SEPTEMBER 2002

State Government E-Procurement in the Information Age:

Issues, Practices, and Trends

E-Government Series

M. Jae Moon
Assistant Professor
George Bush School of Government and Public Service
Texas A&M University

The PricewaterhouseCoopers Endowment for
The Business of Government

E-GOVERNMENT SERIES

State Government E-Procurement in the Information Age:
Issues, Practices, and Trends

M. Jae Moon
Assistant Professor
George Bush School of Government
and Public Service
Texas A&M University

September 2002

TABLE OF CONTENTS

The PricewaterhouseCoopers Endowment for
The Business of Government

FOREWORD

September 2002

On behalf of The PricewaterhouseCoopers Endowment for The Business of Government, we are pleased to present this report by M. Jae Moon, "State Government E-Procurement in the Information Age: Issues, Practices, and Trends."

Professor Moon's report finds that e-procurement initiatives provide significant potential for savings in contracts and purchasing, but there are clear challenges to overcome in further implementing e-procurement in state government. Based on results collected through one survey conducted in 1998 and two conducted in 2001, the report describes progress being made across the nation in implementing e-procurement. The report presents a series of recommendations that states should consider as they move farther down the road toward greater use of e-procurement.

This report builds on previous Endowment reports in the area of e-government, specifically how government organizations can use technology both to enhance the delivery of services to the public and to lower the administrative costs of government. Recent related reports include "State Web Portals: Delivering and Financing E-Service" (by Diana Burley Gant, Jon P. Gant, and Craig L. Johnson), "Leveraging Technology in the Service of Diplomacy: Innovation in the Department of State" (by Barry Fulton), and "Federal Intranet Work Sites: An Interim Assessment" (by Julianne G. Mahler and Priscilla M. Regan).

The recommendations in Professor Moon's report will provide useful guidance to procurement professionals in all levels of government. The examples from e-procurement initiatives in North Carolina, Virginia, and Maryland demonstrate that decisions about funding methods, system architecture, and project partners are critical to the success of any e-procurement system. Further, the e-procurement models presented in the report show different ways that governments and quasi-governmental organizations can collaborate to benefit from a single e-procurement system. We trust that this report will add to the body of knowledge on e-procurement practices.

Paul Lawrence
Partner, PricewaterhouseCoopers
Co-Chair, Endowment Advisory Board
paul.lawrence@us.pwcglobal.com

Ian Littman
Partner, PricewaterhouseCoopers
Co-Chair, Endowment Advisory Board
ian.littman@us.pwcglobal.com

EXECUTIVE SUMMARY

There have been a great deal of criticism and negative perception that public procurement management is neither efficient nor effective at present. One study shows that the government spends more than five times for its procurement administration than its private counterparts (JTFIT, 1996) spend. State governments spend about $75 to $100 to administer a single transaction (JTFIT, 1996), which is perceived to be very inefficient. Such criticism and negative public perception force governments to find new and innovative approaches for promoting better, more efficient procurement management.

In the meantime, as information technology (IT) has become a possible solution for many administrative problems in the public sector, e-procurement has emerged as an innovative alternative to achieve a better, more cost-efficient system. E-procurement is defined as a comprehensive and systemic process in which governments either establish agreements for the acquisition of products/services *(contracting)* or purchase products/services in exchange for payment *(purchasing)*, using IT systems.[1] E-procurement achieves these ends through various means, such as electronic ordering, purchasing cards, reverse auctions, and automatic accounting systems, among others.

This study surveys basic elements of e-procurement as part of e-government initiatives. Examining state governments' e-procurement management, the study reports on the technological applications and services that state governments currently employ and provide. E-procurement, the study suggests, offers potential improvements as well as challenges to state governments as they shift their practices from paper-based to electronic procurement.

Potential Improvements:

- Cost savings
- Time savings
- More flexible vendor choices
- Increased efficiency
- More accountable procurement management/less maverick buying
- Better reporting system
- Increased buyer capacity
- Reduced paperwork
- Employee empowerment
- Streamlined work flow

Challenges:

- Technical complexity (privacy, security, standardization, etc.)
- Legal issues (web information as a public notice, digital signature)
- Potential initial developmental costs and operating costs (who should pay? how should costs be paid?)
- Relationships with online vendors and application service providers (ASPs)
- Relationships with independent ASPs

This study briefly reviews e-procurement initiatives from three states (North Carolina, Virginia, and Maryland) as well as innovative approaches for e-procurement market integration (horizontal/interstate and vertical/intergovernmental integration). The horizontal and vertical integrations are illustrated by the two-state (Colorado and Utah Joint E-Procurement System), multistate (Multi-State EMall™ System), and state-local collaborative e-procurement market integration.

The study identifies multiple elements of e-procurement practices and examines current e-procurement management in state governments based on data collected by the 1998 and 2001 National Association of State Procurement Officials (NASPO) surveys as well as the 2001 online follow-up survey that the author conducted. These main elements of e-procurement are examined:

- Adoption of web pages for state procurement management
- Adoption of electronic signature
- Internet-based bidding/reverse auction
- Digital signature
- Electronic ordering
- Maintenance of procurement records by central procurement office
- Adoption of automated procurement system
- Purchasing cards

Although many states have adopted some of these applications over the last three years, it is still premature to expect real and immediate benefits from e-procurement. Many state governments have not yet experienced actual benefits from their e-procurement practices, leaving them with great challenges. To actualize prospective benefits of e-procurement, state governments should continue to cope with challenges and promote and sustain e-procurement practices. Some technical, legal, and managerial challenges and recommendations include:

- Assessing funding alternatives for e-procurement systems based on a state government's budgetary conditions, selection of cost-recovery models, and accountability mechanisms, among others
- Promoting the technical capacity of procurement officers by providing technical training for electronic catalogs, digital signature, automated procurement systems, Internet-based bidding, reverse auction, and purchasing cards
- Pursuing standardization and interoperability of e-procurement systems
- Promoting horizontal and vertical e-procurement market integration through interstate and intergovernmental procurement cooperation
- Instituting accountability mechanisms (regular and systematic audits) to prevent potential abuse of e-procurement systems (i.e., abuse of purchasing cards, automated procurement systems)
- Developing a legal framework for digital signature and Internet-based bidding procedures
- Developing statewide e-procurement policies and procedures
- Promoting better and more strategic external relationships with vendors and ASPs for more cost-efficient procurement

Introduction[2]

There have been a great deal of criticism and negative perception that public procurement management is neither efficient nor effective at present. One study shows that the government spends about 5.5 cents to administer every procurement dollar while its private counterparts spend only 1 cent to do the similar procurement task (JTFIT, 1996). State governments spend about $75 to $100 administering a single transaction (JTFIT, 1996), which is perceived to be very inefficient. Such criticism and negative public perception force governments to find new and innovative approaches for promoting better, more efficient procurement management.

In the meantime, as information technology (IT) has become a possible solution for many administrative problems in the public sector, e-procurement has emerged as an innovative alternative to achieve a better, more cost-efficient system. E-procurement is defined as a comprehensive process in which governments either establish agreements for the acquisition of products/services *(contracting)* or purchase products/services in exchange for payment *(purchasing)*, using IT systems.[3] E-procurement achieves these ends through various means, such as electronic ordering, purchasing cards, reverse auctions, and automatic accounting/procurement systems, among others.

Reflecting the dramatic emergence of IT applications in the information age, society has been flooded with literature based on various IT-related studies of business, sociology, and economics. Despite the wealth of information on IT-related issues and the increasing significance of IT for management and policy, surprisingly little research has been conducted in the field of public administration. Some studies suggest that public organizations, which tend to be late adopters of new technology, are perpetually behind in the technology diffusion curve. As this pessimistic view of the public sector suggests, such specific IT applications as e-procurement are neither well explored nor advanced in present studies.

Procurement management has had ample opportunities to improve through the phenomenal popularity of e-commerce (activities related to selling, transferring, and buying products and services using IT systems) and the availability of electronic transaction systems in the private sector. As large buyers, state governments search for managerial alternatives to streamline procurement procedures and reduce overhead costs. Often, IT is one of the most attractive alternatives. Of the many functional initiatives of e-government employed by state governments, this study is specifically designed to survey IT usages in e-procurement management.

State governments are the focal governmental unit of this study. Many state governments have adopted e-procurement management, following the federal government example and the compelling rhetoric of e-procurement. State governments are a good unit of analysis because of the wide variation in their practical implementation of e-procurement. Also, the experience of state governments represents a possible laboratory for local governments, which increasingly are interested in new alternatives for managing procurement.

The study explores general IT applications in the public sector from the perspective of e-government, specifically examining the evolution of e-procurement tools at the state level. Then state governments' adoption and implementation of various e-procurement technologies are examined. This is followed by several case studies of innovative initiatives that suggest the potential effectiveness of e-procurement practices in state governments. The study uses data collected by the National Association of State Procurement Officials (NASPO) in 1998 and 2000 and by the author in a 2001 follow-up survey. Overall, this study seeks to increase our practical understanding of and assess the future implications of e-procurement by surveying the current practices of state governments.

Information Technology and the Move toward E-Government[4]

IT appears to be the most significant technological factor in amplifying social (electronically networked society), economic (e-commerce), political (e-politics, e-campaigning), and governmental (e-government) dynamics through its unique properties of networked communication, data processing, and data management. In particular, e-commerce has become an increasingly popular practice for commercial transactions, thanks to the development of electronic transaction systems and Internet-based businesses. These practices have been reshaping the operation and content of businesses in the private sector.

Echoing the IT applications in the private sector, e-government has become a major reform buzzword for future governance in the public sector. A study by Hart-Teeter (2000) shows that both public and private managers are generally excited and positive about the prospects of e-government, though they raise some security and privacy concerns. IT has opened many possibilities for improving the internal managerial efficiency and the quality of public service delivery to citizens. For example, IT has contributed to dramatic changes in politics (Nye, 1999; Norris, 1999), bureaucracy (Fountain, 1999; 2001), performance management (Brown, 1999), reengineering (Anderson, 1999), red tape reduction (Moon and Bretschneider, 2002), democracy (Musso et al., 2000), and public service delivery (West, 2001) during the last decade. As part of the National Information Infrastructure (NII) initiative, the Clinton administration attempted to visualize electronic government as a means through which the government overcomes the barriers of time and distance in administering public services (Gore, 1993).

The Clinton administration believed that IT would enhance both the efficiency and the effectiveness of public organizations by simplifying administrative procedures and instituting reliable accountability mechanisms. On June 24, 2000, President Clinton delivered his first webcast address to the public and announced a series of e-government initiatives. A highlight was the establishing of an integrated online service system that put all online resources offered by the federal government on a single website, www.firstgov.gov. The initiative also attempted to build one-stop access to roughly $300 billion in grant and $200 billion in procurement opportunities (White House Press Office, 2000). This initiative reflected continuing governmental efforts to advance e-government at the federal level. For instance, the federal government has improved their websites and provided web-based services to promote better internal procedural management and external service provision (Fountain, 2001; West, 2001; Moon, 2002).

E-government includes four major internal and external aspects: (1) the establishment of a secure government intranet and central database for more efficient and cooperative interaction among governmental agencies; (2) web-based service delivery; (3) the application of e-commerce practices for more efficient transaction activities, as in procurement and contracts; and (4) digital democracy for more transparent accountability of government (Government and the Internet Survey, 2000). Various technologies support these unique aspects of e-government, including electronic data interchange (EDI), interactive voice response (IVR), voice mail, e-mail, web service delivery, virtual reality, and public key infrastructure (PKI).

For instance, after introducing Electronic Filing Systems (EFS) with custom-designed software that incorporates encryption technology, the U.S. Patent and Trademark Office (USPTO) substantially reduced the amount of paper the agency handles by allowing inventors or their agents to send any documents to the USPTO via the Internet (Daukantas, 2000). Due to various web technologies, 40 million U.S. taxpayers were able to file their 2000 returns via the web, while 670,000 online applications were made for student loans via the web-based system of the Department of Education (Preston, 2000). Some governments have also promoted virtual democracy by pursuing web-based political participation, such as online voting and online public forums.

In their research, some scholars have reacted to the introduction of IT and the evolution of e-government. Some early research (Bozeman and Bretschneider, 1986; Bretschneider, 1990; Cats-Baril and Thompson, 1995) attempted to understand distinctive managerial principles and unique characteristics of the public management information system (PMIS). Other research focused on information resource management at various levels of government (Caudle, 1988, 1996; Fletcher, 1997; Norris and Kreamer, 1996). Recently some scholars have researched the evolution of e-government (Weare, Musso, and Hale, 1999; Musso, Weare, and Hale, 2000; Fountain, 2001; Layne and Lee, 2001; West, 2001; Moon, 2002). Overall, we have a better understanding of the scope and volume of IT applications and advances in e-government, although not of how various aspects of IT affect specific administrative functions within government. This calls for a new set of studies to go beyond the impact of IT on governmental performance and examine the actual effects of IT on specific areas such as e-procurement.

As an e-government initiative, e-procurement has been widely pursued by many governments as a means of becoming "smart buyers." Public managers believe e-procurement both enhances the overall quality of procurement management through savings in cost and time and leads to a more accountable procurement system. The evolution of e-procurement will be explored in great detail in the next section.

