E-Government in Rural North Carolina

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The era of e-commerce and e-procurement is here, and many citizens expect the same responsiveness from government as from the private sector. Enter e-government.

"E-government" is government use of information technology, particularly Web-based Internet applications, to enhance delivery of information and services to employees and agencies within government and to citizens and business partners. E-government focuses on centralization of public data and improvement of internal processes and communications.[1] As the twenty-first century advances, government's overwhelming interest is to use "interoperable" technologies—technologies that allow various departments to share data across information systems or products without special effort on the part of staff. Traversing all types of computer operating systems and various departments' databases has become increasingly necessary.[2] Such coordination will support greater efficiency and effectiveness and result in more citizen access.

To implement interoperable technologies, governments must address issues related to connectivity, infrastructure, hardware, and software (for definitions of these and other key terms, see the sidebar on page 36). This article describes the technologies, the personnel, and the infrastructure currently in place in rural North Carolina to support e-government.

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Background

In early 1997 the Institute of Government recognized a need to add information technology to its offerings to local governments in North Carolina. In early 2000, responding to government requests and following an in-depth analysis, the Institute established the Center for Public Technology. The purpose of the Center is to respond to local governments' needs in information technology and to increase their skills and capacity in that area.

The North Carolina General Assembly also has recognized the importance of information technology in government and in North Carolina generally. In its 2000 session, it created the Rural Internet Access Authority to oversee efforts to provide rural areas with high-speed broadband Internet access.[3] The Rural Internet Access Authority is charged with eradicating the "digital divide" in North Carolina—that is, the gap between the people who do and the people who don't have access to and the capability to use modern information technology. The Rural Internet Access Authority's main goals have been (1) to encourage the provision of local dial-up Internet access from every telephone exchange in North Carolina by August 2001, which has been achieved; and (2) to encourage the provision of high-speed Internet access at competitive prices to all North Carolinians by December 2003.

In summer 2001 the Rural Internet Access Authority commissioned a survey by the Center for Public Technology of the state's Tier 1 and 2 counties and the municipalities and the councils of government within those counties.[4] Tier 1 and 2 counties are the most and

the second-most economically distressed areas of the state, respectively, as ranked by the North Carolina Department of Commerce.[5] The purpose of the survey was to ascertain the infrastructure, the equipment, the personnel, and the applications in place in rural North Carolina to support e-government.

Methodology

The survey inquired about the number of personal computers in use; the types of Internet connections in use; the percentage of employees with personal computers and Internet and e-mail access; the types of electronic transactions, networks, and software in use; and related technology issues. Several local government officials and industry experts reviewed the survey to ensure the validity of the questions. In June 2001 the survey was mailed to the 36 Tier 1 and 2 counties, the 169 Tier 1 and 2 municipalities, and the 18 Tier 1 and 2 councils of government. To encourage participation and to ensure the accuracy of the returned data, follow-up telephone calls were made to all the units. As of August 27, 2001, more than 82 percent had responded, including 89.3 percent of the municipalities, 76.5 percent of the councils of government, and 72.2 percent of the counties.

Highlights of the Findings

Several major themes emerged from the survey data:

- Municipalities in Tier 1 and 2 counties are much more limited in infrastructure, hardware, software, and personnel capacity for information technology than are the counties in which they are located.
- The lack of internal and external information technology networks in Tier 1 and 2 municipalities and counties indicates insufficient infrastructure to support interoperable e-government initiatives.
- Tier 1 and 2 municipalities' connection to the Internet, if they have one, is primarily via a slow-speed, dial-up modem.

Each of these themes is reflected in the discussion of the issues that follows.

Population Size and Technological Sophistication

The survey data suggest that population size is an indicator of how much infrastructure, equipment, and applications each government unit has: the smaller a government unit's population, the less technologically advanced the unit is. More than 50 percent of the Tier 1 and 2 counties have populations of less than 28,000. More than 60 percent of the Tier 1 and 2 municipalities have populations of less than 1,000.

The correlation between population size and information technology is pronounced for municipalities. It is not as strong for counties, in part because they administer state and federal programs, for which hardware and software are provided or subsidized.

