harm that could result from posting the information to the Web site.[61] Other practical criteria may be: whether the data can be kept updated, the value of having the data on-line balanced against the risks, and what priority particular information has in being available to on-line users.

Local governments should establish procedures for archiving records.

Local governments should also set a policy on which Web-related data will be stored electronically and for how long.[62] Data need to be grouped for retention or disposal, and even data that require no protection should be so designated based on a classification scheme. Local governments should determine what procedures staff will follow to appropriately archive or dispose of data. To avoid inconsistencies with archiving data, automated processes can be used to automatically dispose of data that reach certain age thresholds.

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60 Minn. Stat. (2000) §13.03, subd. 2(b) requires written public access procedures.

61 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 93.

62 Information Systems and Audit Control Association, *Control Objectives for Information and related Technology COBIT Management Guidelines 3d ed.,* 102. *Minn. Stat.* (2000) §138.17 governs the destruction and preservation of local government records.

Based on our survey:

- **Larger shares of school districts than of counties or cities had written policies on public access to records. School districts were also more likely than counties or cities to have written policies on archiving electronic records.**

Two-thirds of school districts, and 29 percent of counties and cities, had written policies governing public access to records. Nearly 45 percent of school districts, 39 percent of counties, and 24 percent of cities reported that they had adopted written policies regarding the management and storage of electronic records.

Establish Privacy Policy

Privacy policies should specify what information, if any, will be collected from Web users.

Today's technology has simplified the ability of Web sites to collect personal data from users. Studies and polls have indicated that American citizens have concerns about privacy and misuse of personal information on the Internet.[63] Much of the data currently collected on Web sites are public data, as defined by Minnesota statutes. For instance, some governments with Web sites collect information from users as a way to provide services, such as to alert citizens to snow emergency declarations or to register participants in government programs. As another example of data that are typically public, some governments use technical devices such as "cookies" (text strings stored in a user's browser allowing a server to recall customized information) or logs to allow site managers to track information on users, such as lists of the pages they have visited.

Minnesota's Data Practices Act requires local governments to comply with requirements protecting the rights of individuals who are subjects of government data. Collecting data of any kind on individuals is lawful only when the data are required to administer or manage a program authorized by federal law, state statute, or local ordinance. Further, before asking individuals to supply data that are not public, governments have to provide the information required by the statutory "Tennessen" warning.[64] Table 2.11 summarizes the requirements of this subdivision.

Local governments should adopt a policy specifying which data, if any, they will collect from Web-site users.[65] In developing the policies, local governments should take into account Minnesota's Data Practices Act, including the

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63 National Electronic Commerce Coordinating Council, *Privacy Policies—Are You Prepared? A Guidebook for State and Local Government, Version III* (Washington, D.C.: NECCC, December 2000), 8-10.

64 Minn. Stat. (2000) §13.04, subd. 2. This applies to *private* data, which are not public but are accessible to the subject of the data. It also applies to *confidential* data, which are neither public nor accessible to the subject of the data. Guidance to assist governments with the Data Practices Act is available in: Department of Administration, *Model Policy: Public Access to Government Data and Rights of Subjects to Data* (St. Paul, July 2000).

65 National Electronic Commerce Coordinating Council, *Privacy Policies—Are You Prepared?*, 14. National Electronic Commerce Coordinating Council, *Critical Business Issues in the Transformation to E-government*, 6. In 1998, the U.S. Federal Trade Commission published guidelines on privacy policies for private industry, including a requirement that Web sites post privacy policies. Since then, the Executive Office of the President required all federal agencies to comply with the privacy policy requirement.

Table 2.11: Requirements for Collecting Private or Confidential Data on Individuals

To collect private or confidential data, a Minnesota government entity must first provide a notice (the so-called Tennessen warning) with the following information.

- Why the data are being requested and how they will be used
- Whether the individual may refuse to supply the data or is legally required to supply them
- Any consequences to the individual of supplying or refusing to supply the data
- The identity of others who are authorized to receive the data

SOURCE: *Minn. Stat.* (2000) §13.04, subd. 2.

Privacy policies are needed even if no information is collected from Web users.

presumption that government data are public unless specifically classified otherwise. Policies are needed even if a local government decides to collect no user information or collects only information that is not personal, such as by using cookies. To make the policy visible to users, local governments should present the policy prominently on the Web site. To make it useful, local governments should include information such as: what data will be collected, who will use it and how, steps that will be taken to protect sensitive information, and a description of the means available for users to review and correct certain information.[66] On-line guidance for crafting privacy policies is available.[67]

We found from our survey that:

- **Few local jurisdictions had developed a policy governing what information will be collected from visitors to their Web sites.**

Only 4 percent of those offering on-line information reported having such privacy policies. Another 18 percent reported they followed certain unwritten privacy practices, but they did not have written policies.

It is **Stearns County's** practice to provide a link on the bottom of each of its Web pages to the county's privacy policy. The county's information services department developed the policy based on its review of other Web sites' privacy policies, particularly those of private firms with whom the county had Web-related business. In its policy, the county makes clear that it intends to keep confidential any of the information collected from visitors to the site. The county does not collect "cookies" from visitors, but it does collect e-mail addresses from those who sign up for certain services, such as its subscription service (a free service for e-mailing updated county documents to interested individuals). The privacy

66 Federal Trade Commission, *Privacy Online: A Report to Congress* (1998); www.ftc.gov/reports/privacy3/; accessed July 30, 2001.

67 For instance, see: National Electronic Commerce Coordinating Council, *Citizen Expectations for Trustworthy Electronic Government* (December 2001); http://ec3.org/InfoCenter/02_WorkGroups/2001_Workgroups/Citizen_Confidence_&_Trust/Citizen_Expectations.pdf.

policy states the county's purpose for collecting e-mail addresses and declares that it will not sell or transfer the information to third parties unless required by law or court order. View Stearns County's privacy policy at http://www.co.stearns.mn.us. For more information, contact George McClure, Information Services Director, at george.mcclure@co.stearns.mn.us or 320/656-6051.

Determine Marketing Strategy

Local governments should plan how they will market their Web sites to the broader community.[68] Unless they let people know the services are available, e-government may suffer from low usage. Marketing tactics vary widely, but some common ones are:

Marketing Web sites is important to encouraging usage.

- including the Web address on all letterhead and published materials;
- registering the domain name with multiple search engines (e.g., Yahoo!, Excite!, Google), and keeping the domain name registration current with a registrar accredited through the Internet Corporation for Assigned Names and Numbers;[69]
- creating electronic links on Web sites of other organizations with similar interests;
- getting posted in Web directories, such as "State and Local Government on the Net" at http://www.piperinfo.com/index.cfm; or a list of officially sanctioned state and local sites at http://OfficialCitySites.org; or the list of local government links on the state of Minnesota's Web site at http://www.state.mn.us/govtoffice/index.html.
- sending public information announcements or establishing "virtual" press centers;
- adding buttons to the site so visitors may send the Web address or page to friends via e-mail; and
- holding community forums (with civic groups, for instance) on the availability and use of the site.

As part of its Web-site marketing, a local jurisdiction may face dilemmas over requests from external agencies and businesses to link to its Web site. Providing links may imply endorsement, and refusing some links but accepting others may result in charges of favoritism. Consequently, local governments should set policies laying out criteria for which electronic links they will accept on their

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68 National Electronic Commerce Coordinating Council, *E-Government Strategic Planning*, 22-23. Joe Dysart, "Key Strategies in Web Site Promotion," *American City & County* 116 no. 5 (April 2001): 2.

69 The Internet Corporation for Assigned Names and Numbers, known as ICANN, is the nonprofit organization with responsibility for managing the domain name system, among other duties.

sites.[70] When reasonable policies are established, jurisdictions have a basis for rejecting links that are not aligned with their best interests, such as links to hate groups or sites known to publish inaccuracies. The League of Minnesota Cities has developed a prototype policy on Web-site links that jurisdictions can tailor to their own needs.[71]

Local governments need policies on the types of links from outside organizations that they will post on their Web sites.

Our survey indicated that:

- **Very few local governments had established policies for marketing their Web sites.**

Only 3 percent of those offering e-government had Web-site marketing policies. About a third followed certain unwritten practices regarding marketing but had not adopted a policy.

The city of **Fergus Falls,** located in west central Minnesota with a population of 13,000, adopted a policy to guide decisions about links it would allow on its Web site. In the policy, which is based on the League of Minnesota Cities' model, Fergus Falls states that it will consider links from others whose purposes are similar to that of the city: providing information about the city's government, services, and attractions. The city describes criteria for organizations whose links the city might accept, such as whether the organization is a governmental or educational institution, or whether the organization provides information about cultural and sporting activities in the area. In addition, the policy explicitly states criteria for links it will not accept. For Fergus Falls, the criteria include candidates for public office and organizations advocating positions on public issues. With the policy in place, city staff have leverage to handle the many requests received for links to the city's page. For more information, contact Tony Neville, Information Systems Manager, at tony.neville@ci.fergus-falls.mn.us or 218/739-2251 or Kirsten Danielson, Information Systems Programmer, at kirsten.danielson@ci.fergus-falls.mn.us or 218/739-2251.

Determine Whether Access to the Web Site is Adequate

Certain users may be unable to use a Web site because of physical disabilities or because English is not their native language. Local governments have to decide, based on their users' likely needs, whether they intend to offer maximum accessibility to their Web sites by accommodating these populations.[72] Title II of the Americans with Disabilities Act requires local governments to communicate effectively with people who have disabilities, meaning jurisdictions must be prepared to offer their communications through accessible means. Whether this requires making all Web pages accessible is subject to interpretation, but local

70 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 97.

71 For examples of policies on Web links, privacy, and copyrights, see the League of Minnesota Cities' model policies at http://www.lmnc.org/2001conf/PrivacyStatementInformationDisclaimerCopyrightnotice.doc.

72 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 28. Section 508 of the federal Rehabilitation Act requires federal agencies to comply with accessibility guidelines for their Web-based information.

governments that do not follow Web accessibility guidelines must provide an equivalent alternative that is accessible to those with disabilities.

Federal and state guidelines exist for providing the disabled with access to Web pages. Following these guidelines in the design phase of developing sites enables users with special needs, such as visually impaired people using screen readers, to access Web site content. Table 2.12 summarizes some of the priority guidelines for accessibility, as established by the World Wide Web Consortium's Web Accessibility Initiative. Fortunately, when the accessibility guidelines are known in advance, incorporating them into Web-page design is fairly easy and routine. On-line tools are also available to help design Web pages for use by people with disabilities and to monitor Web page compliance with the guidelines.[73]

Appropriate design makes Web sites accessible to users with disabilities.

Table 2.12: Priority Guidelines for Making Web Sites Accessible to Disabled Users

- For images, symbols, animations and other nontext, provide a text equivalent
- Make information conveyed in color also available without color
- Clearly identify places where languages other than English are inserted
- Make pages readable even if newer technologies, e.g., new browsers or use of "applets," are not supported or are turned off
- Avoid causing the screen to flicker
- Use the clearest and simplest language appropriate for a site's content
- If tables are used, identify row and column headers
- If frames are used, title each frame for ease of identification and navigation
- If multimedia presentations are used, describe the important information of the visual track

SOURCE: World Wide Web Consortium (W3C), *Checkpoints for Web Content Accessibility Guidelines 1.0* (1999); www.w3.org/TR/WCAG10/full-checklist.html; accessed February 4, 2002.

Some jurisdictions are part of communities with significant populations who do not speak or read English. Translating Web pages into other languages can be time consuming or expensive, especially for sites with voluminous pages or jurisdictions where multiple languages are spoken. Considering their likely Web audience, local governments should determine the need for Web pages with alternative language features. Some on-line guidance is available for those wishing to make their Web site accessible in multiple languages.[74]

73 For instance, Minnesota's Office of Technology has published guidelines for making sites accessible to people with disabilities; view them at www.ot.state.mn.us/ot_files/handbook/guidline/guide19-1.html. Local governments may follow a checklist to monitor accessibility at www.w3.org/TR/WCAG10/full-checklist.html or use the electronic checker at www.cast.org/bobby/ to check their pages for disability access.

74 See www.w3.org/International/.

We found that:

- **Small proportions of local governments with Web sites had taken steps to comply with guidelines on accessibility for people with physical disabilities, and even fewer had provided alternative language features on their sites.**

According to our survey, 17 percent of counties and school districts, and 9 percent of cities, had Web sites that comply with guidelines on accessibility for users with disabilities. About 65 percent of local governments responded that they did not know whether their Web sites complied with accessibility guidelines. Less than 2 percent of local jurisdictions had Web sites that incorporate features to assist users who do not speak English.

Local governments should test Web pages for accessibility.

Aitkin County's Web master has tested the accessibility of county Web pages by having a blind relative review them. Through seminars and training sessions, the Web master learned how to make Web sites accessible to visually impaired people, such as by avoiding the use of multiple frames on a page. After developing Web pages, the Web master sent them to her relative who used screen-reader equipment for reading Web text aloud. The Web master has also designed the site for users who may have older versions of browsers and low modem speeds; she has tested the pages by having other county employees read them while using various browser software packages. Without adding significantly to the time for designing and updating the site, the Web master is making sure the site is readable by all users. For more information, contact Cindy Bistodeau, Web Master, at mis@co.aitkin.mn.us or 218/927-7345 or Steve Bennett, Management Information Systems Coordinator, at sbennett@co.aitkin.mn.us or 218/927-7373.

The **Minneapolis Public School District** educates thousands of children whose primary language is something other than English, including Somali, Spanish, and Hmong. While the district acknowledges the desirability of translating its Web pages into other languages, the high expense prevents it from offering translations of the full Web site. Instead, the district has had to set priorities and offer translated Web pages for important information that does not change frequently but is needed regularly. For instance, translations are available for parents who need to register their children for school. With the help of foundation funding, some special projects of great import to the community have also been translated for the Web, such as the district's *Measuring Up* report, which is an accountability report on the school district's performance. For other information, the district directs non-English speakers to particular persons within the appropriate departments. For more information, contact Suzanne Kelly, Public Affairs Executive Director, at suzanne.kelly@mpls.k12.mn.us or 612/668-0230.

Review and Update E-Government Policies

To ensure that e-government policies remain useful and appropriate, local governments must periodically review them.[75] The policies provide guiding principles for operating e-government and, as such, they need to be current.

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75 Center for Technology in Government, *Untangle the Web*, 7.

Assigning this responsibility to a specific individual may help ensure that updates occur as necessary.

6. Make the Web Site Function Optimally

E-government works best when a Web site meets both user needs and a jurisdiction's expectations about delivering services electronically. Once begun, e-government requires a continuing commitment to daily maintenance and security measures.

RECOMMENDATION

To make sure that e-government is usable and useful, local governments should orient their Web sites around meeting users' needs and their own e-government objectives. They should take steps to make Web pages readable and test pages before releasing them publicly. In addition, they must plan for the ongoing maintenance of the sites, which accounts for the bulk of e-government costs.