The Evolution of E-Procurement

Procurement management is significant within governmental actions in terms of its monetary volume and managerial implications. Unfortunately, though, perceived as inefficient and wasteful in procurement practices, governments have suffered a decline in public confidence and trust in their performance. Even though state and federal governments have applied rigid procedural standards to prevent procurement abuses and enhance procurement management, the results have not always been successful—leaving room for further improvements in procurement management.

A study suggests that the total procurement cost to federal and state governments for purchasing from the private sector is an estimated $1 trillion. In fact, the federal government spent about $550 billion in 2000 (Neef, 2001). According to statistics from the General Services Administration (GSA), the federal government made about 28 million purchases during the 1998 fiscal year, and about 98 percent were valued at $25,000 or less. The sheer volume of transactions represents a great opportunity to use e-procurement methods for contracting and purchasing products or services because IT-based transactions can be processed much easier, faster, and cheaper. In particular, the government has fundamentally changed the old paper-based procedures and other forms of conventional management by introducing various elements of IT into procurement practices.

The Federal Acquisition Streamlining Act of 1994 required the federal government's procurement management to evolve into a more expedient process based on EDI[5] (Schriener and Angelo, 1995). This forced the federal government to develop the Federal Acquisition Computer Network (FACNET), which is the government's version of the EDI system. FACNET enables the federal government to disseminate its contracting information via online channels. President Clinton issued a presidential memorandum introducing the EDI system to all the federal government's contracting offices as a primary means for purchases in the $2,500 to $100,000 range. The initiative was taken to make federal procurement faster, more efficient, and more discretionary for federal agencies and employees in purchasing information technologies. Although FACNET's mandated use was repealed by a recent legislative action, many government and civilian agencies currently use it as a primary means of their procurement activities.

The Office of Management and Budget (OMB) has a strategic plan to incorporate e-commerce practices into government procurement management by reforming the buying and payment processes. Many public institutions are adopting innovative purchasing card systems, which are often credited with improving the procurement process for federal agencies and many state governments. Several states have participated in joint cooperative e-procurement systems to promote efficiency. Furthermore, state governments use IT in the form of financial models to support budget allocation, budget forecasting, and other related procurement management activities.

Following the federal and state model, San Diego County has practiced a similar e-procurement

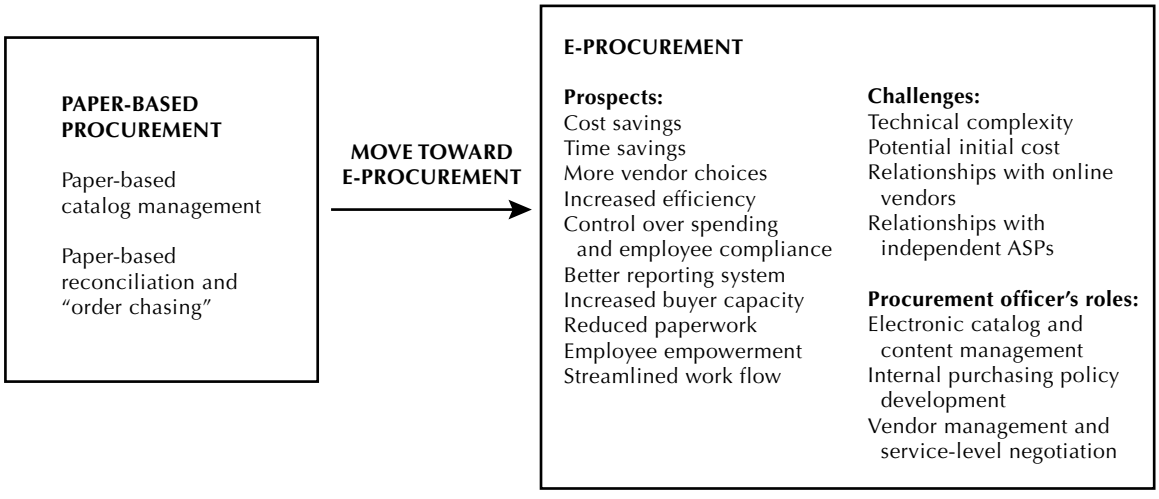
mechanism in which the county posts solicitation/bids and contract-award information on the web and integrates purchasing and accounting systems. To deal with increasing workloads and promote better procurement management, e-procurement allowed purchasing transactions under $100,000 through simplified procedures (Wood, 2000). To promote this system, the Purchasing and Contracting Office of San Diego County developed BUYNET, "a system that would integrate the existing online requisitioning system and the accounts payable system" (p. 38), with the technical assistance of the Department of Information Services. Wood (2000) reports that BUYNET represents a win/win situation to the county's procurement management by providing better information to suppliers, simplifying procurement procedures, reducing the workload of procurement specialists, and saving money for the county government.[6]

Proponents of e-procurement argue that it brings not only monetary savings to governments but also a more accountable, effective, and faster way to manage procurement. Figure 1 compares the prospective strengths and challenges of e-procurement. It also summarizes changes in a procurement manager's roles when procurement practices shift from paper-based to electronic.

Neef (2001) suggests that the various prospects of e-procurement are: (1) lowering transaction costs, (2) faster ordering; (3) greater vendor choices, (4) more efficient and standardized procurement processes, (5) more control over procurement spending (less maverick buying) and employee compliance, (6) more accessible Internet alternatives for buyers, (7) less paperwork and fewer repetitive administrative procedures, and (8) reengineered procurement work flow. Despite these positive aspects, government must still cope with technical, legal, and managerial challenges. These challenges include technical complexity, the potential financial burden involved in the initial investment, security issues, and sustainable relationships with vendors.

Moving toward e-procurement from traditional paper-based processes also brings great challenges to procurement officers. They need new technical and managerial skills, such as managing electronic catalogs, building relationships with online vendors and independent ASPs (portal site providers), and developing strategic team-based purchasing with other purchasing entities, among others. To sustain the evolution of e-procurement, state governments must provide appropriate technical training and assistance to procurement officers and develop

Figure 1: Prospects and Challenges in E-Procurement Management



Adopted from Neef (2001), e-Procurement: From Strategy to Implementation, *p.58.*

closer working relationships with vendors and various government buyers (state agencies, local governments, others).

Architectural Models

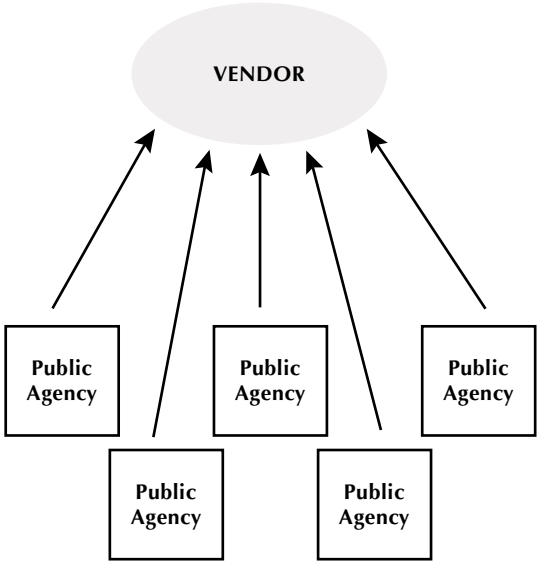
Models of e-procurement differ based on who is the focus of the procurement system (sell-side or buy-side), who manages the electronic catalog (suppliers, buyers, or third parties), and the types of portal sites (one-to-many model or many-to-many model), among others (Neef, 2001). Neef (2001) presents various models including the sell-side one-to-many model, buy-side one-to-many model, independent portal model, and auction model.

The sell-side one-to-many model is a vendor-designed e-market Internet site that allows potential buyers to browse and purchase specific products from the site. As Figure 2 shows, public agencies can access the vendor-designed e-commerce site and make purchases. This model is designed mainly to meet vendors' interests and to promote the marketing activities of vendors. The buy-side one-to-many model is closer to the generic e-procurement concept than the sell-side one-to-many model, which is closer to the concept of e-commerce.

As Figure 3 illustrates, a government can establish a buy-side one-to-many model in which the government invites many vendors and provides electronic catalogs for potential purchasing. Previously, buyers often designed and maintained in-house electronic catalogs of many vendors for various items. The buy-side one-to-many model incorporates electronic purchase order, electronic invoice, electronic fund transfer, and enterprise resource planning (ERP) elements into the system to enhance procedural efficiency and convenience (Neef, 2001).

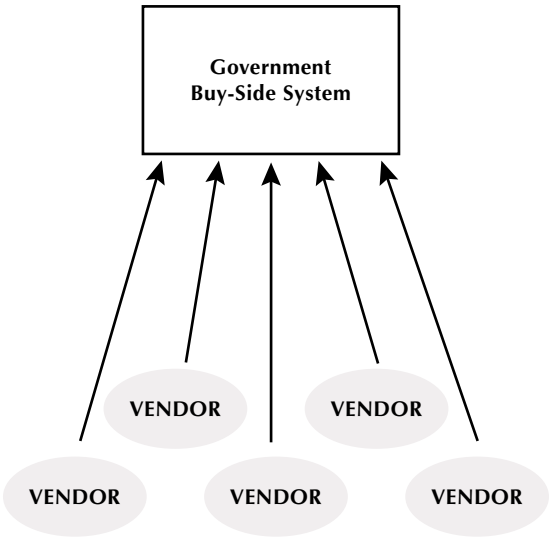
The independent portal model shown in Figure 4 represents both e-commerce and e-procurement elements by having multiple vendors and multiple buyers in a portal site that makes both electronic order and payment transactions.

Figure 2: Sell-Side One-to-Many Model



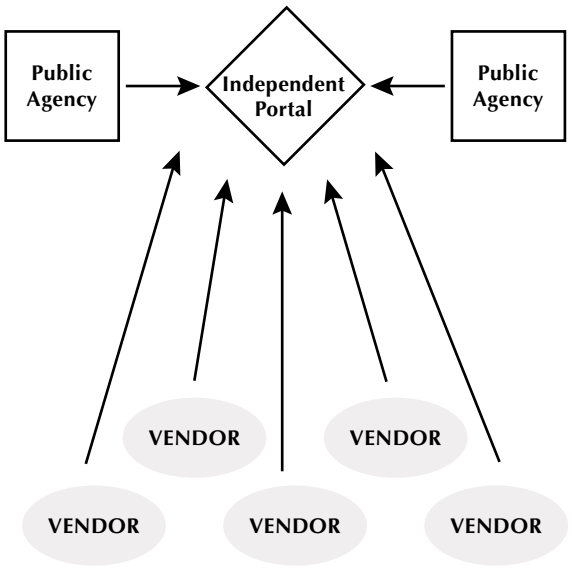
Adopted from Neef (2001), e-Procurement: From Strategy to Implementation, *p.76.*

Figure 3: Government Buy-Side One-to-Many Model



Adopted from Neef (2001), e-Procurement: From Strategy to Implementation, *p.78.*

Figure 4: The Independent Portal Model



Adopted from Neef (2001), e-Procurement: From Strategy to Implementation, *p. 81.*

The independent portal site is a central place where buyers and vendors are integrated to make online transactions. Current e-procurement practices have shifted from the sell-side one-to-many model to the independent portal model. Many ASPs are third parties who design and provide portal sites for web-based shopping malls, web-based auctions, and other web-based marketing- and procurement-related services (Neef, 2001). Many governments have favorably adopted this independent portal model, thanks to the potential benefits from the infrastructure that a private ASP readily provides. Many governments favor this model because, with low initial costs and little technical capacity, they can take advantage of commercial ASPs. Independent ASPs often proactively approach governments and develop e-procurement portal sites for them with an expectation of profitable business opportunities in the future.

Funding Approaches

Various funding approaches[7] have been presented and introduced by state governments for developing state e-procurement systems: (1) exclusive state-funded approach (Tennessee); (2) self-funded approach/ reverse revenue approach (Texas, Connecticut, Colorado, and Utah); and (3) combined approach (Washington) (NECCC, 2000b). If a state has a designated revolving fund or funding flexibility, then the state-funded approach might be a good option. The state can then charge transaction fees to vendors and use them partially to fund the system.

Many state governments prefer the self-funded approach because it requires no initial funding. Private vendors often host the system and charge fees for providing e-procurement services, such as registration/subscription, ordering transaction, bidding transaction, and catalog service (NECCC, 2000b). The combined approach combines the self-funding approach with a government's paying partially for the system's initial development costs. As state governments and ASPs face substantial financial challenges with the exclusive state-funded approach or the self-funded approach, many states seem to prefer the combined approach (Sarkar, 2001b).

Governments need to consider legal and policy aspects in determining their funding mechanisms for e-procurement. States with statutory spending and revenue limitation (i.e., TABOR in Colorado) should deal with systems that charge a fee to the vendors, in the context of their statutory revenue limits. Limits on spending and revenue challenge the legal ability of state agencies to function like commercial entities. Also, they potentially could affect governments' efforts to provide equal opportunities to small businesses (NECCC, 2000b). There are several fundamental questions regarding funding sources of e-procurement systems: (1) Who should maintain the ownership of the system? (2) Who should be in charge of raising necessary funds? and (3) Who should pay the acquisition cost? To answer these questions, governments must deal with another set of legal, political, technical, and policy issues, such as a rigorous business and cost model, a fee-enforcement mechanism, a policy stating the mandated or optional use of the e-procurement system, political support, budget office support, and technical support (NECCC, 2000b).