Number of Personal Computers

Personal computers are indispensable for access to the Internet and other technologies. However, for many units of government in economically distressed areas, such hardware is limited (see Figure 1). On average, in Tier 1 and 2 municipalities, there is one computer for every 2.6 employees. Moreover,

Key Terms

Connectivity: the ability to link to the Internet

Hardware: physical equipment (computers, monitors, keyboards, etc.) as opposed to programs, procedures, rules, and associated documentation

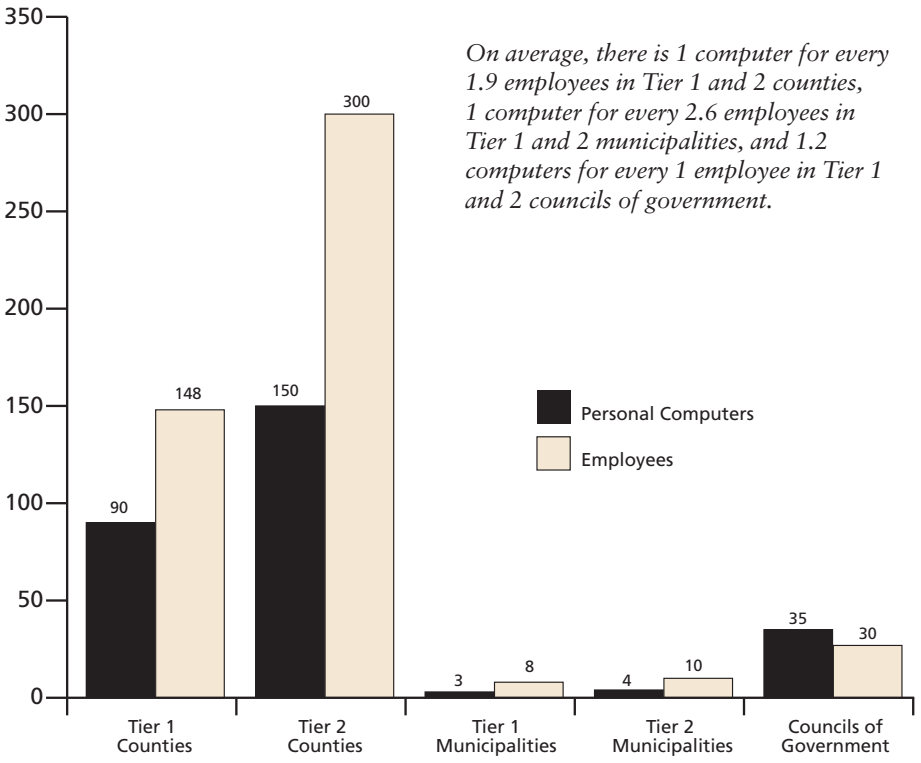
Information technology: the branch of technology devoted to study and application of data and its processing

Infrastructure: the physical components, such as physical and wireless transmission media and communication devices, used to connect computers and users

Interoperability: the ability of software and hardware on different machines from different vendors to share data

Software: a set of computer programs, procedures, and associated documentation concerned with the operation of a data processing system

Figure 1. **Average Number of Personal Computers and Employees in Tier 1 and 2 Units of Government**



On average, there is 1 computer for every 1.9 employees in Tier 1 and 2 counties, 1 computer for every 2.6 employees in Tier 1 and 2 municipalities, and 1.2 computers for every 1 employee in Tier 1 and 2 councils of government.

Table 1. **Employee Access to Personal Computers, E-Mail, and the Internet among Tier 1 and 2 Units of Government**

Unit	50% or More of Employees with Access to PCs	50% or More of Employees with Access to E-mail	50% or More of Employees with Access to Internet
Counties	25 of 26	16 of 26	18 of 26
Municipalities	104 of 150	56 of 149	55 of 148
Councils of Government	13 of 13	13 of 13	13 of 13

twenty-two of the Tier 1 and 2 municipalities have no personal computers at all.

Tier 1 and 2 counties and councils of government fare somewhat better, although some still lack enough personal computers for all their employees. Tier 1 and 2 counties average 1 computer for every 1.9 employees. In contrast, the average council of government has 1.2 personal computers for every employee.