Design the Web Site to Fulfill User Needs and Meet E-Government Objectives

As mentioned near the beginning of this chapter, even in the early strategic planning stages of e-government, a local government should identify its potential Web users and what they want from the government's Web site. This concept is equally important in designing the actual format and content of Web sites. Local governments have to understand the real needs of their sites' audiences if the sites are to be effective communication tools.[76]

A local government's e-government objectives should guide Web site content.

In addition, a local government must combine an understanding of user needs with its own objectives for e-government. The strategic planning described earlier in this chapter should help a jurisdiction explicitly identify what it wants the Web site to accomplish, and this should guide decisions on Web site design. Deciding on the content of a Web site requires balancing the interests of potential users against practical constraints that local governments face. For instance, a local government must consciously decide how much information should be posted on-line, weighing the interests of users against the protection of sensitive data.

Designing Web sites based on citizen needs involves, first, defining the target audiences.[77] This means identifying who is likely to be interested in the content the Web site offers, and which of these groups the government is equipped to serve. Not all users may necessarily share the same needs, however. Local governments may have to distinguish among different classes of users, such as

76 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 27.

77 IBM, *IBM Ease of Use: Web Design Guidelines,* 2-3 and 9-11; http://www-3.ibm.com/ibm/easy/eou_ext.nsf/Publish; accessed June 12, 2001. Sarah L. Roberts-Witt, "Site Design as a Business Decision," *PC Magazine*, September 25, 2001.

Web sites should be organized to meet user needs.

those interested in a single record compared with others who want large volumes of data. A second step is determining potential users' Web skills and expectations. Knowing a profile of likely users is important in building a design that communicates effectively with the users. Gathering input from users is possible with questionnaires, interviews, or focus groups, among other methods. Third, local governments should organize their Web site in a way that makes sense to likely users. This may involve organizing around topics, such as registering children for school, or around groups, such as senior citizens or workers.

Most local governments with Web sites reported in our survey that they identified their sites' likely users.

- **About 78 percent of the local governments offering e-government indicated that, in developing their Web sites, they defined the likely target audience for the site.**

Nearly half developed lists of what users were likely to need on-line. Table 2.13 shows what other steps the local jurisdictions took to involve users in Web-site development.

Table 2.13: Steps Taken for Designing User-Oriented Web Sites, 2001

Steps	Counties (*N*=49)	Cities (*N*=123)	School Districts (*N*=167)
Defined likely target audience	71%	69%	86%
Developed lists of users' likely on-line needs	43	41	53
Relied on user information in making design decisions	33	27	44
Surveyed potential users about their information needs	22	21	28
Conducted usability test of the site to evaluate its structure, content, presentation, or interface	18	11	17
Observed users as they performed tasks using the Web site and solicited their feedback	8	9	17

NOTE: The question read: "What steps did your [jurisdiction] follow in developing your Web site?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Ramsey County provides an example of a county that redesigned its Web site to better meet its user needs. A recently hired information systems analyst with Web expertise, together with a public information officer trained in effective communications, led the redesign effort. The county conducted an on-line survey, querying users about what information and services they wanted to see on the county's site. Staff also analyzed Web statistics showing which pages had the highest level of interest among users. Although individual departments are responsible for the content of their Web pages, information systems staff developed guidelines for departments that focused the content more on what users of department services would want on-line. As a result, on the county's

redesigned site, users view subjects listed by their likely interests, such as "jobs/employment" and "recreation," instead of by department. Although the site is not yet completely uniform in appearance, users find more of a consistent look from page to page since the redesign. To keep viewers interested in the site, the home page changes frequently depending on the season of the year and the interests of users, as indicated by Web use statistics. The county expects to continue reviews of the site to assess how well it fulfills the county's objectives and meets users' needs. For more information, contact Fred Logman, Chief Information Officer, at fred.logman@co.ramsey.mn.us or 651/266-3483.

Follow Industry Guidelines for Site Presentation and Content

Users will judge local governments' Web sites by the pages' content, visual style, and ease of use. Attracting visitors to return to the site means that local governments have to follow some commonly accepted guidelines to enhance the readability of their Web pages.[78] Such features include:

Making Web pages readable encourages users to return.

- identifying the local government on each page,
- using uncluttered pages with consistent headers, fonts, and backgrounds,
- including forms and e-mail links,
- displaying date stamps to indicate timeliness of the information,
- prominently providing contact information such as phone numbers, street addresses, and e-mail addresses,
- avoiding technical language when possible,
- offering a walk-through description of difficult on-line processes,
- providing information on how to answer questions that are not covered on-line,
- orienting users to the site with indexes, search tools, and frequently asked questions (FAQs),
- using clearly labeled navigation buttons, and using them consistently,
- creating "printer-friendly," text-only versions of Web pages, and
- providing links for quick access to useful resources on the government's site and other relevant sites.

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78 Center for Technology in Government, *Untangle the Web*, 11. Many resources on Web site design are available, including online resources such as a *Web Style Manual* at http://info.med.yale.edu/caim/manual/index.html and *WebBusiness Magazine* at http://webbusiness.cio.com/. Many features for enhancing readability are built into software available for designing Web pages.

According to our survey:

- **Nearly all of the local governments offering e-government reported that they developed their Web sites with plain English instead of technical jargon.**

About 85 percent said their sites included a prominent display of contact names, addresses, e-mail addresses, or phone numbers. Seventy-nine percent reported that their Web sites had consistent headers, fonts, and backgrounds from page to page. Table 2.14 displays how frequently local governments reported having incorporated some of the other elements commonly recommended to improve the readability and usefulness of Web sites.

Test the Site Before Public Release

Web pages should be tested both inside and outside the office before they are released.

In advance of launching their Web sites publicly, local governments should plan to test the sites.[79] To get useful user feedback and analyze how well Web sites function, plans should include testing by individuals within and outside the office.

Table 2.14: Features of Local Government Web Sites, 2001

Features	Counties (*N*=49)	Cities (*N*=122)	School Districts (*N*=167)
Use of plain English instead of technical jargon	98%	93%	92%
Contact names, addresses, e-mail addresses, and telephone numbers displayed prominently	82	85	85
Consistent use of headers, fonts, and backgrounds	82	76	81
Clearly labeled navigation buttons used consistently across pages to return users to specific pages	76	70	72
Identification of the jurisdiction on each Web page	73	73	71
E-mail links to useful resources both inside the jurisdiction and external to it	73	65	66
Text-only or low-graphics options to allow fast loading of Web page	49	39	40
Date stamps to indicate the most recent revisions	45	29	38
An index or search function	41	39	23
Information on how to answer questions not covered on-line	35	37	22
A page of “frequently asked questions”	31	28	14
Automated tracking of the times users access various pages or download documents	27	22	14

NOTE: The instructions read: “Indicate which features are part of your current Web site.”

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

79 Center for Technology in Government, *Untangle the Web*, 14. IBM, *IBM Ease of Use: Web Design Guidelines,* 20.

The tests should help evaluate the site's structure, content, presentation, and interface with the user. Relying on people other than the government's own personnel, a jurisdiction should analyze how well users can find the information or services they seek and perform usability tests to assess the "user-friendly" qualities of the site. It is also important to determine how the site behaves when users use different browsers, operating systems, and screen resolutions.

Tests such as these reduce the pressures of having the site absolutely right the first time, because adjustments can be made before it goes public.[80] They also help identify what will be needed to support the site once it is on-line and fine-tune those needs to ensure the site meets the community's real needs.

Most local governments test Web pages, and most have assigned this task to a specific staff person within their jurisdiction, according to our survey.

- **Among the local jurisdictions offering e-government, 67 percent reported that someone in their jurisdiction had been assigned specific responsibility to test Web pages before releasing them publicly.**

In the **Minneapolis Public School District,** the content editor for the Web site is charged with helping individual district departments make their Web pages ready for publishing. The district documented strategies to guide departments as they develop Web pages to bring a consistent look to the many pages and make navigating the pages easy for parents and community members. For certain Web pages developed at the district level, some parents and others have agreed to test the prototype pages and offer feedback. The content editor uses that input to make modifications prior to the final publishing. For more information, contact Suzanne Kelly, Public Affairs Executive Director, at suzanne.kelly@mpls.k12.mn.us or 612/668-0230.

Plan for Ongoing Site Maintenance

Plans should detail a Web site's upkeep.

Once the site is up and running, additional tasks are necessary to keep it operating well. Ongoing maintenance represents real costs to the local governments with Web sites. Local governments should develop a plan for maintaining their Web sites.[81] The plan should consist of procedures for keeping the Web pages operational, a schedule of tasks for day-to-day upkeep, and a list of who is responsible for them. Documenting such plans helps ensure each task is accomplished and provides continuity in managing the site should other staff need to learn the system. Ongoing maintenance includes security measures, as described earlier in this chapter, but goes beyond those to include steps for keeping the site up-to-date. The steps include budgeting for and having someone responsible to:

- regularly update page content,

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80 Center for Technology in Government, *Four Realities of IT Innovation in Government* (2000); www.ctg.albany.edu/resources/htmlrpt/realities_IT_innovation.html; accessed April 3, 2001.

81 Sam Crow, *Web Wise: A Simplified Management Guide for the Development of a Successful Web Site* (Central Point, OR: Oasis Press, 1999), 103-104, 112-115.

Jurisdictions should follow an editorial process to manage the content of Web sites.

- manage an editorial process that determines site content (which may originate from numerous contributors),
- check links and remove those that no longer work,[82]
- develop and test pages to be added,
- inform Web site users about recent changes, such as with a "What's New" feature
- track Web site activity for technical problems that need correcting,
- monitor user-traffic reports indicating how many pages were viewed and in what order,
- manage records to ensure that information collected on-line is integrated into the organization's business processes,
- delete obsolete or useless records,
- archive files that need to be retained,
- respond to users who make requests or offer feedback,
- review the site to evaluate its effectiveness (described more fully below),
- backup the site with each change to it, even when an outside company is hosting the site, and
- manage user accounts, such as deleting user i.d.'s for employees who have left, and otherwise monitoring security.

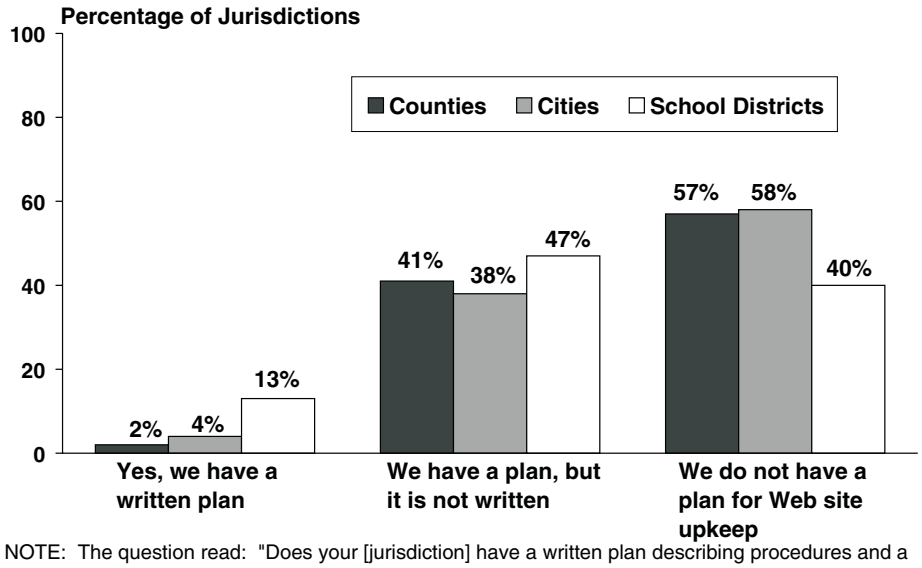
According to our survey,

- **Few local governments had written plans for ongoing maintenance of their Web sites.**

Only about 8 percent of those offering e-government reported they had written plans documenting procedures for upkeep and including a schedule of maintenance activities. More had certain procedures in place but did not have written plans describing them: 47 percent of school districts, 41 percent of counties, and 38 percent of cities reported having unwritten plans for site upkeep. Figure 2.6 displays how many local jurisdictions had written or unwritten plans for ongoing maintenance of their Web site.

82 Software packages, such as CyberSpider Link Test and KyoSoft Link Checker, are available to validate links. We did not evaluate any such software during the course of this study.

Figure 2.6: Written Plans for Web-Site Upkeep, 2001



NOTE: The question read: "Does your [jurisdiction] have a written plan describing procedures and a schedule for Web-site upkeep?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

7. Evaluate E-Government

Offering e-government is an ongoing process, not a static one. Users are less likely to return to Web sites that remain unchanged than sites that present updated information. After governments launch their Web sites, they must periodically review the sites' features and ascertain how well they work.

RECOMMENDATION

To manage e-government, local governments should evaluate their Web sites over time. They should use feedback from users to revise the sites.

Evaluate How Well the Web Site is Meeting E-Government Goals

Evaluation can lead to improved Web sites.

Local governments should evaluate their Web sites with the intent of determining how well their e-government goals are being met.[83] Evaluation provides information to decide what is working well and what has to change. Without evaluating, local governments lose the opportunity to manage the costs and benefits of their Web sites.[84] Evaluation results often indicate changes that could improve the Web site. They may also provide sufficient information for a local

83 Center for Technology in Government, *Untangle the Web*, 17.

84 O'Looney, *Local Government On-Line: Putting the Internet to Work*, 77-79.

government to decide whether to drop certain aspects of e-government altogether, although, as suggested below, the timing of an evaluation is important because many e-government benefits appear only after a site has been in use for some time.

During the initial strategic planning phase of e-government, local jurisdictions should identify explicit measures for evaluating their e-government Web site (as mentioned earlier in this chapter). Starting early allows a government agency to collect baseline data while the site is under development, with the intent of showing changes after the site has been launched. The actual metrics will vary depending on each jurisdiction's objectives, but their purpose is the same: gauging how well the Web site is fulfilling the government's vision for e-government as articulated during strategic planning.

Local governments should determine whether their Web sites are fulfilling their visions for e-government.

If some of a jurisdiction's objectives are to offer e-government within a given range of costs, it will have to measure costs, the key to which is being comprehensive.[85] For these governments, it is important to look both at the initial development costs and ongoing expenses, such as data preparation, training, security, and other ongoing maintenance. The ongoing expenses are likely to be far higher than those for initial development.

Measuring benefits is likely to be more difficult. First, as described in Chapter 1, the benefits tend to accrue over time, not immediately. As more people use the Web site and become familiar with it, its benefits become more frequent and widespread. Second, benefits may not be easy to quantify. Enumerating a dollar value for "improving the timeliness and accuracy of information," for instance, may not be possible, but it is important to at least describe the benefit. For these reasons, a simple comparison of costs and benefits at the end of a year may be unrealistic and even misleading.