Standardization

Standardizing e-procurement is another challenging task for both governments and vendors who want more efficient, more effective e-procurement systems. Standardization already has been an issue in terms of e-commerce practices, such as ordering integration with EDI, eXtensible Markup Language (XML), Open Buying on the Internet (OBI), as well as Vendor Centric Standards with XML and xCBL (NECCC, 2001b). Now, standardization includes several supplier concerns, such as catalog creation, external integration (punch-out,[8] channel consideration for co-branding, etc.), internal integration (supply chain automation), and order status as well as electronic invoicing and payment. It also incorporates specific commodity codes, such as National Institute of Governmental Purchasing (NIGP)[9] and the United Nations Standard Product and Services Code (UNSPSC),[10] among others.

In particular, EDI, a critical element of e-commerce, ensures the security of data transfer. EDI is often used between vendors and manufacturers when dealing with purchase orders, purchase order changes, invoices, and requests for proposals. Long used in the transportation industry, EDI has been adopted by many other industries. Its benefits include saving costs—reducing the amount of paper by transmitting electronic documents instead—improving quality through keeping better records and saving time, reducing inventory, and providing better information for decision making (Kalakota and Whinston, 1997). Among the standards for EDI are International Telecommunication Union (ITU) standards, the ANSI X.12 standard, and the United Nations EDIFACT standard (Gunyou and Leonard, 1998). Steps such as purchase order, purchase order confirmation, booking request, booking confirmation, advance ship notice, status report, receipt advice, invoice, and payment represent the basic EDI transactions (Kalakota and Whinston, 1997, p. 379).

Although closely associated with efficient, speedy adoption of e-procurement by governments and suppliers, standardization and interoperability still face many obstacles. Standardization often requires resources for training in such technical details as typography, lexicon, and structure. Considering the various standards currently used for state e-procurement systems, governments and vendors will have to give more attention and more resources to the difficult task of achieving a uniform standardization of e-procurement.

State E-Procurement in Practice

At the state level, NASPO along with the National Association of State Information Resource Executives (NASIRE) and the National Association of State Directors of Administrative and General Services (NASDAGS) conducted joint research and presented a white paper in 1996 to promote innovative procurement management. Their recently published report, "Buying Smart: State Procurement Reform Saves Millions," suggests managerial solutions and best practices based on a detailed examination of various procurement challenges.

Many state governments have already implemented some innovative procurement measures by reengineering the procurement process—reducing purchasing time, streamlining layers of review, allowing more discretion for small purchases, broadening relationships with vendors, and awarding bids based on best value (JTFIT, 1996). The joint study suggests five reform agenda items, in which e-procurement is emphasized as the future of procurement management:

- Simplifying the procurement of commodity items and services
- Building an infrastructure for electronic commerce
- Procuring based on best values
- Developing beneficial partnerships with vendors
- Solving problems with solicitations

A report by NECCC (2000b) summarizes the scope of e-procurement in state governments by presenting its six major elements: (1) passive bid solicitation systems, (2) web-based publication of state contracts and price agreements, (3) bid solicitation distribution systems, (4) catalog systems without bidding capability, (5) catalog systems with internal quote and bidding capability, and (6) catalog systems integrated with the state's accounting systems (p. 5). These elements reflect the evolution of e-procurement from the elementary stage—one-way, passive communication to disseminate public notices of bid solicitation—to the intermediate stage—proactive bid solicitation through the electronic mailing system—and onward to the highly sophisticated stage of integrating e-procurement into accounting systems. Some states (Connecticut, Washington, Colorado, and Utah) actually require that e-procurement systems be integrated with their existing accounting systems (NECCC, 2000b). As state governments take their technically sophisticated, extensive e-procurement systems to a higher level, they face multiple technical, legal, and managerial challenges.

Based on these preliminary observations, the next section surveys several e-procurement initiatives and presents innovative approaches for e-procurement market integration: single-state systems, two-state systems, a multistate system for horizontal integration, and a local-state system for vertical integration. The current status of various e-procurement applications among state governments is discussed, based on the three surveys conducted in 1998, 2000, and 2001.

Single State E-Procurement Initiatives

North Carolina (NC E-Procurement @ Your Service)

In February 2001, North Carolina initiated an extensive e-procurement system for all public organizations in the state, including state agencies, schools, municipalities, and communities. Accenture (2001) reported on the initiative, suggesting that it would be introduced over three years following a four-year business model, with a total budget of about $60 million.

Unlike many of its counterparts, the North Carolina e-procurement system is mandatory for all state agencies. Two private companies, Accenture and Epylon Corporation, developed the system. Its comprehensive online features include requisitioning, purchase order transmission, notification of electronic quotation requests, electronic quote response for informal bidding, and receipt of goods (for more information, see www.ncgov.com/eprocurement/asp/section/index.asp). The state also plans to integrate the e-procurement system with its financial system. Officials estimate cost savings to be about $50 million a year (Sarkar, 2001c). North Carolina chose a self-funding system, charging a 1.75 percent marketing fee to future vendors. Despite the bold e-procurement initiative, fewer online transactions have been made than the state and vendor expected, which puts more financial constraints on the self-funding model. This is an example of the unexpected obstacles that can follow the implementation of an e-procurement system in a favorable atmosphere and with great rhetoric on the part of a state government.

Virginia (eVA)

Leading an e-government initiative, Virginia's governor highlighted an e-procurement program with Executive Order 65 in May 2000. To actualize the state's e-procurement system, the Department of General Services collected information and feedback from vendors concerning the best design. The state organized a focus group to invite more specific input from vendors and then solicited designs of e-procurement systems, finally selecting American Management Systems Inc. (AMS) as the vendor (Sarkar, 2001c).

Virgina's system, namely eVA (www.eva.state.va.us), was designed to facilitate the automating and streamlining of procurement (Atwater, 2001). In addition to automated procurement procedures, it includes electronic receiving and invoicing as well as reverse auctions. The eVA system provides various procurement information services for public use, as well as exclusive information and services for registered vendors and agencies. Virginia charges $25 per transaction or an advance fee of $200 for registration, online access, vendor catalog posting, and other services such as electronic receipts and online bid submissions. Vendors also pay a 1-percent transaction fee per order, not to exceed $500. The eVA system is expected to benefit government buyers through better selection, buying, processes, and decisions. It benefits participating vendors through simplified administrative procedures, more opportunities, better processes, and better support services. Local governments and school districts in the state, as well as state agencies, can use the system for procurement.

Maryland (eMaryland M@rketplace)

Maryland initiated the eMaryland M@rketplace (www.eMarylandmarketplace.com) program and has been pushing e-procurement as part of an overall effort to become "the digital state." The state launched the program in 2000 and has already seen some progress. According to Pete Richkus, secretary of the Department of General Services:

> [The eMaryland M@rketplace] is already delivering significant savings for the State and our public sector partners. For example, Anne Arundel County saved almost $12,000 on 27 bid solicitations in its first month as a participating buying entity. Our

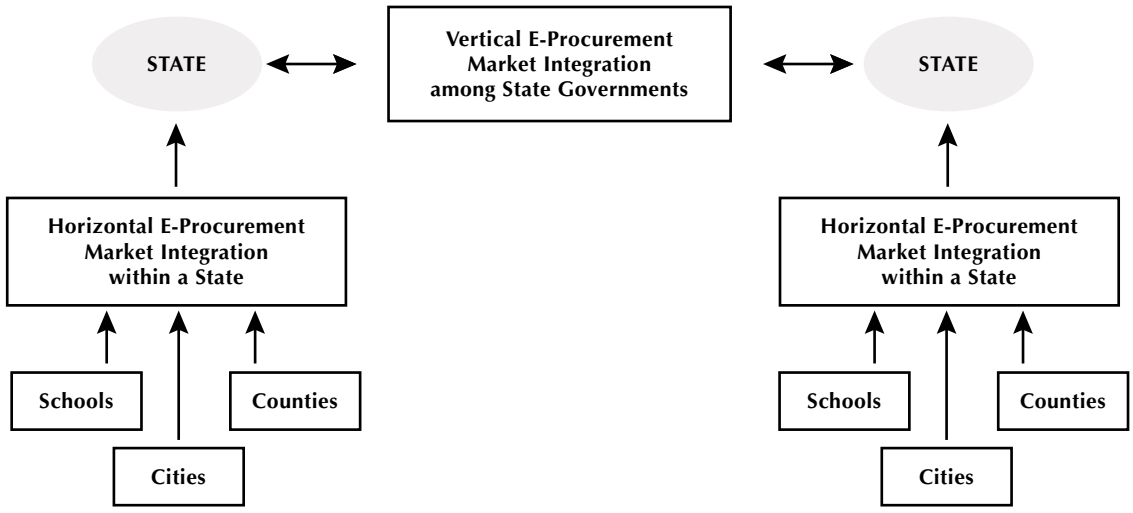
> eMaryland M@rketplace vendors are also realizing financial and resource efficiencies. In March 2000, Maryland began to move its $6 billion in annual purchasing to the Internet by taking a totally innovative approach: no new funding, no new bureaucracy, no multimillion dollar program development contract. The process begins with a creative, multistep request for proposal (RFP), well defined by requirements, and an aggressive outreach program to vendors throughout Maryland as well as to state and local government agency buyers. In its first year, eMaryland M@rketplace posted more than $10 million in purchases on its website, enrolled close to 3000 companies, and trained over 250 buyers (Maryland Department of General Services, 2001, p. 2).

Commenting on the eMaryland M@rketplace, Major Riddick, Jr., the governor's former chief of staff and chairman of the Maryland Information Technology Board, said that the new e-procurement system will "save money, time, and eliminate duplicated efforts and our vendors can recover many of these same costs for themselves" (Maryland Department of General Services, 2001, p.3). The annual report prepared by the Maryland Department of General Services (2001) for the eMaryland M@rketplace (2001) provides some evidence of growing popularity among public buyers in the state. The cumulative catalog-usage-by-dollar amount had jumped to $140,000 in March 2001 from $60,000 in March 2000, while the cumulative catalog-usage-by-transaction number had reached 175 in March 2001 from 25 in March 2000. As of March 2001, 262 government buyers (state agencies, municipalities, schools) and 280 vendors were participating in the eMaryland M@rketplace program.

Initiatives for Horizontal and Vertical Market Integration

Several states' innovative, collaborative e-procurement approaches demonstrate both horizontal (interstate) and vertical (intergovernmental) e-procurement collaboration for market integration. In horizontal market integration, two or more states combine their purchasing power to obtain better pricing and a more cost-efficient procurement system. In vertical market integration, local and state governments and quasi-governmental organizations collaborate by using the same electronic catalogs and the same e-procurement system. Figure 5 illustrates horizontal and vertical e-procurement.

Figure 5: Horizontal and Vertical E-Procurement Market Integration



Colorado and Utah Joint E-Procurement: A Cooperative System

In the 2000 meeting of the Western State Contracting Alliance, the governments of Colorado and Utah exchanged ideas about developing a cooperative e-procurement system that takes advantage of existing e-commerce and first-rate suppliers. Advancing the idea, the two states established a five-year contract for the joint system. They contracted with the NIC Commerce—a subsidiary of a nationally known portal vendor with 13 state portal implementations, including Hawaii and South Carolina—which has e-procurement catalog systems with NASA, the U.S. Air Force, and the Houston-Galveston Area Council of Governments (Utah Division of Purchasing and General Services: www.purchasing.state.ut.us/eps/description.htm). The contract stipulates that the two state governments are not responsible for the development cost and that the NIC Commerce recovers its cost through a 1-percent transaction fee to successful vendors. Other states are allowed to join the system later.

This joint e-procurement system was designed to provide Colorado and Utah with a single catalog system for requisitioning and ordering small purchases, such as office supplies, computers and other commodities, as well as services on state price agreements and catalogs from other vendors in the NIC trading community. The system promotes various goals, as offered in its mission statement: (1) automating procurement processes, (2) collecting comprehensive expenditure data, (3) reducing procurement time with appropriate procurement oversight, (4) seeking improved pricing and cost savings, and (5) enhancing supplier exposure to state purchases (Utah Division of Purchasing and General Services: www.purchasing.state.ut.us/eps/welcome%20page.htm). Following a 270-day pilot phase, the system was to be fully implemented (Sarkar, 2001a). Unfortunately, the two states decided not to implement the joint e-procurement system because they viewed the pilot objectives (particularly in terms of demonstrated efficiencies and prospects of reduced costs through broad supplier adoption) as not having been met. Although Colorado and Utah did not see the tangible benefits of proceeding to full-scale production as outweighing the resource costs and risks involved, their joint effort offers a great possibility for future collaborative efforts between states.

Multi-State EMall™ Initiative: A Horizontal/ Interstate Market Integration

To take advantage of the scale of economy—similar to better price deals at wholesale markets—several states joined the Multi-State EMall™ pilot project that the Operational Services Division of Massachusetts initiated at the end of 1997. Its private ASP, Intelisys Electronic Commerce (whose name was later changed to Metiom), was selected and asked to offer the applications of various e-procurement-related technical elements, including authentication and authorization, requisitioning, order processing, and receiving functionality.