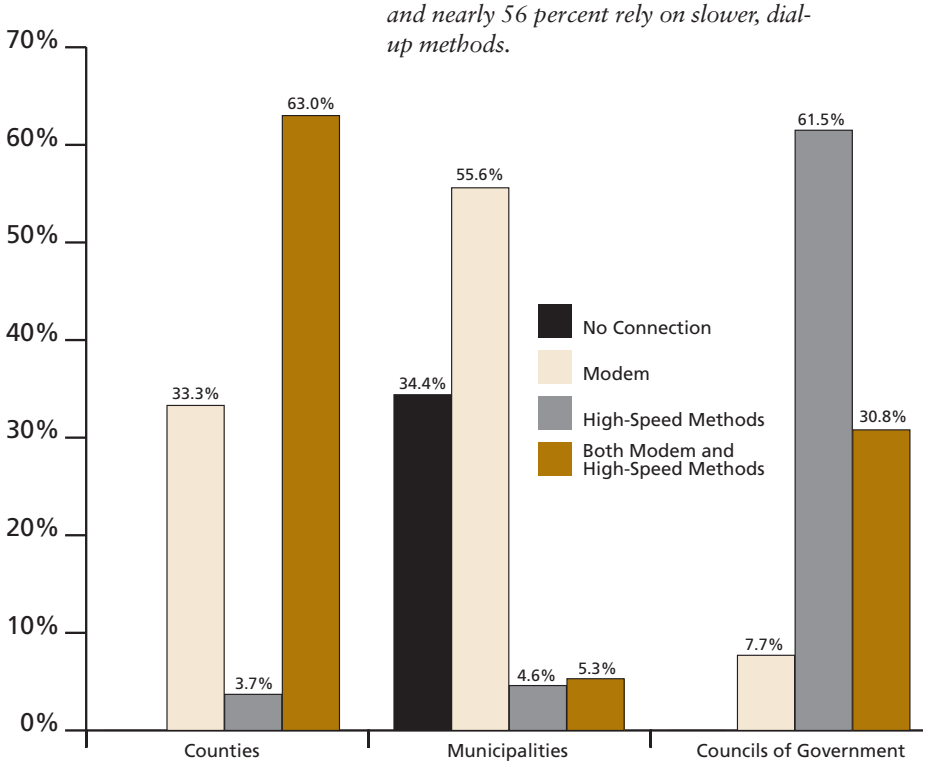
Although not all employees need a personal computer to perform their jobs, the ratio of personal computers to employees in Tier 1 and 2 municipalities and counties is clearly not optimal.

Employee Access to Personal Computers, E-Mail, and the Internet

Employee access to personal computers, e-mail, and the Internet is another critical issue as local governments attempt to move to e-government. Ninety percent of Tier 1 municipalities and 85 percent of Tier 2 municipalities report some access to personal computers for employees, but less than 60 percent of either type report access to e-mail or the Internet. All Tier 1 and 2 counties and councils of government report some access to personal computers, e-mail, or the Internet for employees. Employees of councils of government have greater access to these communication channels than employees of municipalities and counties do, with all reporting councils having at least 50 percent employee access to personal computers, e-mail, and the Internet. (For the number of units of government in which at least 50 percent of employees have access, see Table 1.)

Figure 2. **Types of Internet Connections Used by Tier 1 and 2 Units of Government**

About 34 percent of Tier 1 and 2 municipalities have no Internet connection at all, and nearly 56 percent rely on slower, dial-up methods.