In setting measures, a jurisdiction should look to objectives for external users and its own employees. Possible objectives for setting measures are: increasing customer satisfaction, increasing customer time savings, improving turnaround time on service requests, expanding the customer base, distributing information more widely, enhancing the quality of information, adding new services, increasing participation in the civic process, improving information accuracy, improving transaction cycle times, reducing future or present costs, reducing error rates, saving staff time, and reducing mailing and printing costs.

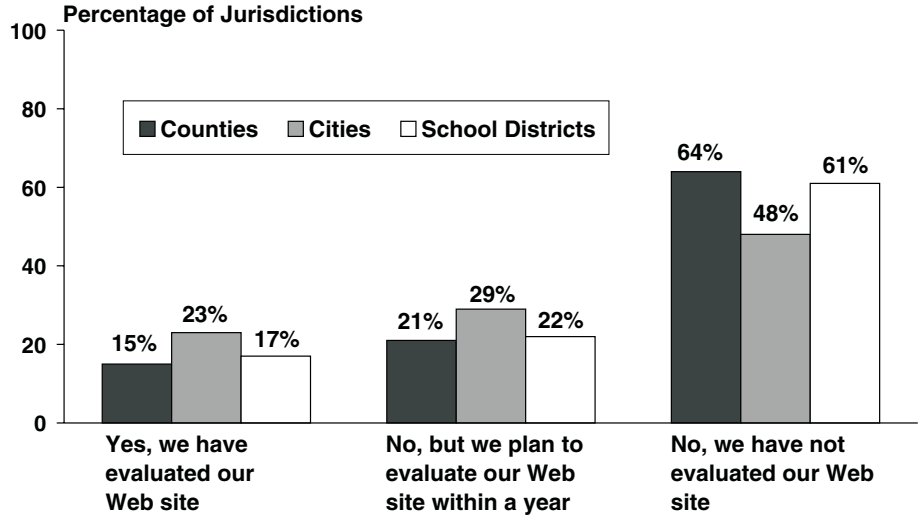
According to our survey:

- **Only small proportions of local jurisdictions that offer e-government had evaluated their Web sites to determine how well they meet e-government goals. Fewer still had identified measures to determine their sites' cost-effectiveness.**

About 23 percent of cities, 17 percent of school districts, and 15 percent of counties reported they had evaluated their Web sites in this way. Several others said they planned to within the year. Figure 2.7 shows how many had evaluated

85 Center for Technology in Government, *Four Realities of IT Innovation in Government*.

Figure 2.7: Local Governments That Evaluated Their Web Sites, 2001



NOTE: The question read: "Has your [jurisdiction] evaluated the Web site to determine how well it is meeting your e-government goals?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

their Web sites to analyze how well they meet e-government goals and how many planned to within the year.

Only about 10 percent of local jurisdictions reported having identified measures to determine whether their Web sites are cost-effective. Another 14 percent said they planned to within the year.

Revise Web Site Based on Evaluation Results and Other Feedback

Web sites should be revised according to a planned schedule.

Local governments should identify enhancements and revise their Web sites on an ongoing basis to keep users interested.[86] In planning to revise Web sites, local governments should collect comments from the public, such as through surveys or an on-line feedback form, and they should solicit input from their colleagues. As an example, the Rosemount-Apple Valley-Eagan School District 196 expanded and redesigned its Web site in response to resident and staff suggestions at public roundtable discussions held in late 2000. In another example, a 2001 survey of Dakota County residents indicated that 23 percent of residents with access to the Internet had visited the county's Web site that year, and many were looking for information on property parcels or recreational facilities. The county has used the survey information to help make its Web site an efficient way for users to retrieve information they need. Local governments may also find it useful to analyze data from Web-user traffic reports, although this information will not indicate how many citizens are actually using their sites. As with the initial site design,

86 Center for Technology in Government, *Untangle the Web*, 18.

revisions should follow a planned schedule that accounts for the expected costs and timing of the changes.

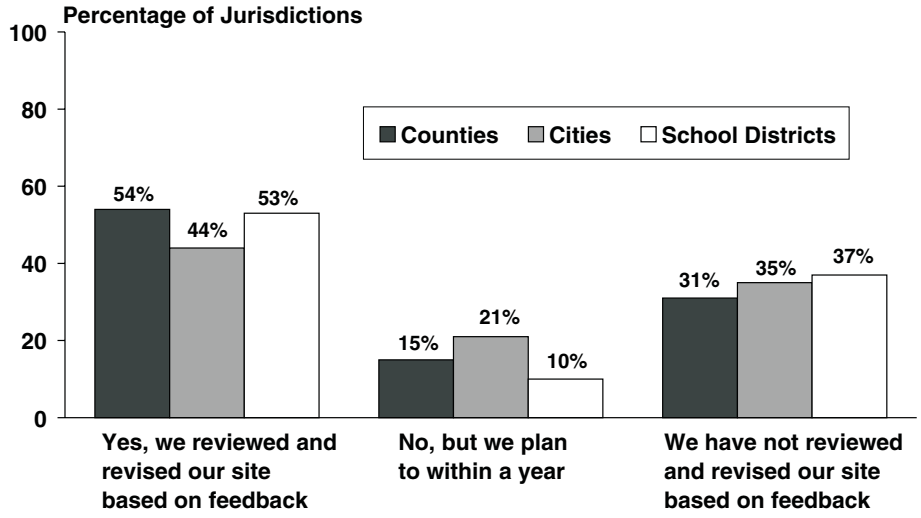
As already mentioned, few local governments have conducted formal evaluations of their Web sites. Yet,

- **Half of local governments reported having taken steps to review and revise their Web sites based on feedback from users.**

Figure 2.8 shows how many local jurisdictions reported either that they revised their Web sites based on user feedback or they are planning to within the year.

Most local governments have revised their Web sites or plan to soon.

Figure 2.8: Local Governments Using User Feedback to Review and Revise Web Sites, 2001



NOTE: The question read: "Has your [jurisdiction]…reviewed and revised the Web site based on feedback from users?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

The city of **Plymouth** has had a Web site since 1996, and it views the site as a service requiring ongoing revisions using input from users and city personnel. Regarding site redesign, staff have made minor revisions over time based on both reactions to the site and their own analysis of the site's usage patterns. The site invites users to offer feedback, and many users send e-mail with either their concerns, or comments on potential enhancements, or their inability to find particular information. Plus, staff collect additional Web revision ideas from staff in other departments who have direct contacts with the public and can indicate what might be useful. A 1999 survey of Plymouth residents helped guide decisions about additions to Web page content by revealing that nearly three-quarters of citizens had Internet access and by indicating with which services citizens most frequently had contact. Staff are proceeding with another major redesign that they hope will expand the site, make it easier to navigate, and make it easier to manage with city departments providing updated Web content. As part of the overhaul, staff are considering services such as on-line information

Revising the Web site is an ongoing process.

on building permits, on-line utility information, and the potential for eventually allowing on-line utility payments. For more information, contact Helen LaFave, Communications Manager, at hlafave@ci.plymouth.mn.us or 763/509-5060, or Jeff Hohenstein, Information Technology Service Manager, at jhohenst@ci.plymouth.mn.us or 763/509-5060.

3 Local E-Government in Minnesota

SUMMARY

In Minnesota, large local governments are far more likely than small ones to already offer e-government. Across all of Minnesota's local jurisdictions, the most frequently cited obstacles to e-government are related to insufficient staff time, the high expense of e-government relative to other local services, and inadequate expertise and training in e-government. Jurisdictions with no plans to offer e-government, mostly small cities, cited these same barriers. Most counties and cities pay for e-government with general fund revenues, but most school districts use a mix of funding sources. Citizen access to computers and the Internet is expanding rapidly, and Minnesotans are more likely than residents of most other states to have access to the Internet. The availability around the state of infrastructure for "high-speed" access to the Internet is mixed, and what little evidence there is suggests that relatively small proportions of Minnesotans in areas with high-speed access actually subscribe to it.

This chapter provides additional information on e-government in Minnesota, including barriers to e-government, paying for e-government, the extent of Minnesotans' access to the Internet, and the availability of high-speed access to the Internet.

In this chapter we address the following questions:

- **How many local governments offer e-government, and what are the obstacles to it?**
- **How are local jurisdictions paying for e-government services?**
- **How widespread is citizen access to computers or other technologies that connect to e-government?**
- **How many Minnesota communities have access to the infrastructure used for e-government?**

To answer these questions, we relied in part on our survey of Minnesota's counties and a sample of cities and school districts. Additional information on survey methodology is available in Appendix A, and survey results are available via the Internet at www.auditor.leg.state.mn.us/ped/2002/pe0208.htm. To supplement national information on the extent of citizen access to the Internet, we sponsored several questions on this topic in a survey of Minnesota residents conducted by

the Minnesota Center for Survey Research. We analyzed data from the departments of Commerce and Administration for information on telecommunications infrastructure in the state. We also collected information on local initiatives to expand Internet access and interviewed some local officials on this subject.

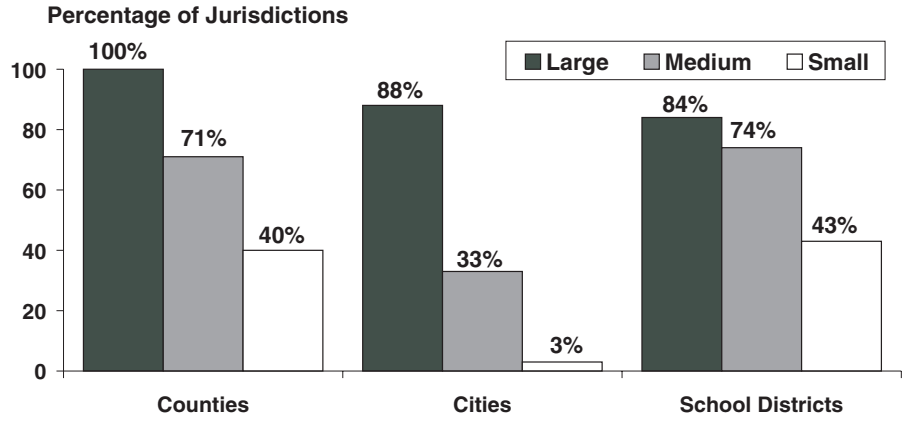
THE EXTENT OF LOCAL E-GOVERNMENT IN MINNESOTA

Grouped together, a majority of Minnesota's counties, cities, and school districts either already offer information or services on-line or expect to within the year, according to our survey. This differs substantially by size and type of local government, however.[1] As shown in Figure 3.1:

- **Larger jurisdictions are more likely than smaller ones to already have Web sites. Medium-sized and small counties and school districts are more likely to have Web sites than medium and small cities.**

Most of Minnesota's local governments offer e-government or expect to within the year.

Figure 3.1: Jurisdictions Offering Information or Services to Citizens On-Line, by Size, 2001



NOTES: The question read: "Does your [jurisdiction] provide any information or services to citizens on-line?" "Large" populations were 50,000 or more for counties; 5,000 or more for cities; and 3,000 or more students for school districts. "Medium" was between 16,000 and 49,999 for counties; between 500 and 4,999 for cities; and between 800 and 2,999 students for school districts. "Small" was fewer than 16,000 for counties; fewer than 500 for cities; and fewer than 800 students for school districts.

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

1 For this analysis, we divided counties and cities by population into small, medium, and large groups: small counties had populations of less than 16,000; mid-size counties had between 16,000 and 49,999; and large counties had 50,000 or more; small cities had populations of less than 500; mid-size cities had between 500 and 4,999; and large cities had 5,000 or more. School districts were divided as follows: small districts had student enrollments of less than 800; mid-size districts had between 800 and 2,999; and large districts had 3,000 or more.

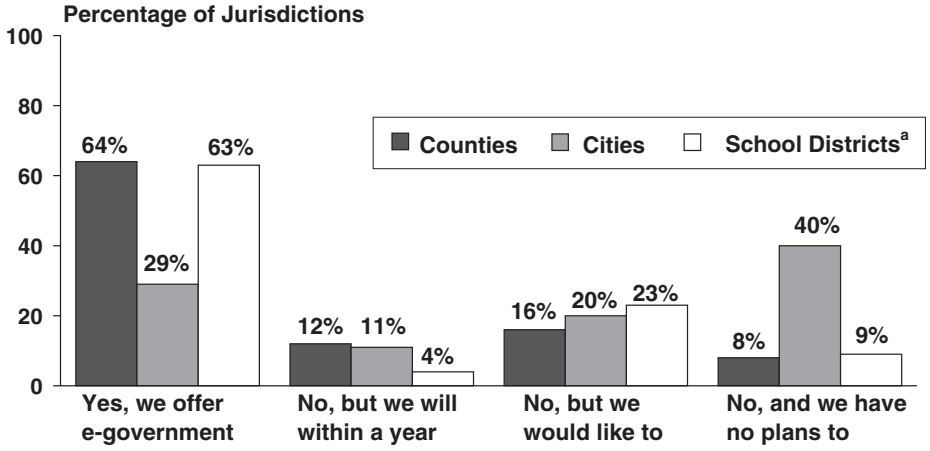
Not only are smaller cities less likely than larger ones to have Web sites, but they also make up a large proportion of all Minnesota cities; 44 percent of the cities in our sample had populations under 500, and 61 percent were under 1,000. Overall, just 29 percent of the cities (mostly larger ones) offered e-government, compared with 64 percent of Minnesota's counties and 63 percent of the school districts, as of our October 2001 survey.

Cities were also far more likely than counties or school districts to report that they had no plans to offer on-line information or services. As Figure 3.2 shows, 40 percent of cities (most of which were small cities) reported they have no plans to offer on-line information. More than 77 percent of the cities indicating they have no plans to offer e-government had populations under 500. We found that:

- **Jurisdictions offering e-government represent most of the population in the state.**

Small cities were most likely to report that they had no plans for e-government.

Figure 3.2: Jurisdictions' Plans to Offer Information or Services to Citizens On-Line, 2001



[a] Three school districts responded "No," but other analysis indicated they have Web sites. They are excluded from this figure.

NOTE: The question read: "Does your [jurisdiction] provide any information or services to citizens on-line?"