In 1998, Massachusetts made online transactions for a statewide procurement contract. The pilot was later expanded to include four other states (Idaho, New York, Texas, and Utah) in the project. The Multi-State EMall team produced a comprehensive evaluation in 1999, suggesting the project to be successful and to exemplify the possibilities of online multistate cooperative procurement processes. In the report presented by the Multi-State EMall team (2000) to the NASPO 2000 Marketing meeting, the team forecasted its cost savings for the year to be between $4.3 million (conservative calculation) and $8.1 million (optimistic calculation). Despite its positive prospects, this initiative currently faces serious challenges as its ASP, Metiom, filed bankruptcy under Chapter 11 in May 2001 (www.state.ma.us/emall/). Despite the unexpected interruptions and challenges, the Multi-State EMall provides information and services via its own website (www.state.ma.us/emall/), and its executive committee plans to sustain the initiative.

State and Local Government Collaboration: A Vertical/Intergovernmental Market Integration

As seen in the eVA and Multi-State EMall initiatives, many single state e-procurement systems pursue vertical (intergovernmental) market integration to take advantage of economies of scale by combining the purchasing powers of local and state governments. California, Massachusetts, North Carolina, South Carolina, and Virginia invite local govern-

ments, school districts, and various quasi-public organizations to participate in their e-procurement systems and obtain price and procedural benefits. For example, the North Carolina e-procurement system attempts to generate a statewide vertical market integration to take advantage of cost savings by incorporating various vendors and buyers, including state agencies and institutions, universities, community colleges, public schools, and local governments.

Advances in State E-Procurement

Much of the following information was obtained from an e-mail survey designed by the author and from mail surveys conducted by NASPO, a non-profit organization of 50 directors from the 50 states' central purchasing offices. The NASPO surveys were conducted in 1998 and 2000 by the NASPO Research and Publication Committee, and their results were published in 1999 and 2001, respectively.[11] In 1998, 47 states[12] responded to the NASPO survey and provided their procurement information, while 43 states[13] responded to the 2001 survey.[14]

The NASPO surveys collected comprehensive information, including procurement authority, bidding practices, ethics codes, environmental issues, purchasing information technology, use of technology, automated procurement systems, purchasing cards, travel cards, and utility deregulation. In a follow-up (conducted by the author in October and December 2001) to update the 2001 NASPO survey, e-mail surveys were sent to procurement officers in 50 states. Thirty-five states[15] responded concerning the use of technology, automated procurement systems, and purchasing cards—information that helps us understand current e-procurement practices among the states.

This study basically combines the author's 2001 follow-up e-mail survey and the 2001 NASPO survey. The 2001 follow-up survey updates the 2001 NASPO survey and adds information for states that did not respond originally: Alabama, Delaware, Oregon, and Wisconsin. The combined 2001 data (the follow-up survey and 2001 NASPO survey) are analyzed and compared with the 1998 NASPO survey data to identify any particular trends in the adoption of e-procurement practices. It should also be noted that the 2001 surveys include much more detailed information than the 1998 survey regarding e-procurement, though many items overlap in the two surveys. The 2001 follow-up e-mail survey by the author includes questions regarding the effectiveness of e-procurement practices.

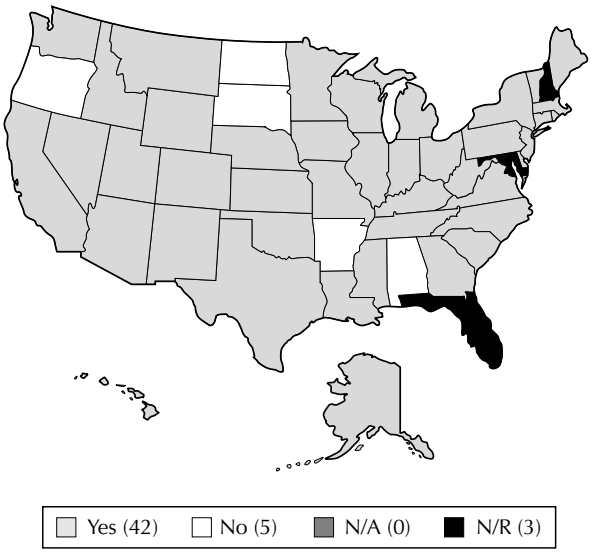
Adoption of Web Technology

Public agencies have adopted web technology widely in recent years. Agencies typically post a wealth of information regarding their missions, functions, contacts, public relations, and answers to frequently asked questions. Web pages for procurement offices often have more sophisticated and technical applications, such as electronic request for proposals, electronic ordering, vendor information, electronic catalog, reverse auction, and Internet-based bidding.

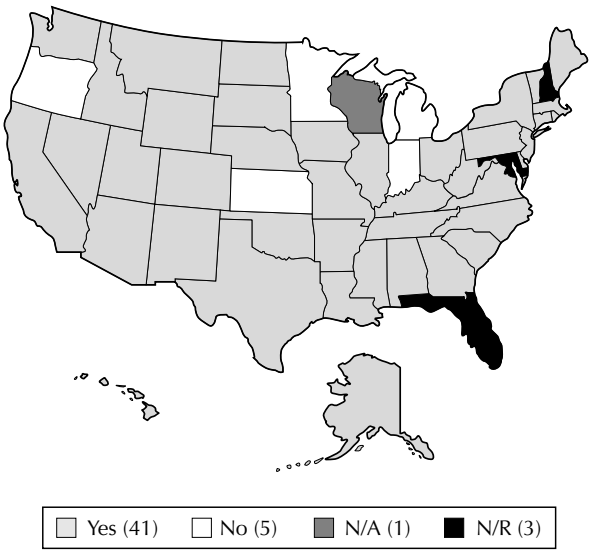
Despite variation in functions, as well as in degrees of sophistication and extensiveness, all state governments offer websites for procurement management. (The web addresses and major contact information are summarized in Appendix I.) According to the 2001 NASPO survey, all state governments utilized e-mail systems to support communication with vendors and internal buyers, but their computer systems are not well linked with other communication systems. For example, only 15 out of 43 states responded that they have integrated fax systems in which a fax is linked with central procurement's computer system. Only

eight states (Arizona, Arkansas, California, Iowa, Nebraska, South Carolina, South Dakota, and Virginia) responded that they received incoming faxes via this system. This indicates that communication systems are not well integrated, although state procurement offices are fairly well equipped with various communication tools.

Posting Solicitation/Bids on the Web (2001)



Posting Contract Awards on the Web (2001)



According to the 2001 combined survey data, while respondent states have their own web pages for their central procurement office, 42 states post solicitation/bid information and 41 states post contract-award information on the web. More state governments have come to rely on the web as a means of disseminating information for public notice. In 1998, for example, 39 states responded that they upload RFP information and 35 states responded that they post contract-award information on the web.

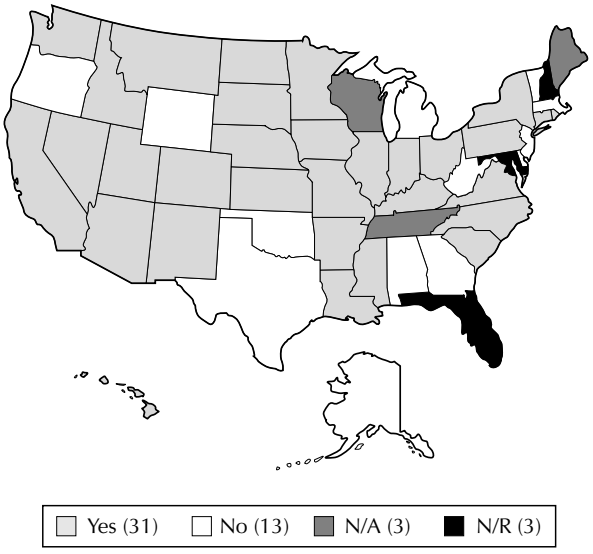
Adoption of Digital Signature

Digital signature is an electronic means of signing electronic documents that provides sender authentication using public-key encryption. Digital signature supports e-procurement and e-commerce by facilitating online financial and documental transactions. The authentication procedure of digital signature includes (1) combining private key and specific document and (2) computing the composite (key + document) and generating a unique number (digital signature).[16]

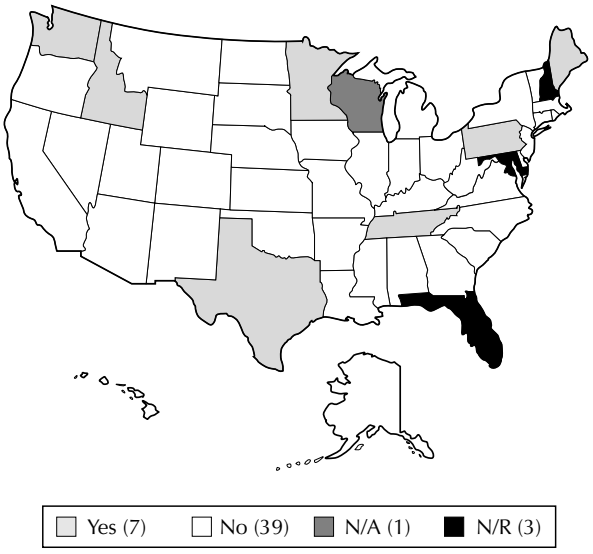
In 2001, only 31 states had enacted digital signature laws to facilitate online financial transactions. Only eight states (Illinois, Kentucky, Louisiana, Minnesota, New Mexico, South Carolina, South Dakota, and Tennessee) responded that their procurement management offices use digital signature to route and approve documents internally. Only seven states (Idaho, Maine, Minnesota, Pennsylvania, Tennessee, Texas, and Washington) responded that they accept as legally binding digital signatures from the vendor community on procurement documents.

The number of state governments enacting digital signature legislation, though, has increased. In 1998, only 21 states responded that they had digital signature legislation, and six states (Arizona, Maryland, Michigan, Nevada, Tennessee, and Texas) responded that they approved digital signature for internal documents. Only four states (Maryland, Ohio, Pennsylvania, and Washington) responded that they accepted digital signature for procurement documents.

Digital Signature Legislation (2001)



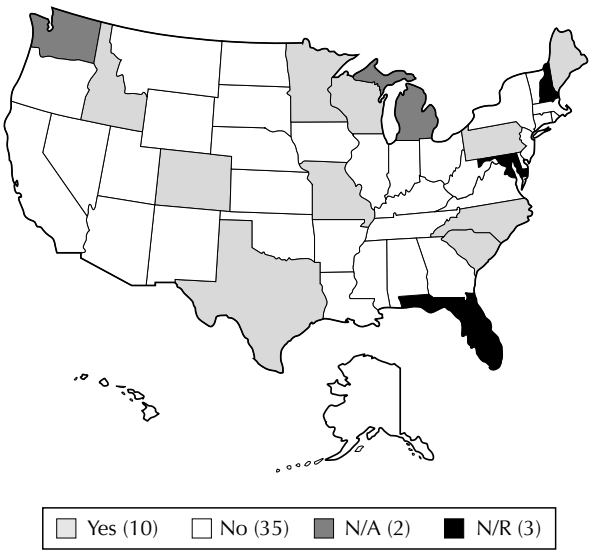
Digital Signature for Procurement Documents (2001)



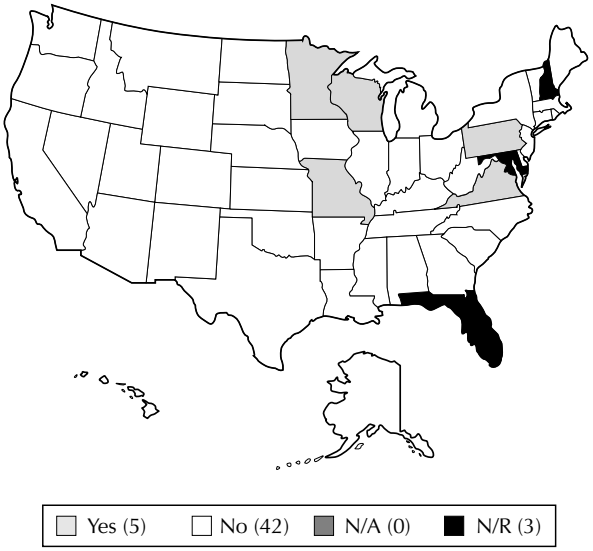
Internet-Based Bidding and Reverse Auction

Internet-based bidding, using e-commerce through online auctions, has become common practice. The practices of Internet-based bidding and even reverse auctions increasingly are being introduced to governments. For example, governments can specify the products they want to purchase with specific prices in a reverse auction, and vendors of these products compete to offer the best prices. At the federal level, the GSA's Federal Technology Service has introduced reverse auction through the Buyers.gov portal site. Often, bidders can bid more than once with their identities unknown to each other, which ensures dynamic competition and true market pricing (O'Hara, 2001). The Minnesota Department of Administration recently initiated reverse auction by allowing vendors to simultaneously compete with each other online for state contracts. The reverse auction system helps governments save costs because vendors tend to lower their bidding price to win the contracts. In fact, in its first auction on June 21, 2001, the Department of Corrections saved about $35,000 by buying 500,000 pounds of aluminum for license plates through MaterialNet (www.materialnet.com) (Morehead, 2001).