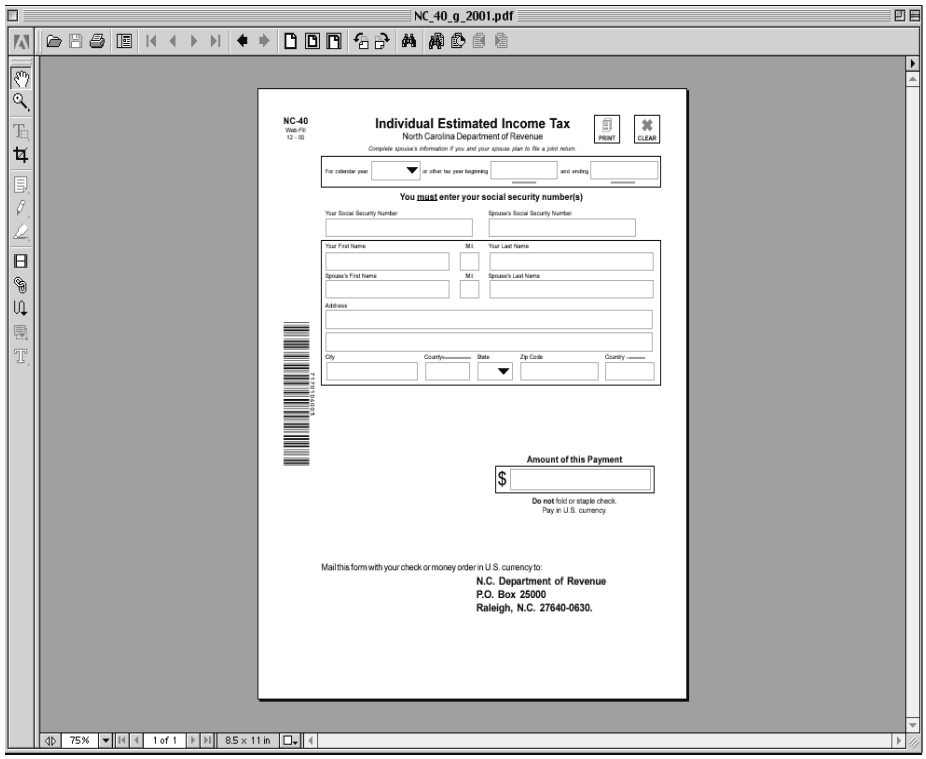
Connection to the Internet

As noted earlier, one of the primary goals of the Rural Internet Access Authority is to provide high-speed Internet connections to all North Carolinians by 2003. The value of a high-speed connection versus a standard dial-up connection is the rate of information transfer. The more quickly applications can be delivered and processed, the more they are used, and the more efficient they become. As more Web applications become available, the rate of data transfer will become increasingly important.

The survey results indicate a clear disparity between municipalities and other government units in connectivity methods (see Figure 2). About 34 percent of Tier 1 and 2 municipalities have no Internet connection at all. Among those that do have a connection, nearly 56 percent rely on slower, dial-up methods. In contrast, 63 percent of Tier 1 and 2 counties connect to the Internet via both modem and high-speed methods (meaning that they have two kinds of capabilities), and nearly 62 percent of councils of government use high-speed methods.

The larger the population of a jurisdiction, the greater the demand will be for the infrastructure necessary to support modern information technology. Therefore the larger the population, the more likely it is that private companies, such as Internet service providers and cable companies, will establish the necessary infrastructure (including cable, dark fiber, and high-speed telephone lines) for high-speed Internet connections. The survey shows a moderate correlation between population size and the

E-government offers citizens such conveniences as filing state tax forms on-line.



type of Internet connection a county has in place. There is a much stronger correlation between population size and a municipality's type of Internet connection. In essence, the smaller a municipality, the less technologically advanced its type of Internet connection.

Official Web Sites

Current literature indicates that government Web sites are necessary to encourage civic participation and to allow citizens access to government service twenty-four hours a day, seven days a week. A recent national survey found that more than 80 percent of local governments had Web sites.[6] North Carolina's Tier 1 and 2 counties and municipalities are well behind this national average, at 58 percent and 21 percent, respectively (see Figure 3). However, all the councils of government in these tiers have Web sites.

Networks

The value of interoperability and connectivity through networks is immeasurable. Networks enable the sharing of applications and data across departments, and they save money by streamlining applications and reducing data redundancy. For example, Joe Smith has lived in a town all his life but has moved three times within the town limits. The planning department, the fire department, and the tax department may have different addresses for him. With interoperable, connected systems, Joe could register his change of address with one department, and the information could be transferred to all other departments. This capability would not only lessen the burden on Joe but also reduce the workload of town staff in changing Joe's address in all the various departmental systems. Among Tier 1 and 2 units, on average, 23 percent of municipalities and 52 percent of counties currently have networks (see Figure 4). In contrast, 83 percent of councils of government have them.