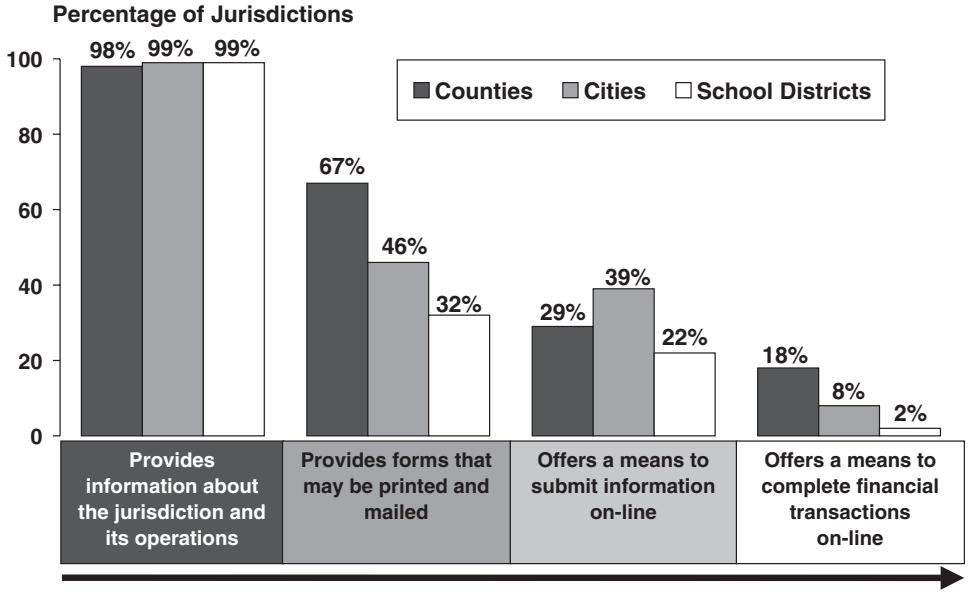
SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

For example, the 64 percent of counties offering e-government represent 91 percent of the population in the counties responding to the survey. Even though only 29 percent of the surveyed cities reported that they offer e-government, these cities account for 88 percent of population in the responding cities. Likewise, the 63 percent of school districts offering e-government represent 84 percent of student enrollment in the responding school districts.

In terms of the spectrum of Web sites described in Chapter 1, Minnesota's local governments largely follow the pattern found elsewhere in the country.[2] Virtually all of those with Web sites reported that they provide basic information about their operations, but only about 42 percent reported providing forms that could be printed and mailed, 29 percent allow certain information to be submitted on-line, and just 6 percent (mostly larger jurisdictions) have a means to complete financial transactions. Figure 3.3 details where counties, cities, and school districts fall on the spectrum of Web sites.

More than half of local Web sites provide only basic information.

Figure 3.3: Content on Local Web Sites, 2001



NOTE: The question read: "How would you describe the extent of the current content of your Web site?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Cities Without Computers

By definition, e-government requires the use of computers, but not all of Minnesota's local jurisdictions are automated. Among cities responding to our survey, 48 reported that they do not have computers; this represents 12 percent of cities. When grouped by size, all but one of these cities were among those with populations under 500. No counties or school districts reported not having computers.

2 Observers of public sector Web sites acknowledge that these sites are evolving over time but believe many are still in the formative stages. See Rowan Miranda, "The Building Blocks of a Digital Government St*rategy," Government Finance Review,* October 20, 2000, 9-13 and Darrell M. West, *Urban E-Government: An Assessment of City Government Websites*, (Providence, RI: Brown University, Taubman Center for Public Policy, September 2001), 4-5. View the latter study on-line at www.insidepolitics.org/egovt01city.html.

OBSTACLES TO LOCAL E-GOVERNMENT

While most local governments reported that they already provide e-government or would like to provide it at some point, many said some obstacles limited their ability to offer e-government. We surveyed local governments, including those with no plans to offer on-line services, about how seriously certain obstacles limited their ability to provide e-government.

Counties, cities, and school districts agreed on the obstacles they considered most serious. Among nine possible barriers,

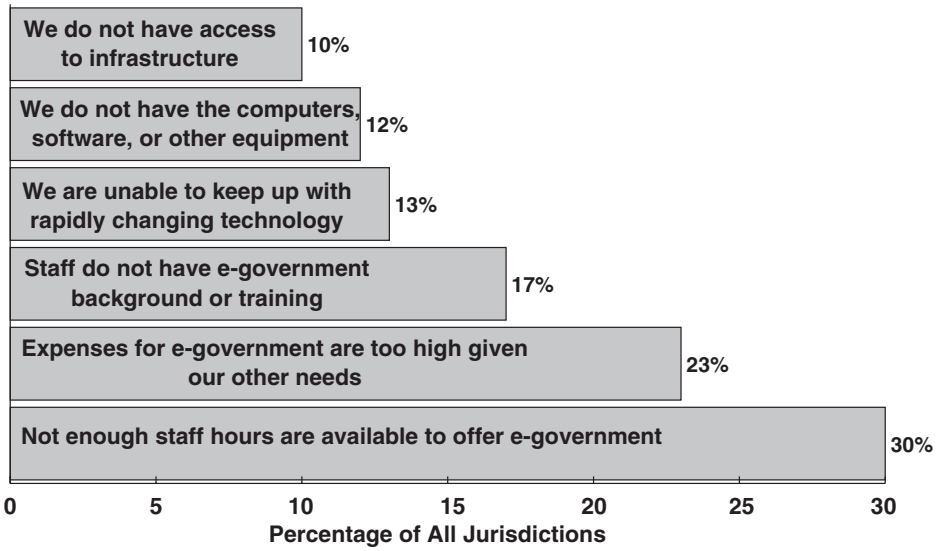
- **The one barrier most frequently cited as "very serious" by counties, cities, and school districts was that "not enough staff hours are available to offer e-government."**

The second most frequently cited barrier by all three types of local jurisdictions was that "expenses for e-government are too high given other needs." The third highest obstacle was "staff do not have e-government background or training." Figure 3.4 depicts the most common "very serious" obstacles to e-government. Counties, cities, and school districts ranked the "very serious" obstacles similarly, as shown in Table 3.1.

At the same time, nearly three-quarters of all local governments said that "citizens indicated they are not interested in e-government" was *not* an obstacle to e-government. Nor was telecommunications equipment an obstacle for many

Common obstacles were related to staffing and expenses.

Figure 3.4: "Very Serious" Obstacles, 2001



NOTES: The question read: "Whether or not you currently offer e-government to citizens, how has any of the following limited your ability to offer e-government?" The figure reflects jurisdictions responding "very serious obstacle."

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Counties, cities, and school districts ranked obstacles similarly.

Table 3.1: Ranking of "Very Serious" Obstacles to E-Government, 2001

Obstacles	Overall Rank (Percentage)	Counties Rank (Percentage)	Cities Rank (Percentage)	School Districts Rank (Percentage)
Not enough staff hours are available to offer e-government.	1 (30%)	1 (20%)	1 (31%)	1 (30%)
Expenses for e-government are too high given our other needs.	2 (23%)	2 (14%)	2 (24%)	2 (22%)
Staff do not have e-government background or training.	3 (17%)	3 (8%)	3 (21%)	3 (14%)
We are unable to keep up with rapidly changing technology.	4 (13%)	4 (5%)	5 (17%)	4 (10%)
We do not have the computers, software, or other necessary equipment.	5 (12%)	5 (4%)	4 (18%)	6 (6%)
We do not have access to high-speed telecommunications lines, cabling, or other infrastructure.	6 (10%)	(0%)[a]	6 (16%)	8 (4%)
We are not sure where to begin.	7 (8%)	(0%)[a]	7 (9%)	5 (9%)
Elected leaders do not view e-government as a high priority.	8 (6%)	6 (1%)	8 (8%)	7 (5%)
Citizens indicated they are not interested in e-government.	9 (4%)	(0%)[a]	9 (6%)	9 (3%)

[a]No counties marked these obstacles as "very serious."

NOTES: The question read: "Whether or not you currently offer e-government to citizens, how has any of the following limited your ability to offer e-government?" The ranks reflect the percentage of jurisdictions indicating the obstacle is "very serious."

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

local jurisdictions, particularly for counties and school districts. Table 3.2 lists the obstacles and their level of seriousness. More than 69 percent of all local jurisdictions reported that "access to high-speed telecommunications lines, cabling, or infrastructure" was not an obstacle to e-government. Cities with smaller populations (under 500), however, were more apt to consider lack of access to infrastructure as a very serious obstacle.

Obstacles by Size and Location of Jurisdiction

The size of cities and school districts was related to how frequently they rated obstacles as "very serious."

- **Smaller cities and school districts tended to rank obstacles to e-government as "very serious" more frequently than the more populous ones.**

Table 3.2: Seriousness of Obstacles to E-Government, 2001

Obstacles	Very Serious	Serious	Moderately Serious	Not an Obstacle
Not enough staff hours are available to offer e-government. (*N*=742)	30%	30%	26%	14%
Expenses for e-government are too high given our other needs. (*N*=734)	23	23	32	22
Staff do not have e-government background or training. (*N*=741)	17	24	41	18
We are unable to keep up with rapidly changing technology. (*N*=721)	13	23	39	24
We do not have the computers, software, or other necessary equipment. (*N*=738)	12	10	20	58
We do not have access to high-speed telecommunications lines, cabling, or other infrastructure. (*N*=727)	10	7	14	69
We are not sure where to begin. (*N*=732)	8	14	29	48
Elected leaders do not view e-government as a high priority. (*N*=728)	6	11	25	58
Citizens indicated they are not interested in e-government. (*N*=712)	4	5	17	74

NOTES: The question read: "Whether or not you currently offer e-government to citizens, how has any of the following limited your ability to offer e-government?"

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Few jurisdictions cited lack of interest as an obstacle.

For instance, among the cities that reported insufficient staff hours as an obstacle to e-government, 44 percent of small cities ranked it as "very serious," compared to 25 percent of mid-size cities and 15 percent of large cities. Similarly, for school districts that considered "staff do not have e-government training or background" as an obstacle, 24 percent of small school districts ranked it as "very serious," while only 8 percent of mid-size and 4 percent of large districts did so. The same pattern was not evident among counties of different sizes.

Similarly, the location of local governments was related to how frequently they rated barriers as "very serious."

- **Jurisdictions in outstate Minnesota were more likely than their counterparts in the seven-county metropolitan area to view barriers to e-government as "very serious."**

As an example, the obstacle "not enough staff hours are available to offer e-government" was most frequently cited overall, but 32 percent of the outstate jurisdictions rated it "very serious" compared with 16 percent of metropolitan jurisdictions. Similarly, 25 percent of outstate jurisdictions reported that "expenses for e-government are too high given our other needs" was "very serious" compared with 11 percent of metropolitan jurisdictions. This pattern was true for each obstacle rated as "very serious."

Geographic location mattered regardless of the type of jurisdiction. Broken down by type of jurisdiction, 22 percent of outstate counties ranked "not enough staff hours" as "very serious" compared with none of the metropolitan counties; 33 percent of outstate cities ranked "not enough staff hours" as "very serious" compared with 19 percent of metropolitan cities; and 33 percent of outstate school districts considered "not enough staff hours" as "very serious," compared with 12 percent of metropolitan districts. This same pattern repeated itself among all "very serious" obstacles included in the survey. For some obstacles, very few jurisdictions overall reported them as "very serious" yet among those who did, the outstate jurisdictions predominated.[3]

Obstacles for Jurisdictions Not Providing E-Government

The obstacles were the same for those with or without e-government.

About 26 percent of local governments, mostly small cities, indicated they have no plans to offer on-line information or services. Among these local governments, the most frequently reported "very serious" obstacles paralleled those reported as very serious by all local jurisdictions.

- **Nearly 50 percent of local governments with no plans to offer on-line information reported "not enough staff hours are available to offer e-government" as a very serious barrier.**

About 47 percent said "expenses for e-government are too high given other needs" was a very serious obstacle. Table 3.3 shows the obstacles reported by jurisdictions with no plans to offer e-government. Those local governments indicating they did not offer e-government but hoped to "someday in the future" most frequently listed these same obstacles as "very serious."

Other Obstacles

In response to an open-ended question on obstacles to e-government, a few jurisdictions wrote in additional obstacles. Many of these were cities noting that their small size was an obstacle. A small number of cities and school districts noted particular staffing problems as obstacles, such as staff turnover and very limited or volunteer-only staff. Five counties wrote in obstacles ranging from high costs to threats from hackers to questions about spending county dollars merely to save citizens time in writing checks or making phone calls.

PAYING FOR LOCAL E-GOVERNMENT

Counties and cities have used similar revenue sources to pay for setting up and running their Web sites. While they tended to use dollars exclusively from general funds, school districts used multiple revenue sources.

3 One exception was among school districts regarding the obstacle on access to high-speed telecommunication lines, cabling, or other infrastructure; the difference between metropolitan and outstate school districts was negligible.

Table 3.3: Obstacles Faced by Jurisdictions With No E-Government Plans, 2001

Obstacles	Very Serious	Serious	Moderately Serious	Not an Obstacle
Not enough staff hours are available to offer e-government. (*N*=176)	49%	24%	9%	18%
Expenses for e-government are too high given our other needs. (*N*=171)	47	21	12	20
Staff do not have e-government background or training. (*N*=176)	42	16	22	19
We do not have the computers, software, or other necessary equipment. (*N*=177)	40	12	13	35
We are unable to keep up with rapidly changing technology. (*N*=162)	33	23	18	26
We are not sure where to begin. (*N*=170)	25	18	24	34
We do not have access to high-speed telecommunications lines, cabling, or other infrastructure. (*N*=165)	25	13	12	50
Elected leaders do not view e-government as a high priority. (*N*=169)	20	18	19	43
Citizens indicated they are not interested in e-government. (*N*=159)	15	12	10	63

NOTES: The question read: "Whether or not you currently offer e-government to citizens, how has any of the following limited your ability to offer e-government?" The table reflects only jurisdictions indicating that they have no plans to provide information or services to citizens on-line.

SOURCE: Office of the Legislative Auditor, Survey of Counties, Cities, and School Districts, October 2001.

Primary Revenue Sources

Most counties and cities in Minnesota pay for e-government services with their general fund revenues.[4] According to our survey,

- **Fifty-three percent of counties and 58 percent of cities exclusively use general fund and other local tax dollars to pay for setting up and running their Web sites.**

Most of the remaining counties and cities combined general fund revenues with capital improvement dollars to pay for their sites. Only a few have also relied on user fees and partnerships with other entities to help pay for Web sites, as described more below.

- **Unlike counties and cities, most school districts reported paying for e-government with a mix of sources, most often from a combination of general funds, capital-improvement program dollars, and state and federal grants.**

4 Data were not collected on jurisdictions that paid for Web sites using enterprise funds, that is, funds for activities expected to generate revenues sufficient to cover expenditures.

Two factors likely make school districts unique relative to counties and cities: (1) Minnesota's school financing system and (2) two sources of federal and state grants for technology in schools. In Minnesota, one of the components of schools' general education revenue is "operating capital revenue," a reserved account within schools' general funds.[5] By statute, school districts may use operating capital revenue only for specific purposes, ranging from constructing school buildings to acquiring technology. Among the specific eligible uses are (a) the purchase or lease of computers and related materials and (b) personnel costs for acquiring and maintaining computers and telecommunications systems.[6]

Further, federal and state grants are available for specific school technology expenses. School districts that meet certain planning requirements are eligible for discounts of 20 to 90 percent on their telecommunications services, including Internet access, through the federal Universal Service Fund "E-rate" grant program. If eligible for the federal program, school districts may also apply for state grants to pay the costs of recurring telecommunications access charges (excluding hardware and equipment expenses).[7]

Revenues From Partnerships, Advertising, and User Fees

As described in Chapter 2, between a third and 49 percent of local governments reported undertaking e-government in partnership with another public or private entity during some phase of planning, implementing, or maintaining on-line services. We also learned that:

- **About 21 percent of local governments reported that they had used partnerships with other entities to help pay for their Web sites.**

Some local governments used Web servers owned by others.