Governing Procedures for Internet Bidding (2001)



Reverse Auction (2001)



Despite the prospective benefits and rising popularity of Internet-based bidding systems and reverse auction in the private business area, they have not been widely introduced to state governments. Only 10 states (Colorado, Idaho, Maine, Minnesota, Missouri, North Carolina, Pennsylvania, South Carolina, Texas, and Wisconsin) have developed procedures or statutes governing Internet bidding, while 13 states (Idaho, Kentucky, Maine, Massachusetts, Michigan, Minnesota, Missouri, North Carolina, Pennsylvania, South Carolina, Texas, Virginia, and Wisconsin) responded that their central procurement office has conducted electronic bidding. Only five states (Minnesota, Missouri, Pennsylvania, Virginia, and Wisconsin) currently conduct reverse auctions for their procurement. The 1998 NASPO survey did not survey the status of Internet bidding and reverse auction in state governments because they had not been widely introduced to state procurement management at that time.

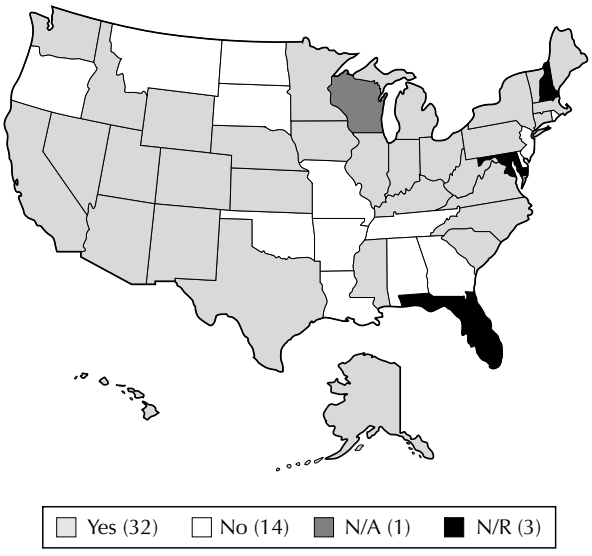
Electronic Ordering

Like e-commerce practices in the private sector, electronic ordering—which governments can use to make purchase orders electronically—is a fundamental element of e-procurement. About 32 states have electronic ordering systems as part of their e-procurement systems. Of them, only four states (California, Ohio, Pennsylvania, and Virginia) responded that their systems are maintained by state governments, whereas 25 states responded that the systems are maintained by vendors. Four states (Idaho, Kentucky, Massachusetts, and Wyoming) responded that their systems are maintained jointly by the state and vendors.

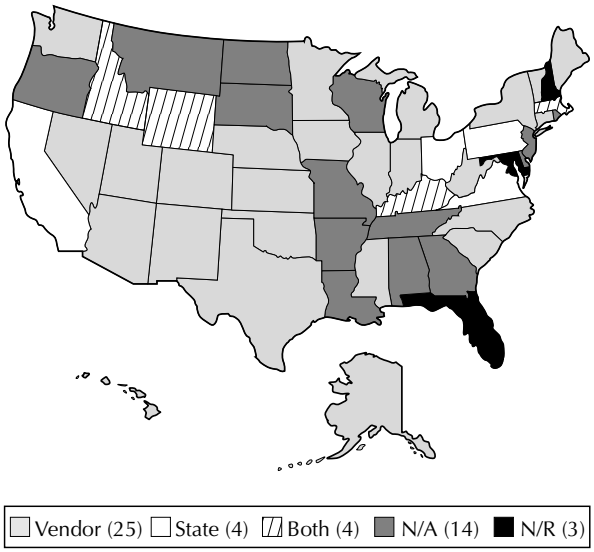
The management of electronic ordering systems and procurement portal sites is often initiated, developed, and maintained by private businesses. This fact suggests two conflicting points. On the one hand, state government have actively taken advantage of the existing private sector capacity to maximize the utility of e-procurement; on the other hand, a strong business interest exists in the e-procurement implementation process, which may cause concerns about potential accountability problems.

Electronic ordering has been rapidly diffused to many states over the last three years. According to the 1998 NASPO survey, only 21 state governments responded that they had an electronic ordering system. Similarly, a majority of the electronic systems (16) are maintained by vendors; the system is maintained by state governments in six states. The Florida state procurement office responded that the system was maintained jointly by vendors and state government.

Electronic Ordering (2001)



Electronic Ordering System Maintainer (2001)

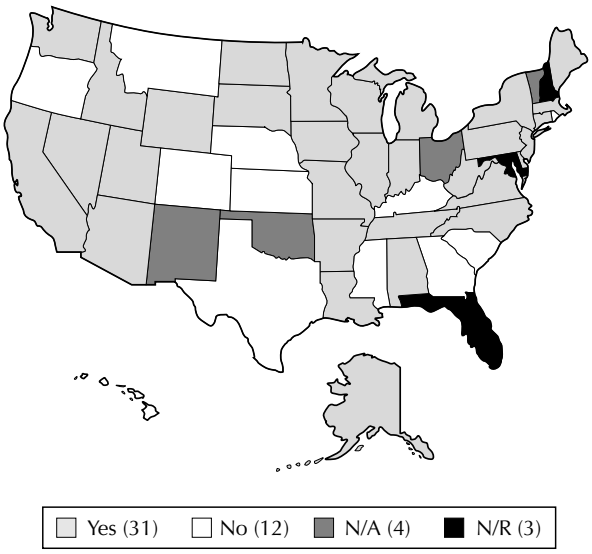


Maintenance of Procurement Records

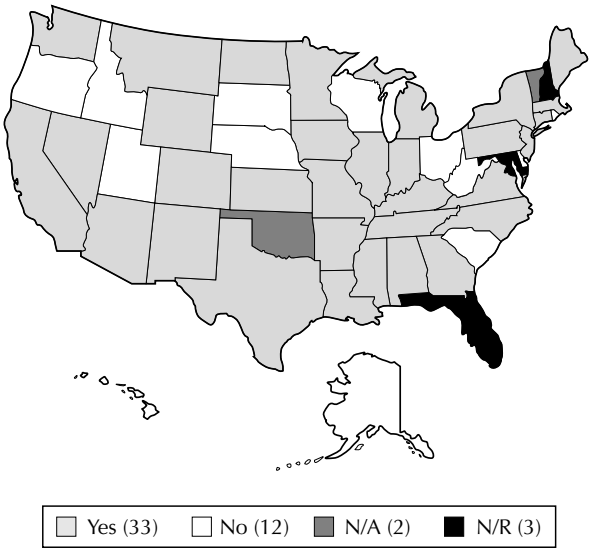
Strong managerial and technical capacities for maintaining and tracking procurement-related records—which allow the state to assess and audit its procurement decisions and cost-effectiveness—are critical to the overall quality of procurement. Many state governments seem to have a centralized record-keeping system in that central procurement offices maintain records of the overall dollar volume of purchases. According to the 2001 data, 31 state governments responded that they maintain those records in central procurement offices, while eight states responded that the records are maintained by other state agencies. Thirty-three state governments responded that their central procurement offices are able to track dollars spent by type of commodity or service, while 36 states responded that they are able to track dollars spent according to vendor.

Little has changed in procurement record-keeping systems. The 1998 survey indicates that 30 states, specifically, their central procurement offices, recorded and maintained the overall dollar amount of purchases. Thirty-two state governments responded, in 1998, that they could track the dollars spent by type of commodity, while 36 state governments responded that they could track dollars spent according to vendor.

Record Keeping (Total Amount) by Central Procurement Office (2001)



Tracking Records for Amount by Commodity (2001)

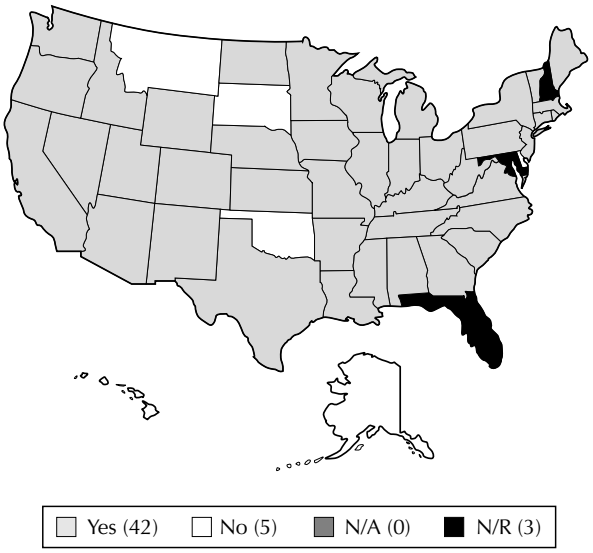


Automated Procurement Systems

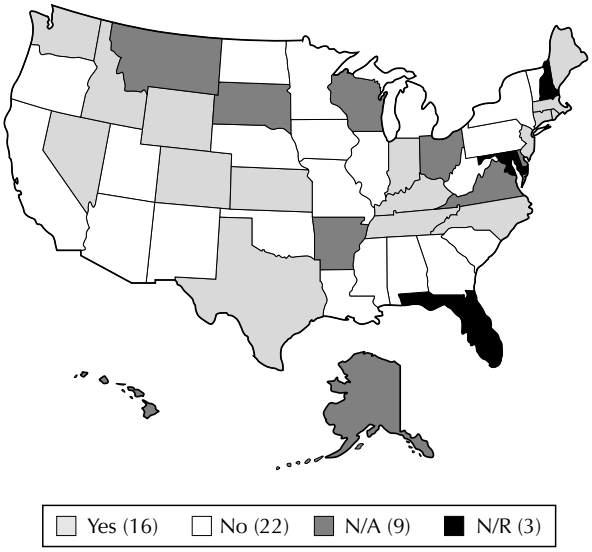
Automation of the procurement process enables the state to make procurement decisions at the user level by providing vendors' information and catalogs on the web. The automated system often decentralizes procurement management, making the organization flatter, or less hierarchical. The system also helps save time and reduce total cost by providing comprehensive views of state procurement decisions and multiple procurement choices. Automated procurement systems offer various functions, from such simple services as provision of vendor's performance and order forms to such sophisticated services as lead-time analysis and asset management support.

In the 2001 survey, many states (42) responded that central procurement offices have automated procurement systems, but few states responded that they are equipped with a full range of capacities, such as automatic purging, selection of vendors, vendor performance screens, lead-time analysis, and asset management. For example, 16 states have the capacity for lead-time analysis, and 18 states incorporate the EDI element in their procurement system. Sixteen state governments integrate their procurement system with the e-commerce system, and 26 have added asset management functions to the automated procurement system. These aspects of e-procurement were not included in the 1998 survey, so no comparison is made here.

Automated Procurement Systems (2001)



Automated Procurement Systems Integrated to E-Commerce (2001)



Purchasing Cards

An electronic payment system (EPS) is defined as "a financial exchange that takes place online between buyers and sellers" (Kalakota and Whinston, p. 153). In fact, EPS is the critical part of e-commerce that enables online financial transactions. EPS includes electronic cash, electronic checks, online credit-card-based systems, the point of sale (POS), smart cards, and purchasing cards, among others. The federal government has developed a system to link e-procurement (ordering) and e-payment (paying) for goods and services. For example, an innovation from the GSA automatically links purchasing information and accounting information (Robinson, 2001).

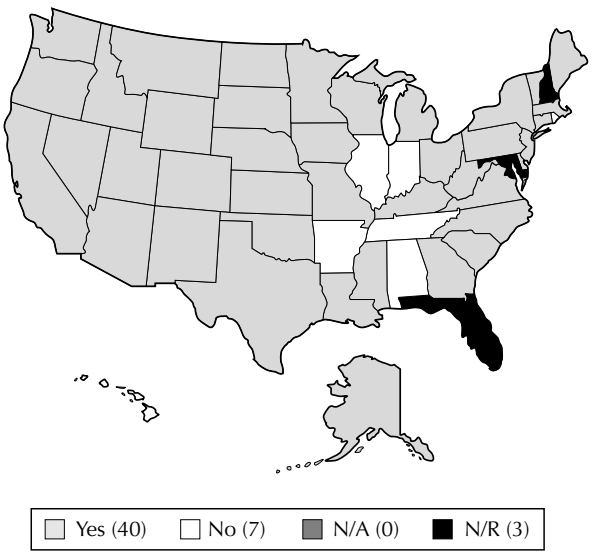
E-procurement systems widely use purchasing cards, in particular, for small but frequent purchases. Many states have adopted purchasing cards to reduce processing costs and to enhance the quality of record keeping. It is common for the cards to be issued by major credit companies (such as Visa, MasterCard, or American Express) so that public employees can purchase various goods and services directly through vendors. A recent NASPO (2001b) report highlights benefits that purchasing cards bring to procurement management, including administrative cost reductions, productivity increases,

vendor flexibility, reporting improvement, and employee empowerment and convenience, among others.

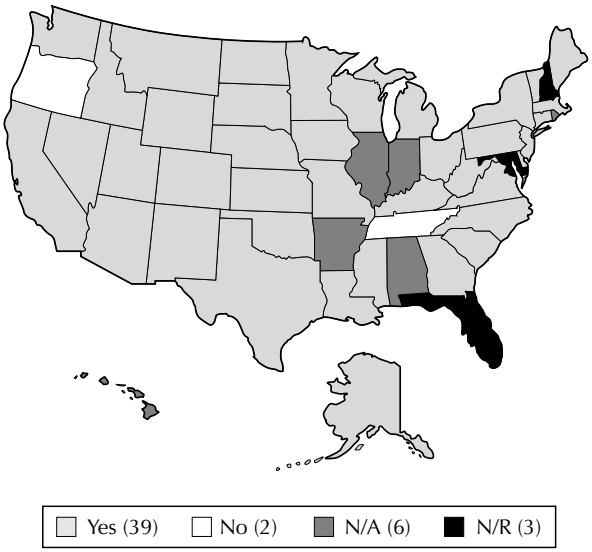
> Presently, more than 50 percent of the items procured through purchasing cards are under $1,000. Quite often, these items can represent up to 80 percent of a government's transactions but less than 20 percent of that government's purchasing dollar. Using a government rule-of-thumb number that each purchase order costs $75 to $100 to issue, the potential cost avoidance for governments is substantial. Some users report up to a 90 percent reduction in processing costs (118).