Information Technology Departments

The lack of information technology departments in Tier 1 and 2 government

Figure 3. **Percentage of Tier 1 and 2 Counties and Municipalities with Official Web Sites**

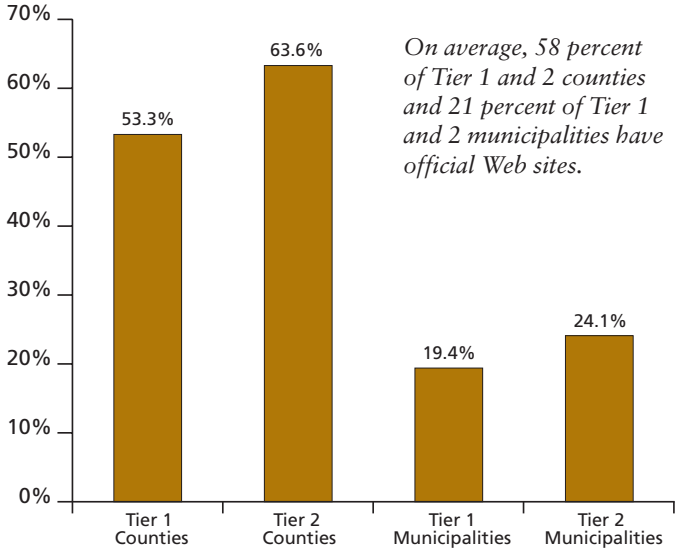
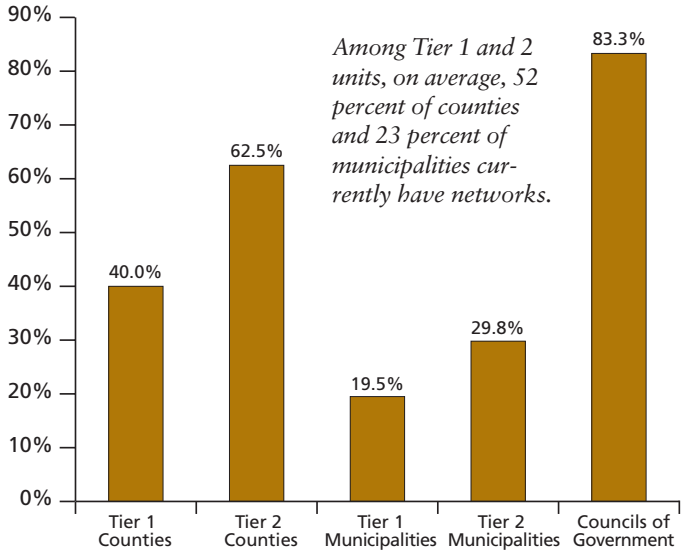
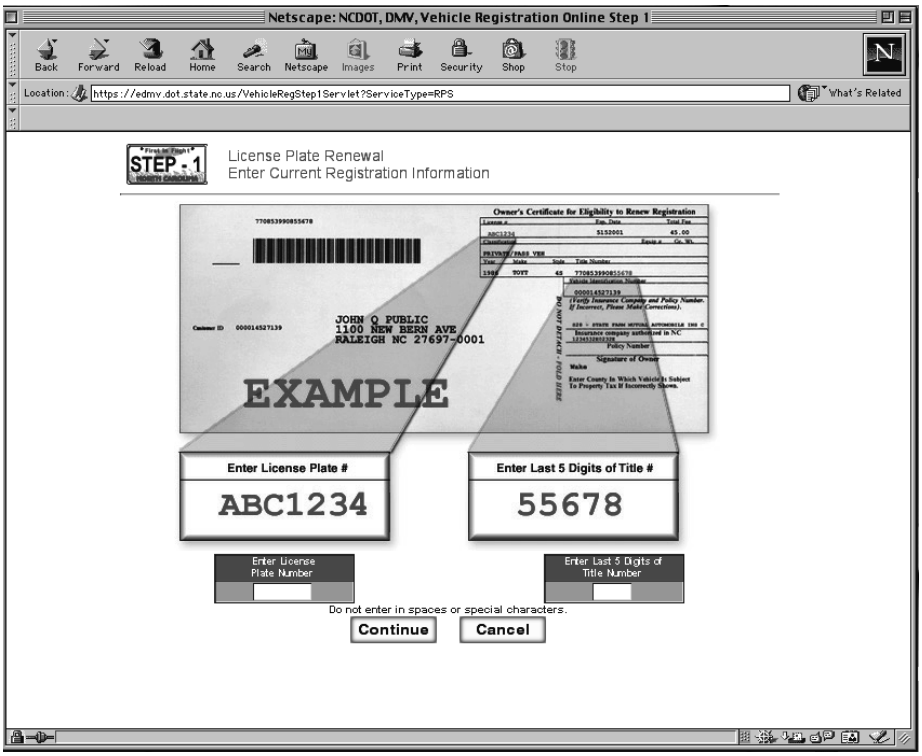