Slightly more than one in five school districts and cities, and 15 percent of counties, reported using partnerships to pay part of the costs of setting up and running Web sites. For example, we learned about certain cities that jointly used Web servers owned by nearby school districts or counties. Working in partnerships, they were able to maintain Web sites at costs lower than they would have paid on their own.

- **Few local governments reported relying on either advertising revenues or user fees to help pay for their Web sites.**

Only 3 percent of all jurisdictions indicated that they used advertising revenues to partially pay for their Web sites. No counties, 5 percent of cities, and 2 percent of school districts reported using advertising revenue to pay for part of their Web

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5 For fiscal year 2002, General Education Revenue has ten other components: basic formula allowance, basic skills, secondary sparsity revenue, elementary sparsity revenue, transportation sparsity revenue, equity revenue, training and experience revenue, referendum offset adjustment, supplemental revenue, and transition revenue. *Minn. Stat.* (2001 Supplement) §126C.10, subd. 1.

6 *Minn. Stat.* (2000) §126C.10, subd. 14 (18), (24).

7 *Minn. Stat.* (2000) §125B.25, subd. 1-3. The state distributes these grants by a formula that accounts for telecommunications access costs, an adjusted count of students, and the amount of federal e-rate dollars received.

sites. The League of Minnesota Cities has advised its members to be careful about using advertising revenue. Because of the potential for conflicts of interest and for lawsuits brought by parties charging cities of being arbitrary in their selection of advertisers, the League suggests that the best policy is to disallow advertising. For cities that accept advertising, the League suggests allowing only a limited number of advertisers. It cautions cities that they cannot select just those advertisers they feel are acceptable without running the risk of legal action.

About 8 percent of local governments reported that they relied on user fees to pay for at least part of their Web sites. Eleven percent of counties and cities, and just 4 percent of school districts, said they paid for their Web sites in part with user fees. Outside of Minnesota, some governments that charged user fees found that fees discouraged citizens from doing business on-line.[8] Local governments equipped to conduct digital financial transactions and charge on-line fees for the service (or charge on a subscription basis) have to decide what on-line payment methods they will make available. The basic methods and considerations for using them are described below.

Considerations for Charging On-Line User Fees

Several methods exist for on-line payments and user charges, including credit cards, electronic checks, automated clearinghouse (ACH) payments, and digital cash. Table 3.4 briefly describes these methods. Regardless of the payment method, governments that establish electronic payments have to deal with significant security and privacy issues, either on their own or with the assistance of third parties that have special expertise in electronic financial payments.[9] In each case, the identity of the user has to be authenticated, such as with passwords and personal identification numbers. Data transmitted by the user have to be secure from unauthorized users by using methods such as encryption or "secure socket layer" technology (a security protocol for sending encrypted information that prevents tampering with the information).

On-line payments require additional measures.

Data stored by the government also have to be secure, implying the use of firewalls and other security measures. When they collect private information, such as credit card numbers, governments have to protect the users' right to privacy. Using electronic payments also means that governments have to incorporate payment software in their Web servers and make arrangements with companies to process the payments and banks to accept the on-line payments.

County Use of On-Line Payments

In 2001, the Minnesota Association of County Officers (MACO) formed an "e-payment" committee in response to legislation passed that year authorizing

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8 Ellen Perlman, "No Free Lunch Online," *Governing,* August 2000, 28-32.

9 National Electronic Commerce Coordinating Council, *Electronic Payments Primer* (Washington D.C.: NECCC, 1999), 13. Many on-line transactions require digital signatures, which are analogous to handwritten signatures on paper. Digital signatures represent methods of "signing" electronic documents with 0's and 1's in ways that authenticate the sender of the document and reveal any tampering of it. They rely on encrypting data that can only be decoded by the intended recipient.

Table 3.4: Methods of Paying On-Line Fees

Credit cards[a]	Credit cards are commonly used on commercial Web sites, but their use on local governments' sites is complicated by uncertainty about paying for processing fees tied to credit cards, particularly for large payments such as 2 percent of a $1,000 property tax bill.
Electronic checks	Electronic checks are digital versions of paper checks, but they avoid the handling and storage costs associated with their paper counterparts. A government subscribes to a service allowing the electronic transfer of data from a user's check, which authorizes the user's checking account to be electronically debited. Users typically pay a nominal fee per check.
Automated clearinghouse (ACH) payments	ACH payments electronically transfer funds from a user's financial account to a local government's account. A user digitally signs an invoice issued by the government and the invoice goes to the user's bank for processing. After verifications, the bank debits the user's account and credits the local government's.
Digital cash	With digital cash, an individual transfers a limited amount of money to an "electronic wallet" mechanism. As the individual makes on-line purchases, the wallet is debited to pay for them.

[a]According to *Minn. Stat.* (2000) §276.02, county boards may accept credit card payments of property taxes if the county charges a fee commensurate with the costs assessed by the company issuing the credit card.

SOURCE: National Electronic Commerce Coordinating Council, *Electronic Payments Primer* (Washington D.C.: NECCC, 1999).

local governments to accept payments by credit card, debit card, or any form of electronic or wire transfers of funds.[10] A survey conducted as part of the committee's work revealed that only seven counties accepted credit card payments and just two accepted electronic checks.

The MACO committee recommended the following.[11] (1) Counties should first ask themselves for what services they want to enable electronic payments and what fees to charge. (2) Counties need to consider the security of the transactions, necessary staff training, and data processing expertise of staff, among other concerns. (3) Counties should recognize the need to develop policies covering legal authority, privacy and security issues; establish a county office to oversee the program; and create procedures for responding should the system fail at critical times (e.g., the day that tax payments are due). (4) Counties need to thoroughly investigate vendors, including their company history, financial status, bonding availability, their methods of reporting electronic transactions to the county, their technical support to the county, and their pricing to both the county and the users.

10 Laws of Minnesota (2001), ch. 13, sec. 2, subd. 2. The law also authorizes cities and counties to add a service charge for accepting these types of payments.

11 Minnesota Association of County Officers, *Guidelines for Implementation of E-Pay Services* (St. Paul: MACO, 2001); www.mncounties.org/maco/Epay%20Report.pdf; accessed December 2001.

CITIZEN ACCESS TO E-GOVERNMENT

The use of computers and the Internet continues to grow and, as it does, citizens' demand for e-government may increase. As more people use commercial Web sites to purchase books, clothing, and automobiles, their expectations may drive demand for increased transactions on public-sector Web sites. Increased use of technology in schools has contributed to making children and young adults fluent and comfortable with computers as part of their daily activities.

Americans' use of computers and the Internet continues to grow.

Across the country, Americans have rapidly increased their use of computers and the Internet. As of September 2001, 56 percent of U.S. households had computers, up from 51 percent in August 2000, and up from 42 percent in December 1998.[12] Almost 51 percent of U.S. households had Internet access in 2001 compared to 42 percent a year earlier. In households with computers, seven of eight subscribed to the Internet. Another national survey indicated that the number of American adults visiting government agency Web sites increased 70 percent between March 2000 and January 2002, although more people tended to use federal and state Web sites than county or municipal sites.[13]

Looking at individuals' (as opposed to households') use of the Internet, Minnesota ranked high. According to the U.S. Department of Commerce, between 61 and 66 percent of Minnesotans were Internet users in 2001, a rate exceeded only by the state of Alaska (between 66 and 72 percent) and tied by New Hampshire.[14]

Some Minnesota local governments have surveyed their populations regarding the extent of Internet access. For example, a telephone survey conducted on behalf of Dakota County in 2001 indicated that 76 percent of the county's residents had access to the Internet at home or work. A similar survey of adult residents in Lakeville indicated that 84 percent of that city's citizens had Internet access through a home or office computer.

Minnesotans Access to E-Government

Minnesotans are relatively heavy users of the Internet.

For more in-depth information on Minnesota's use of the Internet, we collected information during a statewide telephone survey of Minnesotans aged 18 years of

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12 National Telecommunications and Information Administration, *A Nation OnLine: How Americans are Expanding Their Use of the Internet* (Washington, D.C.: U.S. Department of Commerce, 2002), 5; http://www.esa.doc.gov/508/esa/nationonline.htm; accessed February 2002; Eric C. Newburger, *Current Population Reports* "Home Computers and Internet Use in the United States: August 2000" (Washington, D.C.: U.S. Census Bureau, U.S Department of Commerce, September 2001), 1.

13 Elena Larsen and Lee Rainie, *The Rise of the E-Citizen: How People Use Government Agencies' Web Sites* (Washington, D.C.: Pew Internet & American Life Project, April 2002), 5-6. View on-line at www.pewinternet.org/reports/toc.asp?Report=57.

14 National Telecommunications and Information Administration, *A Nation OnLine,* 10-11.

age and older.[15] Most Minnesotans reported having access to the Internet, and this percentage has grown in the last three years. According to the Center for Survey Research survey results,

- **The proportion of Minnesotans with Internet access in 2001 grew 10 percent since 1999, with 84 percent of adults most recently reporting they had access.**

It is important to understand that having "access" to the Internet is not the same as using it. Theoretically, nearly everyone in the state is in an area with possible access to the Internet (by virtue of using a public library's computer if not one's own). Further, there is a difference between someone who has Internet access and connects to the Internet perhaps a few times a month and someone else who uses the Internet on a daily basis. However, this survey did not distinguish among those with theoretical access to the Internet, those who seldom used the Internet, and those who used it frequently. Residents reporting Internet access should be understood as a broad category, within which are smaller subgroups of actual users.

Slightly more residents in the seven-county metropolitan area than in outstate Minnesota said they had access to the Internet. About 87 percent of Twin Cities area residents reported that they had Internet access, compared with 81 percent outstate. Statewide, 77 percent of people with Internet access reported having access from their homes.

More and more Minnesotans use the Internet to make purchases. About 55 percent of those with access to the Internet in 2001 have purchased products or services on-line using the World Wide Web. This represents a 53 percent increase over those making such purchases in 1999, as shown in Figure 3.5. About 60 percent of Twin Cities area residents with Internet access said in 2001 that they had made on-line purchases compared with 49 percent of rural residents with Internet access.

A slight majority of Minnesotans with Internet access said they were at least somewhat likely to use on-line local services if available.

When asked specifically about their likely use of on-line local government services, 51 percent of Minnesotans with Internet access said they would be "somewhat likely" or "very likely" to use such services if they were available. About 49 percent said they were "not very likely" or "not at all likely" to use local government services on-line. Twin Cities area residents were somewhat more likely than outstate residents to indicate they would use local government services on-line, with 58 percent of metropolitan residents saying they would compared with 42 percent of rural residents.

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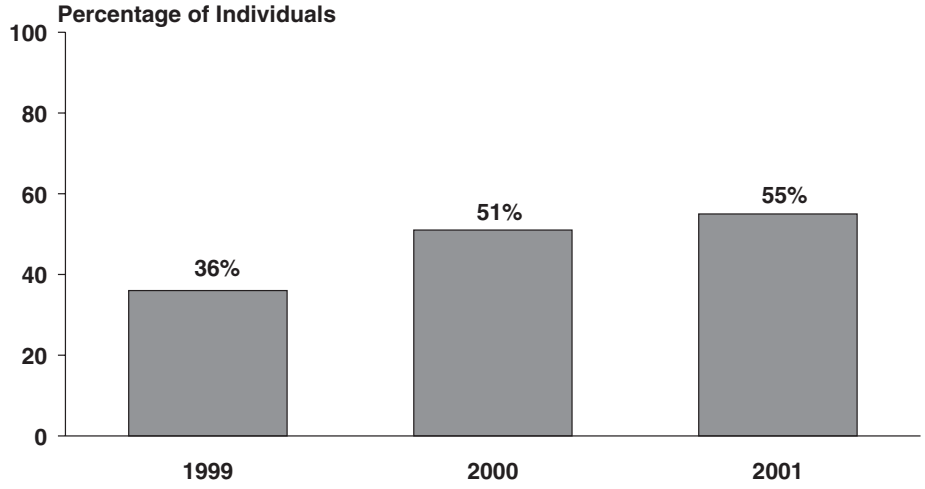
15 The Center for Survey Research at the University of Minnesota conducted this telephone survey in the fall of 2001. See: Minnesota Center for Survey Research, *2001 Minnesota State Survey - Part II: Results and Technical Report* (Minneapolis: University of Minnesota, 2002). A separate survey conducted on behalf of the Department of Administration's Office of Technology in November 2001 reported that 55 percent of households around the state have access to the Internet. See: Minnesota Office of Technology, *Citizen Input on Electronic Government Services* (St. Paul, January 2002), 5. Differences in results are partly due to the wording of questions and generalizing data to households versus individuals.

Figure 3.5: Minnesotans With Internet Access Purchasing Products or Services On-Line, 1999-2001



NOTE: Telephone respondents were asked: "Have you ever purchased any products or services from any organization online through the World Wide Web?"

SOURCE: Minnesota Center for Survey Research, University of Minnesota, *2001 Minnesota State Survey*, Fall 2001, and prior volumes.

Far more Minnesotans with Internet access made on-line purchases in 2001 than 1999.

Although most Minnesotans reported that they have Internet access, they have concerns about using on-line services. According to this survey:

- **Minnesotans' biggest concern about using on-line local government services was how secure the information is that they provide via the Internet.**

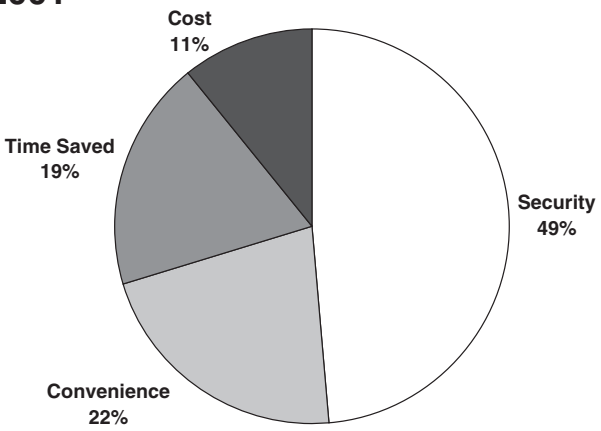
When asked about their most important consideration in deciding whether to use local government services on-line, 49 percent of those with Internet access ranked security as their top choice. About 22 percent ranked "the convenience of using a Web site" as their chief consideration. Figure 3.6 shows how Minnesotans with Internet access ranked their most important considerations in deciding whether to use on-line local government services. There were no significant differences between concerns of Twin Cities area residents and those of outstate residents.

ACCESS TO INFRASTRUCTURE

As discussed in Chapter 1, the Internet is a worldwide collection of interconnected computer networks. The physical infrastructure that connects these computer networks is vast and varied.