In the 2001 survey, seven states (Alabama, Arkansas, Hawaii, Illinois, Indiana, Rhode Island, and Tennessee) responded that they do not use purchasing cards yet, although many states have flexible policies under which purchasing cards are optional. Forty, out of 47, states responded that they use purchasing cards as a tool for their procurement management. Most states that use purchasing cards have some sort of limit, such as a single purchase (often $1,000 or $2,500), daily purchase, or cycle purchase limit, to prevent abuse of the cards. Many states do not allow state employees to use purchasing cards for alcoholic beverages and travel. States vary greatly in monthly transaction volumes with, for example, South Carolina having monthly card transactions of $35,000 and Washington spending $2.5 million per month on average.

Purchasing Cards (2001)



Purchasing Cards for Statewide Contracts (2001)



Thirty-nine state governments use purchasing cards for statewide contracts and fleet management. Only five states (Arizona, California, Iowa, Pennsylvania, and West Virginia) responded that their purchasing cards are funded through a fee-based cost recovery. Only 17 state governments post purchasing-card transactions to their accounting systems.

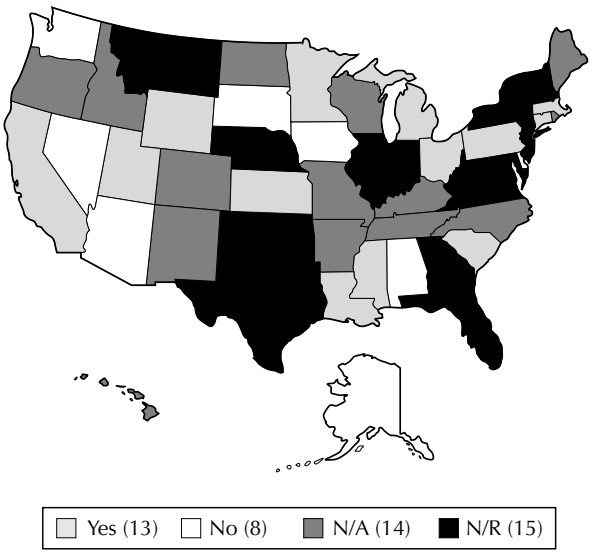
Purchasing cards appear to be the major development in state procurement over the last three years. According to the 1998 survey, only 32 state governments indicated that they used purchasing cards for state procurement, 29 state governments used purchasing cards for statewide contracts, and 35 state governments had fleet management purchasing cards.

Assessment of Systems' Effectiveness

The 2001 follow-up e-mail survey by the author asked the states' chief procurement officers to indicate whether e-procurement management had yielded cost-saving and time-saving benefits. Only 13 states[17] out of 35 respondents indicated cost savings, while 11 states[18] indicated having saved time.

Massachusetts indicated having saved $52–$108 per procurement transaction and having realized a 72-percent reduction in the time spent for procurement management. Despite rhetoric and some indication of positive outcomes, however, not many state governments could offer their specific, rigorous information about cost and time benefits. State governments, it seems, lack this information and cannot prove specific utilities of their initiatives because e-procurement is still new and experimental. As indicated above, however, many state governments have made steady progress in advancing e-procurement by adopting various elements. Table 1 summarizes the changes in state e-procurement practices between 1998 and 2001.

Cost Savings through E-Procurement (2001)



Time Savings through E-Procurement (2001)

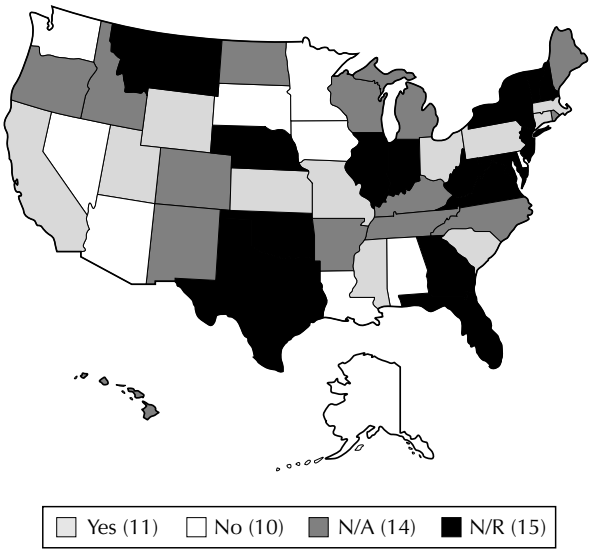


Table 1: Changes in State E-Procurement Practices between 1998 and 2001

	1998*			2001**		
	Yes	**No**	**N/A**	**Yes**	**No**	**N/A**
Posting solicitation/bid on the web	**39**	8	0	**42**	5	0
Posting contract award information on the web	**35**	12	0	**41**	5	1
Digital signature legislation	**19**	28	0	**31**	13	3
Approving digital signature internally	**6**	41	0	**8**	35	4
Accepting digital signature for procurement documents	**4**	43	0	**7**	39	
Governing Internet-based bidding procedures***				**10**	35	2
Practicing Internet-based bidding***				**13**	33	1
Reverse auction***				**5**	42	0
Electronic ordering	**21**	26	0	**32**	14	1
Automated procurement system***				**42**	5	0
Purchasing cards	**32**	15	0	**40**	7	0
Purchasing cards for statewide contracts	**29**	18	0	**39**	2	6
Fleet management purchasing cards	**35**	12	0	**39**	6	2
Cost-saving benefit***				**13**	8	14
Time-saving benefit***				**11**	10	14

** Forty-seven state governments responded to the 1998 NASPO survey.*

*** Forty-seven state governments are included. The data from the 2001 NASPO survey and the 2001 follow-up e-mail survey by the author are combined.*

**** The question is asked only in the 2001 e-mail follow-up survey, to which 35 state governments responded.*

Conclusions and Recommendations

Conclusions

E-procurement, as an e-government initiative, is perceived to be an innovative alternative that leads to better, more efficient, and more effective procurement management by overcoming many traditional paper-based procurement problems. Based on this outlook, many state governments have implemented e-procurement initiatives to improve their procurement management, some even attempting to pursue horizontal and vertical e-procurement market integration.

Many state governments have adopted various e-procurement techniques: (1) posting solicitation and bids and contract-award information on the web, (2) electronic ordering, (3) automated procurement system, and (4) purchasing cards. Several others have also been implemented but less widely: (1) digital signature legislation and accepting digital signature as legally binding for procurement documents, (2) Internet-based bidding, and (3) reverse auction. E-procurement remains in the experimental stage, however, and most state governments have not reached the mature point of realizing benefits from their e-procurement practices.

A promising alternative rather than an instant panacea, e-procurement leaves state governments facing many technical, financial, legal, and managerial challenges. The following challenges should be resolved in order to sustain e-procurement as an initiative and obtain the prospective benefits and utilities.

1. Financial Issues

State governments often face considerable challenges in finding the financial resources required to develop e-procurement systems. With funding being a common problem, the exclusive state-funded approach is not being widely adopted. Many state governments rely on private companies' participation and private resources in developing the technical systems, and support a financial arrangement in which the private companies later recoup their investment by charging various fees. Accordingly, many e-procurement systems are developed, provided, and maintained by vendors and ASPs, which leads to the potential problem of private business interests overruling public interests. E-procurement systems driven by private businesses could be corrupted when those private interests lack appropriate accountability mechanisms.

Nor has the self-funded model met with success, as we saw in the North Carolina case. Sarkar (2001b) also reports that the private funding model has not been successful. A hybrid model has become more popular, one in which state governments invest some money and vendors recover their own costs through transaction fees. But state governments must continue to pay careful attention to the nature of funding mechanisms for e-procurement systems.

2. Technical and Standardization Issues

Lack of technical capacity is a major obstacle to e-procurement and other e-government initiatives. Procurement officers need such specialized technical skills as managing electronic catalogs, electronic

ordering, Internet-based bidding, reverse auction, digital signature, purchasing cards, and automated procurement systems. Managing e-procurement demands a more comprehensive range of skills because the automated procurement system is often linked to budgeting and accounting systems. Similarly, standardization and interoperability pose continuing challenges to state governments as they pursue better, more efficient, and more effective e-procurement systems.

3. Vertical and Horizontal Market Integration
Collaborative initiatives for e-procurement market integration that several state governments have undertaken have failed to succeed. They face technical and managerial difficulties, and many local governments are not equipped with either the necessary technical capacities or the e-procurement officers. States have not acquired tangible benefits of horizontally integrated e-procurement systems partially because the potential for gaining efficiencies and reducing costs through broad supplier adoption are outweighed by the costs and risks involved.

4. Legal/Accountability Issues
Because there have been legal challenges with respect to digital signatures, state governments should have an appropriate legal arrangement that specifies when a digital signature is accepted as a legally binding signature for procurement documents. Posting RFP information on the web should also be treated as a legitimate public notice. Because, for instance, purchasing cards have been abused by many public officials who use them for inappropriate purposes (GAO, 2001), state governments need strong accountability mechanisms to reduce the possibilities of abuse, fraud, and mismanagement of the e-procurement system.

5. Internal/External Management Challenges
E-procurement offers various internal and external management challenges to state procurement offices. Internally, states should develop—and govern according to—policies that offer comprehensive institutional outlines for e-procurement decisions and processes, institute clear procedures and functions as well, and develop closer, more strategic relationships with vendors. Externally, state governments need to communicate with vendors and ASPs to update procurement items and prices and to negotiate with them for better options and prices.

Recommendations

1. Develop Strategic Funding Mechanisms
In pursuing long-term, sustainable benefits of e-procurement, state governments should carefully assess both weaknesses and strengths of alternative funding models (exclusive state-funded approach, self-funded approach, and hybrid approach) and cost-recovery models. Assessments should be based on the governments' financial condition, the projected number and amount of e-procurement transactions, as well as cost-efficiency and public accountability.

2. Provide Technical Assistance and Pursue Standardization
State governments should develop and maintain technical personnel, in-house or contractual, who can manage automated procurement and administer statewide procurement transactions and related data.

State governments should continue to introduce advanced e-procurement elements that are less diffused to governments, including Internet-based bidding and electronic ordering.

State governments should provide more technical training opportunities to state procurement officers and public/quasi-public officers who use advanced e-procurement systems.

3. Promote Vertical and Horizontal E-Procurement Market Integration
State procurement offices should continue to carefully pursue e-procurement market integration, vertical and horizontal, and to form specific cooperative institutional arrangements.

They should invite more vendors to participate in e-procurement systems based on mutual interests, and they should also provide more technical assistance to local governments and other quasi-public organizations.

4. Institute Legal/Accountability Mechanisms
State governments should enact digital signature laws and should proactively define announcements made via the web to be legitimate public notices.

State governments should institute strong accountability mechanisms to reduce the possibilities of abusive, improper, and fraudulent e-procurement activities.

State governments should promote accountability and efficiency by establishing and maintaining record-keeping systems and by integrating procurement systems with accounting systems to allow for systematic tracking and checking of procurement data.

5. Establish Collaborative Relationships with Vendors, ASPs, and Government Buyers
State governments should develop statewide procurement policies and procedures that govern many e-procurement activities, including electronic ordering, Internet-based bidding, and reverse auctions, among others.

Central procurement offices should develop closer, more strategic relationships among government buyers, vendors, and ASPs in order to build more cooperative relationships and ensure more updated price information and better price negotiation.

State governments should establish a systemic procurement arrangement for better prices with specific vendors through purchase agreements.

E-procurement offers both opportunities and challenges to state governments. To accomplish sustainable e-procurement, state governments should cope with these challenges proactively and strategically by enhancing appropriate technical and managerial capacities, improving the quality of systems, and establishing cooperative inter-sectoral and intergovernmental relationships among central procurement offices, state agencies, local governments, vendors, and ASPs. Such efforts will turn the rhetoric of e-procurement into real administrative results in the near future.