Figure 4. **Percentage of Tier 1 and 2 Units of Government with Networks**





On-line registration of vehicles is another convenience of e-government.

units is another obstacle to development and implementation of e-government initiatives. Information technology departments provide the knowledge base and the technical support to implement and maintain technology systems on a daily basis. Without dedicated information technology departments or at least trained information technology personnel, local governments will have difficulty moving forward into the era of e-government.

Ninety-six percent of Tier 1 and 93 percent of Tier 2 municipalities do not have an information technology department. Seventy-three percent of Tier 1 counties and 50 percent of Tier 2 counties do not have such a department. Further, 69 percent of the councils of government lack this kind of support. Although not all organizations need a fully dedicated information technology department, all do need at least one person trained to handle the information technology issues that will inevitably arise.

Other Barriers and Limitations

All the types of government units surveyed rank funding as the biggest hindrance to implementing e-government initiatives. The second-biggest hindrance for Tier 1 municipalities is implementation and maintenance issues, which involve both establishment of new technologies and the upkeep required to keep systems functioning at optimal levels. For Tier 2 municipalities and for councils of government, training is the second-biggest hindrance; for Tier 1 and 2 counties, lack of infrastructure.

Conclusion

Information technology is a tool for accomplishing a specific task more efficiently and effectively. It enables local government to improve interaction with and access by the public, and to streamline internal processes and communications. The advantage of using digital data, as opposed to traditional, paper-based data, is the ease of maintenance and sharing.

Implementation of e-government requires investment in information technology. It also demands that local government officials understand how to tap effectively into the services available to increase citizen interaction and streamline internal processes. The survey results reported in this article offer insights into the current status of information technology in rural North Carolina. They also provide a benchmark for measuring future progress and offer a roadmap for information technology planning and investments in local governments. The results will help the Rural Internet Access Authority determine appropriate directions for funding in order to generate high-value returns for local governments and citizens.

Notes

1. Jason H. Alexander & Joseph W. Grubbs, *Wired Government: Information Technology, External Public Organizations, and Cyberdemocracy*, 3 PUBLIC ADMINISTRATION AND MANAGEMENT: AN INTERACTIVE JOURNAL, No. 1 (1998), available at www.pamij.com/.

2. David Landsbergen, Jr., & George Walken, Jr., *Realizing the Promise: Government Information Systems and the Fourth Generation of Information Technology*, 61 PUBLIC ADMINISTRATION REVIEW 206 (2001).

3. The Rural Internet Access Authority is in the North Carolina Department of Commerce. Administrative and professional staff are provided by the North Carolina Rural Economic Development Center, a private nonprofit organization that focuses on developing, promoting, and implementing sound economic practices in rural North Carolina. The Rural Internet Access Authority is governed by a commission of twenty-one members, including employees of state government, business and education leaders, members of the Microelectronics Center of North Carolina, and representatives of the state's telecommunications companies, including Internet service providers, rural telephone cooperatives, local telephone exchange companies and independent telephone companies, commercial wireless communications carriers, and the cable industry.

4. The survey also included K–12 schools and community colleges. The results of that part of the survey are not included in this article, which focuses on government.

5. Tier 1 counties include Alleghany, Ashe, Beaufort, Bertie, Camden, Cherokee, Clay, Columbus, Edgecombe, Graham, Halifax, Hertford, Hyde, Jones, Martin, Northampton, Perquimans, Richmond, Scotland, Swain, Tyrrell, Warren, Washington, and Yancey. Tier 2 counties include Anson, Bladen, Duplin, Hoke, Madison, Mitchell, Montgomery, Onslow, Pamlico, Pasquotank, Robeson, and Vance.

6. DONALD F. NORRIS ET AL., IS YOUR LOCAL GOVERNMENT PLUGGED IN? HIGHLIGHTS OF THE 2000 ELECTRONIC GOVERNMENT SURVEY (Baltimore: International City/County Management Ass'n, Feb. 27, 2001), available at http://icma.org/download/catis/grp120/sgp224/e-gov2000.pdf.