Telecommunications systems are the hardware and software configured to communicate text, voice, or video from one location to another. Within these systems, communication channels, provided via wire, cable, fiber optics, and satellite, provide the means to transmit data from one device in a network to

Figure 3.6: Considerations of Minnesotans With Internet Access in Using On-Line Local Government Services, 2001



NOTE: Telephone respondents were asked: "In deciding whether to use local government services online, there are several issues that Internet users may consider, such as the convenience of using a Website, whether the online service has a cost, how secure the information is that they provide online, and the time they might save. What would be most important to you ... convenience, cost, security, or time saved?"

SOURCE: Minnesota Center for Survey Research, University of Minnesota, *2001 Minnesota State Survey*, Fall 2001.

another. Transmission speed through any of these channels is measured in bits per second. Most Internet users use modems connected to their copper telephone wires to dial in and connect at a speed of up to 56 kilobits per second (kbps). "High-speed" access, such as through cable lines or wireless transmissions, allows quicker connections to the Internet at speeds from 256 kbps to 200 *mega*bits per second and even higher. High-speed access is also known as broadband service.

High-speed Internet access features fast connections and high bandwidth, but it costs more than traditional dial-up service.

High-speed access offers advantages over dial-up service. Its faster connections and increased bandwidth allow for sharing of large databases, streaming video of live events, superior uploading and downloading speeds, viewing movies and other video, displaying numerous and intricate graphics, and telecommuting opportunities, among other uses.

At the same time, the cost of high-speed access is greater than dial-up service. Homeowners may pay $40 to $50 per month or more for broadband services. The business failures of some prominent broadband service providers have also raised questions about service stability.

The infrastructure for high-speed access is not available everywhere, nor is the demand universal. According to the U. S. Department of Commerce, 80 percent of individuals using the Internet at home use the slower dial-up telephone access and 20 percent pay for broadband, although the use of broadband in the home is increasing.[16] Not all areas of the country have access to broadband service, but even where it is available, the demand has been relatively low. The Federal Communications Commission estimated that at least 70 percent of U.S.

16 National Telecommunications and Information Administration, *A Nation OnLine*, 39.

households had access in 2001 to high-speed cable modems but only about 10 percent of them subscribed.[17]

Broadband Services in Minnesota

In Minnesota, the availability of broadband service presents a mixed picture. We found that:

- **The different technologies that provide high-speed access to the Internet are not available uniformly around the state. Moreover, even in areas where such services exist, we found little evidence that large shares of households and businesses have subscribed to the services.**

In this section, we mention three types of broadband services: fiber optics, digital subscriber lines, and cable modems. Wireless technologies also provide broadband services, but we do not have data on how widespread they are in Minnesota.

Minnesota's Department of Administration estimates that about 95 percent of the telephone exchanges in the state are connected to the world by fiber. This seemingly high percentage is misleading, however, because it does not account for the availability of fiber optic connections from a telephone company's central office to individual homes and businesses (sometimes referred to as the "last mile" issue). Nor does the department have data on how many customers purchase high-speed access through fiber optic connections in areas where the connections exist.

Access to high-speed Internet service varies around the state.

Another high-speed communication channel is digital subscriber lines, known as DSL, which operate over existing copper telephone wires but offer high transmission capabilities. According to the Minnesota Department of Commerce, about 31 percent of the telephone exchanges around the state offered DSL in 2001. The map in Figure 3.7 represents the location of these exchanges. As with fiber optics, the availability of DSL service in an area does not represent how frequently households and businesses purchase it. The Commerce Department does not collect data to estimate the number of DSL subscribers.

Cable modems represent a third method for high-speed access to the Internet. According to data from the Department of Administration, 18 percent of Minnesota cities in 2001 had cable modems available. (However, the data were incomplete. No data were available for 32 cities, and data on cable modem availability was unknown for 208 cities with cable service. In addition, 141 cities did not have a cable company or the company was unknown.) The cities known to have cable modems available were typically larger cities, representing 70 percent of the population residing in cities. As a percentage of cable companies, 22 percent of the 87 known cable companies around the state reported that they made broadband modems available. Similar to the other modes of high-speed access, the state does not collect data on the number of cable subscribers with a broadband cable modem.

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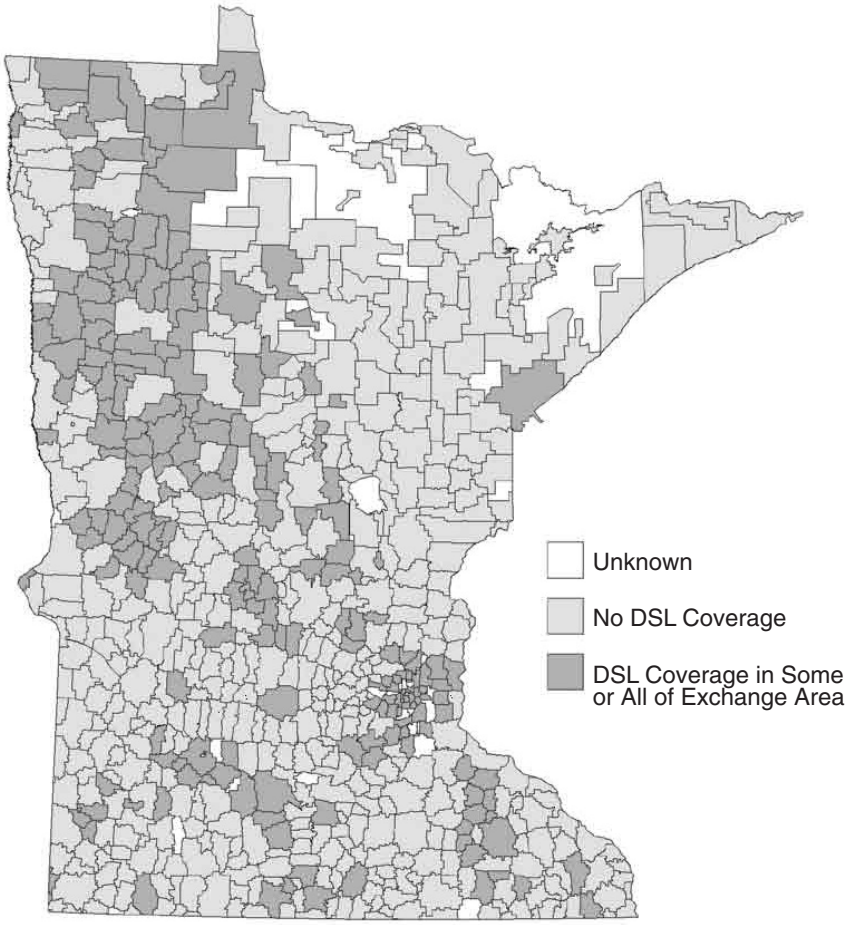
17 Thomas E. Weber, "Broadband Advocates Should Fight to Increase Demand, Not Supply," *Wall Street Journal*, January 28, 2002, B3.

Figure 3.7: Availability of Digital Subscriber Line Service by Telephone Exchange Areas, 2001



NOTES: A telephone exchange with DSL may not have the service available to all customers in that area. In Duluth, only one of eight telephone exchange sub areas has DSL available.

SOURCE: Office of the Legislative Auditor analysis of data from the Department of Commerce, Telecommunications Division.

Most Minnesotans using the Internet at home do not have high-speed access.

Among the questions asked of Minnesotans by the Center for Survey Research, we asked about high-speed access to the Internet. Most residents using the Internet at home do not have high-speed access. Of those Minnesotans with Internet access at home, 16 percent said they have access from their home to DSL service and 12 percent said they have access to some other (unspecified) high-speed service. The survey did not distinguish between people in areas of the state lacking access to high-speed Internet service and those who have access but have opted against purchasing it.

Most Minnesota counties, cities, and school districts do not consider lack of access to high-speed infrastructure as an obstacle to offering e-government, as mentioned earlier in this chapter. Still, particularly for cities, lack of

infrastructure can be a problem. According to our survey, nearly 16 percent of cities reported that lack of access to high-speed infrastructure was a "very serious" obstacle, and most of these were small cities located outside of the seven-county metropolitan area. Just 4 percent of school districts, mostly located in outstate Minnesota, reported lack of infrastructure as a "very serious" obstacle; no counties reported lack of infrastructure as either a "serious" or "very serious" obstacle.

More Minnesotans in the metropolitan area than elsewhere have high-speed Internet access.

Some studies indicate that rural Minnesotans are going on-line at nearly the same rates as urban residents. Yet access to broadband services is more limited in rural Minnesota than in the metropolitan area. Results from the Center for Survey Research's survey showed a somewhat higher use of DSL in the metropolitan area than in outstate Minnesota. Of Minnesotans with access to the Internet at home, 21 percent in the metropolitan area reported having access to DSL compared with 8 percent in outstate Minnesota. One analysis speculates that the need for broadband in outstate Minnesota is not yet compelling because few counties or cities offer on-line services that could benefit residents.[18]

Programs to Increase Availability of Broadband Service

The public sector has developed programs to increase affordable high-speed Internet access in outstate Minnesota. Some of these are local initiatives in areas of the state where the private telephone and telecommunications companies have not provided broadband service. State government has also been interested in broadening telecommunications infrastructure to permit high-speed Internet access around the state.

The city of Buffalo in Wright County, and the Red Rock Central School District in Redwood County, are examples of local governments that recently created their own wireless services because no other broadband service was available. In southwestern Minnesota, the communities of Heron Lake, Lakefield, Okabena, Brewster, and Round Lake have created "5Comm," a community collaboration working to bring affordable, wireless high-speed Internet access to citizens in their area. The Iron Range Resources and Rehabilitation Board's "Do I.T." program is a public/private partnership created in 1998 with a goal of increased access to high-speed voice, video, and data connectivity in northern Minnesota's taconite tax relief area. Its intent is to (1) attract and retain technology business by providing the necessary infrastructure and a highly trained workforce and (2) increase community awareness of the benefits that information technology can provide.

The Minnesota Department of Administration plans to expand high-speed access through what it calls a "Broadband Internet Initiative." The initiative consists of four strategies, most of which are in early, conceptual stages of development. One is the "high-speed internet connectivity agreement," which would have telecommunications companies join the state in an agreement to provide Internet access in rural areas at a cost and speed available in urban areas. The written agreement did not yet exist as of early 2002.

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18 Jack M. Geller, *On Access to Broadband* (Mankato, MN: Center for Rural Policy and Development, Minnesota State University-Mankato, 2001), 1.

The second strategy is the "broadband Internet development fund." Although this fund does not yet exist, its intent is to market the advantages of broadband service to citizens and stimulate demand for it. Private telecommunications companies would finance this fund, but many have balked at providing money for an effort that may benefit their competitors.

Third, the department wants to leverage state agencies' technology purchases in a way that encourages private companies to provide high-speed access infrastructure. In exchange for a state contract, a company would agree to certain actions that would expand the availability of high-speed access. This third strategy is still largely conceptual.

The final strategy consists of a technology enterprise fund and board, which the 2001 Legislature created. The fund is to provide grants to government agencies for technology investments. Its board will primarily determine how best to distribute grants from the fund.

In addition to broadband service, the state's Office of Technology is developing a Minnesota portal Web site, which would be the official access point to electronic government information and services. Although the design now underway focuses on state agencies and programs, a long-range vision for the portal includes electronic services at the local level as well.

Study Methodology

APPENDIX A

This appendix explains the process we followed to conduct the best practices review of e-government services. It describes the steps we took, the timeline we followed, and the involvement of local government representatives.

BACKGROUND RESEARCH

To explore issues relevant to e-government services, we gathered information from a variety of sources. We began with an extensive review of literature and Web sites, reviewing materials from professional associations, academic and private research centers, and other groups with expertise in e-government, such as the Center for Technology in Government and the National Electronic Commerce Coordinating Council. We also researched state and federal laws about legal requirements, including those for data privacy and security.

At the beginning of the study in June 2001, we held a roundtable discussion to help define the scope of the review. We invited individuals representing a variety of viewpoints, including administrators and information technology managers from school districts, cities, and counties; state officials, including the Office of Technology; legislators and legislative staff; and others interested in e-government. At this meeting, 26 participants offered ideas.

We supplemented our background research with personal interviews and e-government seminars. This included interviewing state officials about the state's role in setting electronic government standards and providing a telecommunications infrastructure backbone. To understand what was already known about local e-government, we spoke with representatives of local government associations and intergovernmental computer collaborations. We also participated in seminars and on-line training, with a particular focus on digital security and Web site design. Seminars included a League of Minnesota Cities' conference, a National State Auditor Association conference on information technology, and the Minnesota Government Information Technology Symposium. Web-based events included sessions on e-government strategies and security.

The Minnesota departments of Commerce and Administration supplied data on the availability of cable, DSL, and other telecommunications infrastructure in the state. Although some of the data were not up-to-date, they gave us a better picture of what regions had infrastructure enabling computer users to gain high-speed access to the Internet.

For information on the extent of citizen access to the Internet, we analyzed data from the U.S. Department of Commerce and from the Minnesota Office of Strategic and Long Range Planning. To supplement that information, we

sponsored six questions on the 2001 Minnesota State Survey, an annual survey conducted by the Minnesota Center for Survey Research at the University of Minnesota. This was a telephone survey conducted in November 2001 of approximately 800 randomly selected individuals from randomly selected households around the state. The questions sponsored by our office asked about access to the Internet; high speed Internet access; whether respondents would use local government services on-line; the most important factors influencing use of local government services on-line; and whether respondents had ever made on-line purchases. Because those who participated in the survey were randomly selected from Minnesota's population, the results can be generalized to individuals in the entire state. No more than 1 time in 20 should the results vary by more than 3.5 percentage points from answers that would be obtained if all Minnesota residents were interviewed.

TECHNICAL ADVISORY PANEL

Early in the project we formed a technical advisory panel to provide expertise and comment on draft materials throughout the review. As shown in Table A.1, the 16-member panel consisted mainly of county, city, and school district staff who were either information technology professionals or otherwise involved in technology issues. They came from jurisdictions representing a mix of sizes and

Table A.1: Technical Advisory Panel Members, 2001-2002

Merton Auger, City Administrator, City of Buffalo

Jim Campbell, Information Technology Director, Dakota County

Barbara Gallo, Technology Services Director, League of Minnesota Cities

Mike Garris, Director, Local Government Information Systems (LOGIS)

Tom Hannon, Information Technology Director, City of St. Cloud

Bob Hanson, Information Technology Director, Hennepin County

Doug Johnson, Technology Administrator, Mankato Area Schools

Bob Knafla, Information Systems Director, Sherburne County

Fred Logman, Chief Information Director, Department of Information Services, Ramsey County

Marcia Love, Superintendent, Plainview Public Schools

Rhonda Lynch, Information Services Director, Carver County

Gail Miller, County Recorder, Renville County

Rae Montgomery, Extension Educator, University of Minnesota Extension Service

Patrick Plant, Director of Technology, Anoka-Hennepin Independent School District #11

Mike Ryan, System Architect, Office of Technology, Minnesota State Department of Administration

Lee Whitcraft, Co-Executive Director, Technology and Information in Education Services (TIES)

geographic regions. Other members represented the state's Office of Technology, the University of Minnesota Extension Services, intergovernmental computer collaboratives, and the League of Minnesota Cities.