Appendix I: Web Addresses and Contact Information for State Procurement Offices

State	Director	Address
Alabama http://www.purchasing.state.al.us/	Ran Garver (Acting)	Division of Purchasing Department of Finance P.O. Box 302620 100 N. Union Street, Ste. 192 Montgomery AL 36130 Phone: 334/242-7250 Fax: 334/242-4419 rgarver@purchasing.state.al.us
Alaska http://www.state.ak.us/local/akpages/ADMIN/home.htm	Vern Jones	Division of General Services Department of Administration P.O. Box 110210 333 Willoughby Road Juneau AK 99811-0210 Phone: 907/465-5684 Fax: 907/465-2189 Vern_jones@admin.state.ak.us
Arizona http://sporas.ad.state.az.us/	John Adler	State Procurement Office Department of Administration 15 South 15th Avenue, Suite 103 Phoenix AZ 85007 Phone: 602/542-5308 Fax: 602/542-5508 John.Adler@ad.state.az.us
Arkansas http://www.accessarkansas.org/dfa/purchasing/index.html	Joe Giddis	Office of State Purchasing Department of Finance & Administration 1509 West 7th Street P.O. Box 2940 Little Rock AR 72203 Phone: 501/324-9312 Fax: 501/324-9311 joe.giddis@dfa.state.ar.us

State	Director	Address
California http://www.pd.dgs.ca.gov/	Ralph Chandler	Procurement Division Department of General Services 1823 14th Street Sacramento CA 95814 Phone: 916/445-6942 Fax: 916/324-2009 Ralph.Chandler@dgs.ca.gov
Colorado http://www.gssa.state.co.us/	Richard Pennington	Division of Purchasing Department of Personnel 225 East 16th Avenue, Ste. 802 Denver CO 80203-1613 Phone: 303/866-6100 Fax: 303/894-7445 richard.pennington@state.co.us
Connecticut http://www.das.state.ct.us/busopp.asp	Jim Passier	Procurement Services Department of Administrative Services P.O. Box 150414 165 Capitol Avenue Hartford CT 06106 Phone: 860/713-5086 Fax: 860/713-7484 jim.passier@po.state.ct.us
Delaware http://www.state.de.us/purchase/index.htm	Blaine Herrick	Division of Purchasing Department of Administrative Services Wilmington Avenue, Gov. Bacon Grounds P.O. Box 299 Delaware City DE 19706 Phone: 302/834-7081 Fax: 302/836-7642 bherrick@state.de.us
District of Columbia	Jacques Abadie, III (Interim)	Department of Administrative Services 441 4th Street, NW Suite 800 S Washington DC 20001 Phone: 202/727-0252 Fax: 202/727-6827 abadiej@ocp.dcgov.org

State	Director	Address
Florida http://fcn.state.fl.us/fcn/centers/purchase/	David Minacci	Division of Purchasing Department of Management Services 4050 Esplanade Way, Suite 335M Tallahassee FL 32399-0950 Phone: 850/488-3049 Fax: 850/414-6122 hosayr@dms.state.fl.us
Georgia http://www.doas.state.ga.us/	Debra Blount (Acting)	Statewide Business Services Department of Administrative Services 200 Piedmont Avenue, Suite 1304 W. Floyd Building Atlanta GA 30334 Phone: 404/657-6000 Fax: 404/655-4528 rdkissel@doas.ga.gov
Hawaii http://www.state.hi.us/icsd/dags/spo.html	Aaron Fujioka	State Procurement Office P.O. Box 119 1151 Punchbowl Street, 230-A Honolulu HI 96813 Phone: 808/587-4700 Fax: 808/587-4703 Aaron_Fujioka@exec.state.hi.us
Idaho http://www2.state.id.us/adm/purchasing/index.htm	Jan Cox	Division of Purchasing Department of Administration 5569 Kendall Street P.O. Box 83720 Boise ID 83720 Phone: 208/327-7472 Fax: 208/327-7320 jcox@adm.state.id.us
Illinois http://www.state.il.us/cms/purchase/default.htm	Robert Kirk	Procurement Services Division Dept. of Central Management Services 801 Wm. G. Stratton Building Springfield IL 62706 Phone: 217/785-3868 Fax: 217/782-5187 robert_kirk@cms.state.il.us

State	Director	Address
Indiana http://www.ai.org/idoa/index.html	Rebecca Reddick	Division of Procurement Department of Administration Government Center South 402 W. Washington St., Rm. W468 Indianapolis IN 46204 Phone: 317/232-3032 Fax: 317/232-7312 rreddick@idoa.state.in.us
Iowa http://www.state.ia.us/government/dgs/Purchase/business.htm	Patricia Schroeder	Customer Service, Admin. and Purchasing Department of General Services Hoover State Office Building, Level A Des Moines IA 50319 Phone: 515/281-8384 Fax: 515/242-5974 Patti.Schroeder@dgs.state.ia.us
Kansas http://da.state.ks.us/purch/	John Houlihan	Division of Purchases Department of Administration Landon State Office Building 900 S.W. Jackson Street, Room 102N Topeka KS 66612 Phone: 785/296-2376 Fax: 785/296-7240 John.Houlihan@state.ks.us
Kentucky https://ky-purchases.com/	Mike Burnside	Division of Purchases Finance & Administration Cabinet Room 367, Capitol Annex Building Frankfort KY 40601 Phone: 502/564-4510 ext. 248 Fax: 502/564-7209 Mike.Burnside@mail.state.ky.us
Louisiana http://www.doa.state.la.us/osp/osp.htm	Denise Lea	Office of State Purchasing Division of Administration P.O. Box 94095 301 Main Street, 13th Floor Baton Rouge LA 70804 Phone: 225/342-8057 Fax: 225/342-8688 dlea@doa.state.la.us

State	Director	Address
Maine http://www.state.me.us/purchase/homepage.htm	Richard Thompson	Division of Purchases Department of Administrative & Financial Services State Office Building State House Station #9 Augusta ME 04333-0009 Phone: 207/624-7332 Fax: 207/287-6578 Richard.B.Thompson@state.me.us
Maryland http://www.dgs.state.md.us/overview/procure2.htm	Mark Krysiak	Purchasing Bureau Department of General Services 301 W. Preston Street, Room M6 Baltimore MD 21201 Phone: 410/767-4430 Fax: 410/333-5482 gpwcmg@dgs.state.md.us
Massachusetts http://www.state.ma.us/osd/osd.htm	Ellen Phillips	Operational Services Division John W. McCormack Office Building One Ashburton Place, Room 1017 Boston MA 02108 Phone: 617/727-7500 ext. 260 Fax: 617/727-6123 ellen.phillips@state.ma.us
Michigan http://www.state.mi.us/dmb/oop/	Kathy Jones	Office of Purchasing Department of Management & Budget P.O. Box 30026 530 W. Allegan, Mason Bldg., 2nd Floor Lansing MI 48909 Phone: 517/373-0300 Fax: 517/335-0046 jonesk@state.mi.us
Minnesota http://www.mmd.admin.state.mn.us/	Kent Allin	Materials Management Department of Administration 112 State Administration Building 50 Sherburne Avenue St. Paul MN 55155 Phone: 651/296-1442 Fax: 612/297-3996 kent.allin@state.mn.us

State	Director	Address
Mississippi http://www.mmrs.state.ms.us/Purchasing/	Don Buffum	Office of Purchasing & Travel 1401 Woolfolk Bldg, Suite A 501 North West Street Jackson MS 39201 Phone: 601/359-3912 Fax: 601/359-2470 buffum@dfa.state.ms.us
Missouri http://www.oa.state.mo.us/purch/purch.htm	Jim Miluski	Division of Purchasing & Materials Mgmt. Department of Administration P.O. Box 809 301 W. High Street, HST Bldg. #580 Jefferson City MO 65101 Phone: 573/751-3273 Fax: 573/526-5985 MilusJ@mail.oa.state.mo.us
Montana http://www.mt.gov/doa/ppd/index.htm	Marvin Eicholtz	Procurement & Printing Division Department of Administration P.O. Box 200135 Helena MT 59620-0132 Phone: 406/444-3318 Fax: 406/443-2212 meicholtz@state.mt.us
Nebraska http://www.das.state.ne.us/materiel/	Don Medinger	Material Division Department of Administrative Services 301 Centennial Mall South P.O. Box 94847 Lincoln NE 68509 Phone: 402/471-2401 Fax: 402/471-2268 dmeding@notes.state.ne.us
Nevada http://www.state.nv.us/purchasing/	William Moell	Purchasing Division Department of Administration 209 E. Musser, Room 304 Carson City NV 89710 Phone: 775/684-0170 bmoell@govmail.state.nv.us

State	Director	Address
New Hampshire http://www.state.nh.us/das/purchasing/index.html	Wayne Myer	Bureau of Purchase & Property Department of Administrative Services State House Annex, Room 102 25 Capitol Street Concord NH 03301 Phone: 603/271-3606 Fax: 603/271-2700 wmyer@admin.state.nh.us
New Jersey http://www.state.nj.us/treasury/purchase/	Janice DiGiuseppe (Acting)	Procurement & Contracting New Jersey State Purchase Bureau Department of Treasury 33 W. State Street, CN-230 Trenton NJ 08625-0230 Phone: 609/292-4751 Fax: 609/292-0490 formica_j@tre.state.nj.us
New Mexico http://www.state.nm.us/clients/spd/spd.html	Lou Higgins	Purchasing Division Department of General Services 1100 St. Francis Drive Joseph Montoya Building Santa Fe NM 87501 Phone: 505/827-0480 Fax: 505/827-2484 lou.higgins@state.nm.us
New York http://www.ogs.state.ny.us/purchase/default.asp	Paula Moskowitz	Procurement Services Group Office of General Services Mayor E. Corning, 2nd Tower, Room 3804 Albany NY 12242 Phone: 518/474-6710 Fax: 518/486-6099 customer.services@ogs.state.ny.us
North Carolina http://www.doa.state.nc.us/PandC/	J. Arthur Leaston	Division of Purchase & Contract Department of Administration 305 Mail Service Center Raleigh NC 27699-1805 Phone: 919/733-3581 Fax: 919/733-4782 john.leaston@ncmail.net

State	Director	Address
North Dakota http://www.state.nd.us/csd/	Linda Belisle	Central Services Office of Management & Budget 600 East Blvd., Dept. 188 Bismarck ND 58505-0420 Phone: 701/328-3494 Fax: 701/328-1615 lbelisle@state.nd.us
Ohio http://www.state.oh.us/das/gsd/pur/pur.html	Mark Hutchison	General Services Division Department of Administrative Services 4200 Surface Road Columbus OH 43228-1395 Phone: 614/466-2375 Fax: 614/466-7525 Mark.Hutchison@das.state.oh.us
Oklahoma http://www.dcs.state.ok.us/okdcs.nsf/	Tom Jaworsky	Central Purchasing Division Department of Central Services 2401 N. Lincoln Blvd., Ste 116 Oklahoma City OK 73105 Phone: 405/521-2115 Fax: 405/522-6266 Tom_Jaworsky@dcs.state.ok.us
Oregon http://tpps.das.state.or.us/purchasing/	Dianne Lancaster	Purchasing Services Division Department of Administrative Services 1225 Ferry Street, SE Salem OR 97310 Phone: 503/378-3529 Fax: 503/373-1626 Dianne.Lancaster@.state.or.us
Pennsylvania http://www.dgs.state.pa.us/purch.htm	Joe Nugent	Department of General Services 414 North Office Building Harrisburg PA 17125 Phone: 717/787-4718 Fax: 717/783-6241 jnugent@state.pa.us

State	Director	Address
Rhode Island http://www.purchasing.state.ri.us/home.html	Peter Corr	Associate Director/Purchasing Agent Division of Procurement Materials & Information Management Department of Administration One Capitol Hill Providence RI 02908-5855 Phone: 401/277-2142 ext. 123 Fax: 401/277-6387 pcorr@purchasing.state.ri.us
South Carolina http://www.state.sc.us/mmo/mmo/	Robert Voight Shealy	Materials Management Officer Office of General Services 1201 Main Street, Ste. 600 Columbia SC 29201 Phone: 803/737-0600 Fax: 803/737-0639 VShealy@ogs.state.sc.us
South Dakota http://www.state.sd.us/boa/pp.htm	Jeff Holden	Office of Purchasing & Printing Division of Central Services Bureau of Administration 523 East Capitol Pierre SD 57501 Phone: 605/773-3405 Fax: 605/773-4840 jeff.holden@state.sd.us
Tennessee http://www.state.tn.us/generalserv/purchasing/	George Street	Department of General Services Third Floor, Tennessee Tower 312 Eighth Avenue North Nashville TN 37243-0557 Phone: 615/741-1035 Fax: 615/741-0684 gstreet@mail.state.tn.us
Texas http://www.gsc.state.tx.us/	Jim Railey	General Services Commission P.O. Box 13042 Capitol Station Austin TX 78711 Phone: 512/463-3444 Fax: 512/463-7994 jim.railey@gsc.state.tx.us

State	Director	Address
Utah http://www.purchasing.state.ut.us/	Douglas Richins	Division of Purchasing Department of Administrative Services 3150 State Office Building, Capitol Hill Salt Lake City UT 84114 Phone: 801/538-3143 Fax: 801/538-3882 pamain.drichins@state.ut.us
Vermont http://www.bgs.state.vt.us/PCA/index.html	Peter Noyes	Division of Purchasing General Services Department 128 State Street, Drawer 33 Montpelier VT 05633-7401 Phone: 802/828-2211 Fax: 802/828-2222 peter.noyes@state.vt.us
Virginia http://159.169.222.200/dps/	Ron Bell	Division of Purchases & Supply Department of General Services P.O. Box 1199 805 E. Broad Street, 4th Floor Richmond VA 23218-1199 Phone: 804/786-3846 Fax: 804/371-7877 rbell@dgs.state.va.us
Washington http://www.ga.wa.gov/vendor.htm	Bill Joplin (Acting)	Office of State Procurement Department of General Administration 201 General Administration Building P.O. Box 41017 Olympia WA 98504-1017 Phone: 360/902-7404 Fax: 360/586-2426 bjoplin@ga.wa.gov
West Virginia http://www.state.wv.us/admin/purchase/	David Tincher	Purchasing Division 2019 Washington St., East P.O. Box 50130 Charleston WV 25305 Phone: 304/558-2538 Fax: 304/558-4115 dtincher@gwmail.state.wv.us

State	Director	Address
Wisconsin http://vendornet.state.wi.us/vendornet/	Leo Talsky (Acting)	Bureau of Procurement Department of Administration 101 E. Wilson Street, 6th Floor P.O. Box 7867 Madison WI 53707-7867 Phone: 608/266-0974 Fax: 608/267-0600 Michael.Cornell@doa.state.wi.us
Wyoming http://ai.state.wy.us/GeneralServices/procurement.asp	Mac Landen	Purchasing Section Department of Administration & Information Emerson Building, Room 323E 2001 Capitol Avenue Cheyenne WY 82002 Phone: 307/777-7253 Fax: 307/777-5852 MLANDE@state.wy.us

Source: National Association of State Procurement Officials (NASPO)'s website (http://www.naspo.org/directory/index.cfm#anchor236482), accessed April 22, 2002.