Panelists volunteered their time for five meetings to offer their feedback as the study progressed. They reviewed and commented on the draft report. We are grateful to panel members for their advice and help. Panel members may or may not agree with the recommendations of our study, and the Legislative Auditor's Office remains responsible for the report's contents.

E-GOVERNMENT INDICATORS OF PERFORMANCE

To help identify effective e-government practices, we researched guidelines and standards recommended by organizations involved in e-government, Web site development, and Internet security. From this research, we compiled indicators of performance related to effectively planning, developing, and maintaining e-government services. In September 2001, our technical advisory panel reviewed the indicators, and we later modified some based on its feedback.

The performance indicators formed the basis of questions that we developed to survey local governments on their e-government practices (the surveys are discussed below). We used the indicators to compare local jurisdictions' involvement with e-government and to identify those reporting effective practices. The best practices for successful e-government services discussed in Chapter 2 evolved from the performance indicators. In November 2001 our technical advisory panel reviewed and commented on the best practices, and we modified them accordingly.

SURVEY METHODOLOGY

We surveyed counties, cities, and school districts to understand the degree to which they offer e-government, identify jurisdictions using e-government best practices, and gather information on obstacles to local e-government. Our surveys asked local jurisdictions about steps they have taken in planning, developing, and maintaining their Web sites, including security measures. Copies of the survey instruments and their aggregate results are available on our Web site at http://www.auditor.leg.state.mn.us/ped/2002/pe0208.htm.

We developed two formats for the survey and gave respondents the choice of either completing it on-line using the Internet or filling out a paper version and returning it by mail. The survey questions were identical in both formats. Before mailing the surveys, we pretested survey questions as well as the use of the on-line survey with members from our technical advisory panel and with other staff in our office.

In early October 2001, we mailed the questionnaires along with a cover letter explaining the study and requesting recipients' help. The surveys went to either information technology directors or county administrators (or their equivalent) in each of the 87 counties.

To survey cities and school districts, we selected random samples based on size and geographic region. First for cities and then school districts, we grouped the jurisdictions into six geographic regions. Within each region, we further grouped first cities and then school districts by size to achieve a balance of smaller, mid-sized, and larger jurisdictions. From within these groups divided by region and then by size, we randomly selected 521 of Minnesota's 854 cities and 310 of 345 school districts. We sent the city surveys to an information technology manager or other technology contact; where we did not have names for those individuals we mailed the survey to city managers, administrators, or clerk-treasurers and asked them to forward the survey to the appropriate persons. The school district surveys went to technology coordinators in districts where we had those coordinators' names; otherwise, the surveys went to the district superintendents with a request to forward the survey to the appropriate individuals.

The deadline for completing surveys was October 23, 2001. We mailed follow-up letters and surveys to counties, cities, and school districts that had not responded by the first due date and extended the deadline to November 6, 2001.

Seventy-eight of the 87 counties responded to the survey (with 44 of them responding on-line), for a response rate from counties of 89.7 percent. Table A.2 lists the counties that responded to the survey. We received responses from 429 of the 521 cities surveyed (with 117 responding on-line), for a city response rate of 82.3 percent. Table A.3 lists the cities receiving the survey and denotes those that

Table A.2: Counties Receiving Survey

*Aitkin County	*Freeborn County	*Meeker County	*Scott County
*Anoka County	*Goodhue County	*Mille Lacs County	*Sherburne County
Becker County	*Grant County	Morrison County	*Sibley County
*Beltrami County	*Hennepin County	Mower County	*Stearns County
*Benton County	Houston County	*Murray County	*Steele County
*Big Stone County	*Hubbard County	*Nicollet County	*Stevens County
*Blue Earth County	Isanti County	*Nobles County	*Swift County
*Brown County	*Itasca County	*Norman County	*Todd County
*Carlton County	*Jackson County	*Olmsted County	*Traverse County
*Carver County	*Kanabec County	Otter Tail County	*Wabasha County
*Cass County	*Kandiyohi County	Pennington County	*Wadena County
*Chippewa County	*Kittson County	*Pine County	*Waseca County
*Chisago County	*Koochiching County	*Pipestone County	*Washington County
Clay County	*Lac Qui Parle County	*Polk County	*Watonwan County
*Clearwater County	*Lake County	*Pope County	*Wilkin County
*Cook County	*Lake of the Woods County	*Ramsey County	*Winona County
*Cottonwood County	Le Sueur County	*Red Lake County	*Wright County
*Crow Wing County	*Lincoln County	*Redwood County	*Yellow Medicine County
*Dakota County	*Lyon County	*Renville County	
*Dodge County	*Mahnomen County	*Rice County	
*Douglas County	*Marshall County	*Rock County	NOTE: Asterisks (*) depict counties from which we received completed surveys in time for analysis.
*Faribault County	*Martin County	*Roseau County	
*Fillmore County	*McLeod County	*St. Louis County	

Table A.3: Cities Receiving Survey

*Ada
*Adams
*Afton
*Akeley
*Albert Lea
*Alden
*Alexandria
*Alpha
*Alvarado
*Amboy
*Andover
*Anoka
*Arco
*Arden Hills
Arlington
*Ashby
*Atwater
*Audubon
*Aurora
*Austin
[1]Avoca
*Avon
*Backus
[1]Barnesville
*Barnum
*Barry
*Baxter
*Bayport
*Beardsley
*Beaver Bay
*Beaver Creek
*Becker
*Bejou
*Belgrade
*Belle Plaine
Bellingham
*Beltrami
*Belview
*Bemidji
*Benson
Bertha
Big Lake
*Bigelow
*Bingham Lake
*Birchwood
*Bird Island
*Biscay
*Blackduck
*Blaine
Blomkest
*Bloomington
*Blue Earth
Bluffton
*Bock
Borup
*Bovey
*Boyd
*Breckenridge
*Bricelyn
*Brooklyn Center
*Brookston
*Brooten
*Browerville
Browns Valley
*Brownsdale
*Bruno
*Buckman
*Buffalo
*Buffalo Lake
*Burnsville
*Burtrum
Butterfield
*Byron
*Callaway
*Calumet
Canby
*Carlos
*Carlton
*Cass Lake
*Cedar Mills
*Center City
*Centerville
*Champlin
*Chandler
*Chatfield
*Chisholm
Circle Pines
*Claremont
*Clarissa
*Clarkfield
*Cleveland
*Climax
Clinton
Clontarf
*Cloquet
*Coates
*Cobden
*Cohasset
*Cokato
Coleraine
*Columbia Heights
*Comfrey
[1]Comstock
*Corcoran
*Correll
Cottage Grove
Cottonwood
Crookston
*Crosslake
*Crystal
*Currie
*Cyrus
*Dakota
[1]Dalton
*Danube
*Darfur
*Darwin
*Dawson
*Dayton
*De Graff
*Deephaven
Deer River
Delhi
*Dellwood
*Denham
*Dennison
*Dent
*Dodge Center
*Doran
Dover
*Duluth
*Dumont
Dundee
*Dunnell
Eagan
*Eagle Bend
East Grand Forks
[1]Easton
*Echo
*Edgerton
*Eitzen
*Elgin
*Elkton
*Ellendale
*Ellsworth
*Elmdale
*Ely
*Erskine
Evan
*Evansville
*Eveleth
*Excelsior
*Fairmont
Faribault
*Farwell
*Fergus Falls
*Fertile
Fifty Lakes
*Finlayson
Fisher
*Flensburg
*Floodwood
Forest Lake
*Foreston
*Fosston
*Franklin
Frazee
*Freeport
*Fridley
*Garfield
*Garvin
*Gary
*Geneva
*Georgetown
*Gibbon
*Glencoe
Golden Valley
*Goodhue
*Goodview
*Graceville
*Granada
Grand Marais
*Grand Rapids
*Granite Falls
*Grasston
*Green Isle
*Greenbush
*Greenfield
*Greenwald
*Hadley
*Hallock
*Halma
*Ham Lake
*Hamburg
*Hammond
*Hampton
*Harding
[1]Hardwick
*Harmony
*Hartland
*Hastings
*Hawley
Hayward
*Hazel Run
*Hector
*Heidelberg
*Henderson
*Hendricks
Hendrum
*Henning
*Henriette
*Hermantown
[1]Heron Lake
Hillman
*Hills
*Hilltop
*Hinckley
*Hitterdal
*Hokah
*Hollandale
*Holloway
*Holt
*Hopkins
*Howard Lake
*Hoyt Lakes
*Hugo
*Humboldt
*Hutchinson
*Ihlen
*Inver Grove Heights
Iona
*Iron Junction
*Ironton
*Ivanhoe
*Jackson
*Janesville

Table A.3: Cities Receiving Survey (continued)

*Jasper
*Jeffers
*Karlstad
*Kasota
*Kasson
*Keewatin
*Kennedy
[1]Kent
*Kenyon
*Kerkhoven
*Kilkenny
*Kimball
*Kinbrae
*Kingston
Kinney
*La Crescent
*La Prairie
*La Salle
*Lafayette
Lake Benton
*Lake Bronson
*Lake City
*Lake Crystal
*Lake Elmo
[1]Lake Henry
*Lake Park
*Lake Shore
*Lake Wilson
*Lakeland
*Lakeland Shores
*Lakeville
*Lancaster
*Lastrup
*Lauderdale
*Le Roy
*Le Sueur
*Leonidas
*Lester Prairie
*Lewisville
*Litchfield
Little Canada
*Littlefork
[1]Long Beach
*Longville
*Lonsdale
*Loretto
*Lowry
*Lucan
[1]Luverne
*Lyle
*Madelia
*Madison
*Madison Lake
*Manchester
[1]Manhattan Beach
*Maple Lake
[1]Marble
*Marietta
*Marine On St. Croix
*Mayer
Maynard
*Mazeppa
*McIntosh
Meadowlands
*Meire Grove
*Menahga
Mendota
*Mendota Heights
Middle River
Miesville
*Milaca
*Milan
*Millerville
*Millville
*Milroy
*Minneapolis
Minneiska
Minnetrista
*Montevideo
*Montgomery
*Monticello
*Montrose
*Moorhead
Mora
*Morristown
*Motley
*Mound
*Mounds View
Mountain Lake
*Nevis
*New Hope
*New London
*New Market
*New Prague
New Trier
*New Ulm
*New York Mills
*Newport
*Nicollet
*Nimrod
*Nisswa
*Norcross
*North Branch
North St. Paul
*Northfield
*Northrop
*Oak Park Heights
*Oakdale
*Odin
*Ogilvie
*Onamia
*Orono
*Oronoco
*Orr
*Osakis
*Oslo
Osseo
*Ottertail
*Owatonna
*Palisade
*Parkers Prairie
*Paynesville
*Pelican Rapids
*Pemberton
*Perham
Perley
*Pierz
*Pillager
*Pine City
*Pine Island
*Pine River
*Pine Springs
*Plainview
*Plummer
*Plymouth
Preston
*Princeton
Prinsburg
*Prior Lake
*Proctor
*Racine
*Ramsey
Red Lake Falls
*Regal
Rice
*Richmond
*Riverton
*Rochester
*Rockford
*Rockville
*Rollingstone
Ronneby
Roscoe
*Roseau
*Rosemount
*Rothsay
*Round Lake
*Royalton
*Rush City
*Rushford
*Rushford Village
[1]Rutledge
*Sabin
*St. Augusta
*St. Bonifacius
*St. Clair
*St. Hilaire
*St. Leo
*St. Louis Park
*St. Martin
St. Mary's Point
*St. Paul
*St. Rosa
*St. Stephen
*St. Vincent
*Sanborn
*Sandstone
*Sargeant
*Sartell
*Sauk Centre
*Sedan
*Shafer
*Shelly
*Sherburn
*Shevlin
*Shoreview
Silver Bay
[1]Silver Lake
[1]Skyline
*Sleepy Eye
Sobieski
*Solway
*South Haven
*South St. Paul
*Spicer
*Spring Grove
*Spring Hill
Spring Lake Park
*Spring Valley
*Springfield
*Squaw Lake
*Starbuck
*Steen
Stephen
*Stewart
*Stewartville
Storden
*Strandquist
*Strathcona
Sturgeon Lake
*Sunfish Lake
Swanville
*Taconite
*Tamarack
*Taopi
*Taylors Falls
Tenney
*Thomson
*Tonka Bay
*Tower
*Trail
*Trommald
*Trosky
Twin Lakes
*Tyler
*Ulen
*Underwood
[1]Upsala
*Urbank
*Utica
Vadnais Heights
[1]Vergas
*Vermillion
*Verndale
*Vernon Center
*Victoria

Table A.3: Cities Receiving Survey (continued)

Villard	Watertown	*Willernie	*Wrenshall
*Vining	*Waterville	Williams	*Wykoff
Wabasha	*Watson	*Willmar	*Wyoming
*Wabasso	Waubun	*Willow River	*Zemple
*Wadena	*Waverly	*Wilmont	*Zimmerman
*Wahkon	*Wayzata	*Wilton	*Zumbro Falls
*Waite Park	*Wendell	*Windom	*Zumbrota
*Waldorf	*West St. Paul	*Winger	
*Walker	*West Union	*Winnebago	NOTE: Asterisks (*) depict cities from which we received completed surveys in time for analysis.
*Walnut Grove	*Westbrook	*Winton	
*Waltham	*Whalan	*Wolf Lake	
*Warren	Wheaton	*Woodland	
*Warroad	*White Bear Lake	*Woodstock	[1]Returned survey too late to be included in our analysis.
*Waseca	*Wilder	*Worthington	

responded. Of 310 school districts surveyed, we received responses from 272 (with 156 responding on-line), for a school district response rate of 87.7 percent. Table A.4 lists the school districts receiving the survey and denotes those that responded.

Based on the response rates and degree of variation in responses, the margin of error for the county survey is plus or minus 3.6 percentage points; for the city survey it is 3.3 percentage points; for the school district survey it is 2.9 percentage points. The margin of error may be larger for responses to particular questions where the number of respondents is low. Survey results may also reflect additional sources of error that cannot be measured. For example, the wording and order of the survey questions can affect results. We did not independently verify the accuracy of the information respondents provided.

SITE VISITS OF SELECT LOCAL JURISDICTIONS

Using data from our surveys, we identified counties, cities, and school districts that met various indicators of performance for e-government. From among the many local governments that met a majority of our performance indicators, we selected 12 to visit for in-depth interviews: four each of counties, cities, and school districts. We also gathered information while visiting other local jurisdictions for a study on managing local government computer systems, which was conducted at the same time as this study. The examples of best practices in Chapter 2 are based on information gathered during these visits.

We visited the sites in December 2001 and January 2002. On these visits, we asked about the advantages and disadvantages of specific practices, costs and savings associated with undertaking them, and circumstances under which a practice may be transferable to other local jurisdictions. The people we interviewed also offered suggestions and tips for other jurisdictions considering similar practices. To collect the information systematically, we used a standard

Table A.4: Independent and Special School Districts Receiving Survey

*A.C.G.C.
*Ada-Borup
*Adrian
*Aitkin
*Albany
Albert Lea
[1]Alden
*Alexandria
*Annandale
*Anoka-Hennepin
*Ashby
*Austin
*Badger
*Bagley
*Balaton
*Barnesville
Barnum
*Battle Lake
*Becker
*Belgrade-Brooten-Elrosa
Belle Plaine
*Bemidji
*Benson
*Bertha-Hewitt
*Bird Island-Olivia-Lake Lillian
*Blackduck
*Blooming Prairie
Bloomington
*Blue Earth Area
*Braham
*Brainerd
*Brandon
*Breckenridge
*Brewster
Brooklyn Center
*Browerville
*Browns Valley
*Buffalo
*Buffalo Lake-Hector
*Burnsville
*Butterfield
*Cambridge-Isanti
*Campbell-Tintah
*Canby
*Cannon Falls
*Carlton
*Cass Lake
*Cedar Mountain
*Chaska
Chatfield
*Chisago Lakes
*Clearbrook-Gonvick
*Cleveland
*Clinton-Graceville-Beardsley
*Cloquet
Columbia Heights
*Comfrey
*Cook County
*Cromwell
*Crookston
*Cyrus
*Dassel-Cokato
*Dawson-Boyd
*Deer River
*Delano
*Detroit Lakes
*Dilworth-Glyndon-Felton
*Dover-Eyota
*Duluth
*Eagle Valley
*East Grand Forks
*Eden Prairie
*Edgerton
*Edina
*Elgin-Millville
*Elk River
*Ellsworth
*Ely
*Evansville
*Eveleth-Gilbert
*Fairmont Area
*Faribault
Farmington
*Fillmore Central
*Fisher
*Floodwood
*Foley
Forest Lake
*Fosston
*Franconia
*Frazee
Fridley
*Fulda
G.F.W.
*Glencoe-Silver Lake
*Glenville-Emmons
*Goodridge
*Granada Huntley-East Chain
*Grand Meadow
*Grand Rapids
*Greenbush-Middle River
Greenway
*Grygla
*Hancock
*Hawley
*Hayfield
*Hendricks
*Henning
Herman-Norcross
*Hermantown
*Heron Lake-Okabena
*Hibbing
*Hills-Beaver Creek
*Hinckley-Finlayson
*Holdingford
*Hopkins
*Houston
*Howard Lake-Waverly-Winsted
*Hutchinson
*International Falls
*Inver Grove
*Isle
*Ivanhoe
Jackson County Central
*Janesville-Waldorf-Pemberton
*Jordan
*Kasson-Mantorville
*Kelliher
*Kenyon-Wanamingo
*Kerkhoven-Murdock-Sunburg
*Kimball
Kingsland
*Kittson Central
*Lac Qui Parle Valley
La Crescent-Hokah
*Lake Benton
*Lake City
*Lake Crystal-Wellcome Memorial
*Lake Of The Woods
Lake Park Audubon District
*Lake Superior
*Lakeview
*Lakeville
*Lancaster
*Lanesboro
Laporte
*Le Center
*Le Roy
*Lester Prairie
[1]Le Sueur-Henderson
*Lewiston
*Litchfield
*Little Falls
*Littlefork-Big Falls
Long Prairie-Grey Eagle
*Luverne
*Lyle
*Lynd
*M.A.C.C.R.A.Y.
*Mabel-Canton
*Madelia
*Mahnomen
*Mahtomedi
*Maple Lake
*Maple River
*Marshall
*Marshall County Central
*Martin County West
*McGregor
*McLeod West
*Melrose
*Mesabi East
*Milaca
Milroy
*Minneapolis
*Minneota
*Minnetonka
*Minnewaska
Montevideo
*Monticello
*Moose Lake
[1]Mora
*Morris
*Mounds View
*Mountain Iron-Buhl
*Mountain Lake
Murray County Central
*N.R.H.E.G.
*Nashwauk-Keewatin
*Nett Lake
*Nevis
*New London-Spicer
*New Prague
*New Ulm
*New York Mills
*Norman County East
*Norman County West
*North Branch
*North St. Paul-Maplewood
*Northfield
*Norwood
*Ogilvie
*Oklee
*Onamia
Orono
*Ortonville
*Osakis
*Osseo
*Owatonna
*Park Rapids
*Parkers Prairie
*Paynesville
*Pelican Rapids
*Pequot Lakes
*Perham
Pierz
*Pine City
*Pine Island
*Pine Point
*Pine River-Backus
[1]Pipestone-Jasper
*Plainview
*Plummer
*Princeton
Prinsburg
*Prior Lake
*Proctor
*Randolph
*Red Lake
*Red Lake Falls
*Red Rock Central
*Red Wing
*Redwood Falls
*Renville County West
*Richfield
*Robbinsdale
Rochester
*Rockford
*Rocori

Table A.4: Independent and Special School Districts Receiving Survey (continued)

*Roseau
*Rosemount-Apple Valley-Eagan
*Roseville
*Rothsay
*Round Lake
*Royalton
*Rush City
*Rushford-Peterson
*Russell
*Ruthton
*St. Anthony-New Brighton
*St. Charles
*St. Clair
*St. Cloud
St. Francis
*St. James
St. Louis County
St. Louis Park
*St. Michael-Albertville
*St. Paul
*St. Peter
*Sartell
*Sauk Centre
Sebeka
*Shakopee
Sibley East
*Sleepy Eye
*South St. Paul
South Washington County
Southland
*Spring Grove
*Spring Lake Park
*Staples-Motley
*Stephen-Argyle Central
*Stewartville
*Swanville
Thief River Falls
*Tracy
*Tri-County
*Triton
*Truman
*Tyler
*Ulen-Hitterdal
*Underwood
*United South Central
*Upsala
*Verndale
*Wabasha-Kellogg
*Wabasso
*Waconia
*Wadena-Deer Creek
*Walker-Hackensack-Akeley
*Warren-Alvarado-Oslo
*Warroad
*Watertown-Mayer
*Waterville-Elysian-Morristown
*Waubun
*Wayzata
*West Central Area
*West St. Paul-Mendota Heights-Eagan
*Westbrook
*Wheaton Area
*White Bear Lake
*Willmar
*Windom
*Win-E-Mac
*Winona
*Worthington
*Wrenshall
*Yellow Medicine East
*Zumbrota-Mazeppa

NOTE: Asterisks (*) depict school districts from which we received completed surveys in time for analysis.

[1]Returned survey too late to be included in our analysis.

questionnaire with nine open-ended questions. Those we interviewed had an opportunity to review and correct the summaries written for the report.

LOCAL GOVERNMENT ADVISORY COUNCIL

In April 2001, this study was recommended by the Local Government Advisory Council. Table A.5 lists the individuals currently serving on the council. When the Minnesota Legislature established the best practices reviews program in 1994, it created the council and charged it with recommending local government

Table A.5: Local Government Advisory Council Members, 2001-2002

Charles Meyer (chair), St. Louis Park City Manager
Don Helmstetter, Spring Lake Park Schools Superintendent
Tim Houle, Morrison County Coordinator
Kay Kuhlmann, Red Wing City Council Administrator
Scott Neal, Northfield City Administrator
Jack Paul, Hubbard County Coordinator
Doug Reeder, South St. Paul City Administrator
Terry Schneider, Minnetonka City Councilman
Dave Unmacht, Scott County Administrator
Lothar Wolter, Jr., Norwood Young America Township Clerk

services for review. The Advisory Council recommended the topic of e-government services to the Legislative Audit Commission, which approved the council's recommendation in May 2001. Council members also reviewed and commented on a draft version of this report.

Glossary

APPENDIX B

This appendix defines terms used in the report. These terms represent a small subset of the many technology-related terms involved with e-government. For definitions and descriptions of these terms, readers may want to consult one of numerous on-line glossaries including:

- Whatis?com at http://whatis.techtarget.com/, which features technology-related terms and includes a useful search function;

- Marshall Brain's HowStuffWorks at http://www.howstuffworks.com/, which provides easily understood, detailed descriptions of computers and technology (among many other categories of subjects);

- Network Working Group's Internet Security Glossary, at ftp://ftp.isi.edu/in-notes/rfc2828.txt, describes information technology security terminology, and it is a reference suggested by the CERT® Coordination Center at Carnegie Mellon University;

- Corporate Computer Consultants Limited Jargon Buster at http://www.cccl.net/information/JargonBusterHome.asp, which focuses on information security terms and offers numerous links for more in-depth information;

- Precidia Technologies Glossary at http://www.precidia.com/technical_support/glossary.html, which defines a limited but useful list of technology terms;

- Texas State Library and Archives Commission, Wireless Community Networks Glossary at http://www.tsl.state.tx.us/ld/pubs/wireless/appendixa.html, which contains a limited but useful list of terms commonly used with wireless technologies.

The following are technology-related terms used in this report.

Antivirus programs: Software installed to search a hard drive, floppy disks, or particular files for any known or potential viruses. The software compares data on a computer or file against a collection of known virus "signatures."

Broadband: Service that allows high-speed access to the Internet through the use of equipment such as cable modems and lines, DSL service, fiber optics, and wireless transmission systems. These telecommunication channels provide the means to transmit data electronically at speeds far faster than the traditional

channel (which is a modem connected to copper telephone wires to dial in and connect to the Internet at a speed of up to 56 kilobits per second).

Browsers: Software programs allowing users to find and explore files on Internet Web sites. Common browsers are Netscape Navigator, Internet Explorer, and Mosaic.

Client/server computing: A model of computer program interactions whereby one program, acting as the client, makes a request and a second program, acting as the server, fulfills the request. In network computing, typically one computer acts as the server awaiting requests from client computers; multiple client computers may share the services of a single server program. The server centralizes data storage and processing, and the tasks of entering data or requesting services are distributed among various client programs on personal computers.

Cookies: Text strings stored in a computer user's browser allowing a server to recall customized information.

Demilitarized zone: Computer security term describing a neutral area between the Internet connection and the rest of a computer network. A computer host or small network is inserted to act as a demilitarized zone (DMZ) that allows outsiders access to an organization's Web pages but inhibits them from gaining access to any of the rest of the organization's computer network. Outsiders that penetrate the DMZ security can access and alter the organization's Web site but the rest of the organization's computerized data would not be exposed.

Digital signatures: Analogous to handwritten signatures on paper, digital signatures represent methods of "signing" electronic documents with 0's and 1's in ways that authenticate the sender of the document and reveal any tampering of it. Digital signatures rely on encrypting data that can only be decoded by the intended recipient.

Disaster recovery plans: Plans describing how an organization will deal with unanticipated events, such as power failures or hacker attacks, that disrupt their computer systems. Such plans include elements that focus on preventing disruptions as well as steps needed to resume computer functions and minimize downtime once disasters occur. They may be part of an organization's "business recovery" plan to resume service delivery when events have disrupted services.

Domain-name servers: Computers that translate text into computer-readable numbers that map to specific computer addresses. The domain name indicates where to forward a request for a Web page. For instance, a domain-name server would translate a user's entry of http://www.auditor.leg.state.mn.us/ into the site containing the Web page for the Minnesota Office of the Legislative Auditor.

DSL: A digital subscriber line (DSL) is a telecommunications channel providing access to the Internet. It operates over existing copper telephone wires but offers higher transmission capabilities than traditional dial-up service. Home computer users with DSL can use telephones while also connecting to the Internet.

E-government: Information or transactions that governmental units provide on-line to citizens and others using the Internet and Web sites.

E-mail: The exchange of messages generated, stored, and transmitted by computer, most often using the Internet.

Firewalls: Software and hardware devices to protect computer networks from unwelcome or unauthorized outside access.

Hosting: The business of using a computer to house and maintain computer files for Web sites and providing a connection to the Internet, making the files available to people using the Internet.

Incident response procedures: Steps planned by an organization to prepare itself for computer incidents. Such a plan includes identifying possible incidents (from hackers to internal misuse to natural disasters), listing effective responses to them, and specifying who is to undertake what procedures in the event of any particular incident.

Infrastructure: Telecommunications equipment such as telephone wires, cabling, or wireless systems used for connecting to the Internet and interacting with data provided on the Internet.

Internet: A global collection of computer networks connected together to form a single, interconnected network for communications.

Internet service providers: Also referred to as ISPs, Internet service providers offer a "point of presence" or gateway connecting computer users to the Internet and all of its accessible files.

Intranets: Electronic networks that are based on Internet technology but are internal to users within an organization and not accessible by outside users.

Intrusion-detection systems: Security software that monitors for intrusions and unusual activities on a computer network.

IP (Internet protocol) address: A number that uniquely identifies each computer on the Internet, used to send and receive information across the Internet.

Listservs: Discussion groups using electronic mailing lists to send e-mail and transmit information about topics of common interest to their members. Computer users subscribe to mailing lists in their areas of interest. All subscribers automatically receive e-mail messages posted by any individual subscribed to that group.

Log: A log, or access log, is a list of the requests people have made from a Web site. Analyzing access logs can provide information on the number of computer visitors to a home page, the number of requests for each page at a site, and usage patterns by time of day or year.

Modem: A device that modulates and demodulates, i.e., converts, computer data into a signal compatible with transmission over cable or telephone lines. Wireless modems convert data into radio signals for wireless transmissions.

Network: In reference to computers, a network is a collection of compatible hardware and software arranged to allow computer users to share files and printers (and other peripheral devices) or connect to other networks.

Patches: Repairs or enhancements to software programs to keep them usable until new versions of the programs are released.

Portal: A Web site that intends to be a major starting point or anchor site that users find easy to use and return to often. Portals often contain a directory of Web sites and extensive search capabilities, and they may allow users to customize the site to suite their individual interests.

Routers: Specialized computers that direct and transmit bits of data from one network to another. Routers control the flow of messages among computer networks.

Secure socket layer: A technology protocol that provides on-line security for passing sensitive information back and forth by sending encrypted information and preventing tampering with that information. Secure socket layer technology is part of most Web browsers and Web servers.

Servers: Computers that share their resources, such as files and printers, with other computers on a network. Servers may be powerful personal computers with large hard-disk capacity, minicomputers, mainframe computers, or specialized computers designed specifically as servers.

Virus: Programming code that causes unexpected and undesirable events, such as erasing data. Viruses often spread to other computers, unbeknownst to the original recipient. They are commonly transmitted in attachments to e-mail messages, from a diskette or compact disc, or from within files users download to their computers.

Vulnerability assessments: Software tools that scan computer systems to detect security flaws and known software or hardware bugs.

Web sites: Collections of related files (commonly with a beginning file called a "home page") available over the World Wide Web.

World Wide Web: The universe of information accessible via the interconnected computer networks known as the Internet. It operates via accepted standards for storing, retrieving, and exchanging electronic information.

Worm: A self-replicating virus that resides in a computer's active memory, usually detected only when its uncontrolled replication consumes system resources and slows or stops other computing tasks.

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