Appendix II: Summary of the Surveys

Table A.1: 1998 NASPO Survey

State	Web Solicitation	Contract Award on Web	Digital Signature	DS for Internal Document	DS for Procurement Document	Electronic Ordering	EO Maintainer	Record: Total Amount
Alabama	n	n	n	n	n	n	n/a	n
Alaska								
Arizona	y	y	y	y	n	n	n/a	y
Arkansas	n	n	n	n	n	y	vendor	n
California	y	y	y	n	n	y	vendor	y
Colorado	y	y	n	n	n	n	n/a	n
Connecticut	y	y	n	n	n	y	state	y
Delaware	n	y	n	n	n	y	vendor	y
Florida	y	n	y	n	n	y	combo	y
Georgia	y	y	y	n	n	n	n/a	y
Hawaii	y	n	n	n	n	n	n/a	n
Idaho	y	n	y	n	n	y	vendor	y
Illinois	y	y	y	n	n	n	n/a	y
Indiana	y	y	y	n	n	n	n/a	y
Iowa	y	y	n	n	n	y	state	y
Kansas	y	y	y	n	n	n	n/a	n
Kentucky								
Louisiana	n	n	n	n	n	n	n/a	y
Maine	y	n	n	n	n	y	vendor	y
Maryland	y	y	n	y	y	n	n/a	y
Massachusetts	y	y	n	n	n	y	state	y
Michigan	y	n	n	y	n	n	n/a	y
Minnesota	y	y	y	n	n	y	state	y
Mississippi	n	n	y	n	n	y	vendor	n
Missouri	y	y	n	n	n	y	vendor	y
Montana	y	y	y	n	n	n	n/a	y
Nebraska	y	y	n	n	n	y	vendor	n
Nevada	y	y	n	y	n	n	n/a	y
New Hampshire								
New Jersey	y	y	n	n	n	n	n/a	y
New Mexico	y	y	y	n	n	n	n/a	y
New York	y	y	n	n	n	y	vendor	n
North Carolina	y	y	y	n	n	n	n/a	y
North Dakota	n	n	n	n	n	n	n/a	n
Ohio	y	y	n	n	y	y	state	y
Oklahoma	y	y	n	n	n	n	n/a	y
Oregon	y	y	y	n	n	y	vendor	y
Pennsylvania	y	y	n	n	y	y	state	n
Rhode Island	y	y	y	n	n	n	n/a	n
South Carolina	y	n	y	n	n	n	n/a	n
South Dakota	n	y	n	n	n	y	vendor	y
Tennessee	y	y	n	y	n	n	n/a	y
Texas	y	y	n	y	n	n	n/a	n
Utah	y	y	y	n	n	y	vendor	y
Vermont	y	y	n	n	n	y	vendor	n/a
Virginia	n	y	n	n	n	n	n/a	n
Washington	y	y	y	n	y	n	n/a	n
West Virginia	y	y	n	n	n	n	n/a	y
Wisconsin	y	y	y	n	n	y	vendor	y
Wyoming	y	n	n	n	n	n	n/a	n

Record: Amount by Commodity	Record: Amount by Vendor	Purchasing Card	PC for Statewide Contract	Fleet Management	PC for Travel
n	n/a	n	n	n	y
n	n/a	y	y	y	n
n	n/a	n	n	n	y
y	y	y	y	y	y
n	y	y	y	y	y
y	y	y	y	n	y
n	n/a	y	y	n	y
y	y	y	y	y	y
y	y	y	y	y	y
n	n/a	n	n	n	n
y	y	y	y	y	y
y	y	n	n	y	y
y	y	n	n	y	n
y	y	n	n	y	y
n	n	y	y	y	y
y	y	n	n	y	y
y	y	y	y	y	y
y	y	y	y	y	y
y	y	y	y	y	n
y	y	y	n	y	y
y	y	y	y	y	n
n	n	y	y	y	y
y	y	y	n	y	n
n	y	y	y	y	y
n	n	n	n	n	y
y	n	y	y	n	y
y	y	y	y	n	y
y	y	n	n	y	y
y	y	y	y	y	y
y	y	y	y	y	y
n	n	n	n	y	n
y	y	y	y	n	y
y	y	n	n	y	y
y	y	y	y	y	y
y	y	y	y	y	y
n	y	n	n	n	n
n	y	y	n	y	y
n	y	y	y	y	y
y	y	n	n	y	y
y	y	y	y	y	y
y	y	y	y	y	y
n/a	n/a	n	n	y	n
y	y	y	y	y	y
y	y	y	y	n	y
y	y	y	y	y	y
y	y	y	y	y	y
y	y	n	n	n	y

Table A.2: 2001 Combined Procurement Survey—The 2001 NASPO Survey and 2001 Follow-Up E-Mail Survey

State	Web Solicitation	Contract Award on Web	Digital Signature Legislation	DS for Internal Approval	DS for Procurement Document	Governing Internet Bidding	Internet Bidding	Reverse Auction
Alabama	n	y	n	n	n	n	n	n
Alaska	y	y	n	n	n	n	n	n
Arizona	y	y	y	n	n	n	n	n
Arkansas	n	y	y	n	n	n	n	n
California	y	y	y	n	n	n	n	n
Colorado	y	y	y	n	n	y	n	n
Connecticut	y	y	y	n	n	n	n	n
Delaware	y	y	n	n	n	n	n	n
Florida								
Georgia	y	y	n	n	n	n	n	n
Hawaii	y	y	y	n	n	n	n	n
Idaho	y	y	y	n	y	y	y	n
Illinois	y	y	y	y	n	n	n	n
Indiana	y	n	y	n	n	n	n	n
Iowa	y	y	y	n	n	n	n	n
Kansas	y	n	y	n	n	n	n	n
Kentucky	y	y	y	y	n	n	y	n
Louisiana	y	y	y	y	n	n	n	n
Maine	y	y	n/a	n/a	y	y	y	n
Maryland								
Massachusetts	y	y	n	n	n	n	y	n
Michigan	y	n	n	n	n	n/a	y	n
Minnesota	y	n	y	y	y	y	y	y
Mississippi	y	y	y	n	n	n	n	n
Missouri	y	y	y	n/a	n	y	y	y
Montana	y	y	y	n	n	n	n	n
Nebraska	y	y	y	n	n	n	n	n
Nevada	y	y	y	n	n	n	n	n
New Hampshire								
New Jersey	y	y	n	n	n	n	n	n
New Mexico	y	y	y	y	n	n	n	n
New York	y	y	y	n	n	n	n	n
North Carolina	y	y	y	n	n	y	y	n
North Dakota	n	y	y	n	n	n	n	n
Ohio	y	y	y	n	n	n	n	n
Oklahoma	y	y	n	n	n	n	n	n
Oregon	n	n	n	n	n	n	n	n
Pennsylvania	y	y	y	n	y	y	y	y
Rhode Island	y	y	y	n	n	n	n	n
South Carolina	y	y	y	y	n	y	y	n
South Dakota	n	y	y	y	n	n	n	n
Tennessee	y	y	n/a	y	y	n	n	n
Texas	y	y	n	n	y	y	y	n
Utah	y	y	y	n	n	n	n	n
Vermont	y	y	n	n	n	n	n	n
Virginia	y	y	y	n	n	n	y	y
Washington	y	y	y	n/a	y	n/a	n/a	n
West Virginia	y	y	n	n	n	n	n	n
Wisconsin	y	n/a	n/a	n/a	n/a	y	y	y
Wyoming	y	y	n	n	n	n	n	n

Electronic Ordering	EO Maintainer	Total Amount	Amount by Commodity	Amount by Vendor	Automated Procurement System	Lead-Time Analysis
n	n/a	y	y	y	y	n
y	vendor	y	n	n	n	n/a
y	vendor	y	y	y	y	n
n	n/a	y	y	y	y	y
y	state	y	y	y	y	n
y	vendor	n	y	y	y	n/a
y	vendor	y	y	y	y	n
n	n/a	y	n	y	n	n/a
n	n/a	n	y	y	y	n/a
y	vendor	n	n	n	n	n/a
y	combo	y	n	y	y	y
y	vendor	y	y	y	y	y
y	vendor	y	y	y	y	y
y	vendor	y	y	y	y	n
y	vendor	n	y	n	y	n
y	combo	n	y	y	y	n
n	n/a	y	y	y	y	y
y	vendor	y	y	y	y	n/a
y	combo	y	y	y	y	y
y	vendor	y	y	y	y	n
y	vendor	y	y	y	y	y
y	vendor	n	y	y	y	n
n	n/a	y	y	y	y	y
n	n/a	n	y	y	n	n/a
y	vendor	n	n	n	y	n
y	vendor	y	y	y	y	y
n	n/a	y	y	y	y	y
y	vendor	n/a	y	y	y	y
y	vendor	y	y	y	y	n
y	vendor	y	y	y	y	y
n	n/a	y	y	y	y	n
y	state	n/a	n	n	y	n/a
n	vendor	n/a	n/a	y	n	n
n	n/a	n	n	n	y	n
y	state	y	y	y	y	n/a
n	n/a	n	n	n	y	y
y	vendor	n	n	y	y	n
n	n/a	y	n	y	n	n/a
n	n/a	y	y	y	y	y
y	vendor	n	y	y	y	y
y	vendor	y	y	y	y	n
y	vendor	n/a	n/a	n/a	y	n
y	state	y	y	y	y	y
y	vendor	y	y	y	y	n
y	vendor	y	n	n	y	n
n/a	n/a	y	n	n	y	n/a
y	combo	y	y	y	y	n

Table A.2: 2001 Combined Procurement Survey—The 2001 NASPO Survey and 2001 Follow-Up E-Mail Survey (continued)

State	EDI Element	Integrated to E-Commerce	Asset Management	Purchasing Card	PC for Statewide Contract	PC for Travel	Cost Recovery for PC
Alabama	n/a	n	y	n	n/a	y	n/a
Alaska	n/a	n/a	n/a	y	y	y	n
Arizona	n	n	n	y	y	y	y
Arkansas	y	n/a	y	n	n/a	y	n/a
California	n	n	n	y	y	y	y
Colorado	y	y	n	y	y	y	n
Connecticut	y	y	n	y	y	y	n
Delaware	n/a	n/a	n/a	y	y	y	n
Florida							
Georgia	n/a	n	n	y	y	y	n
Hawaii	n/a	n/a	n/a	n	n/a	n	n
Idaho	y	y	y	y	y	y	n
Illinois	n	n	n	n	n/a	y	n/a
Indiana	y	y	y	n	n/a	y	n/a
Iowa	n	n	y	y	y	y	y
Kansas	y	y	n	y	y	y	n
Kentucky	y	y	y	y	y	y	n/a
Louisiana	n	n	n	y	y	y	n/a
Maine	y	y	n	y	y	y	n/a
Maryland							
Massachusetts	y	y	n	y	y	y	n
Michigan	n	n	n	y	y	y	n
Minnesota	y	n	n	y	y	y	n
Mississippi	n	n	n	y	y	y	n
Missouri	n	n	y	y	y	y	n
Montana	n/a	n/a	n/a	y	y	y	n
Nebraska	n	n	n	y	y	y	n
Nevada	y	y	y	y	y	y	n
New Hampshire							
New Jersey	y	y	n	y	y	n	n
New Mexico	y	n	n	y	y	y	n
New York	n	n	n	y	y	y	n
North Carolina	y	y	y	y	y	y	n
North Dakota	n/a	n	n	y	y	n	n/a
Ohio	n/a	n/a	n/a	y	y	y	n
Oklahoma	n	n	n	y	y	y	n
Oregon	n	n	n	y	n	n/a	n
Pennsylvania	y	n	n/a	y	y	y	y
Rhode Island	n/a	y	y	n	n/a	y	n/a
South Carolina	n	n	n	y	y	y	n
South Dakota	n/a	n/a	n/a	y	y	y	n
Tennessee	n	y	n	n	n	y	n
Texas	y	y	y	y	y	y	n
Utah	n	n	n	y	y	y	n
Vermont	n	n	n	y	y	y	n
Virginia	y	n/a	y	y	y	n	n
Washington	y	y	n	y	y	y	n/a
West Virginia	n	n	n	y	y	y	y
Wisconsin	n/a	n/a	n/a	y	y	y	n/a
Wyoming	n	y	y	y	y	y	n

PC Linked to Accounting System	Fleet Management	Cost Saving	Time Saving
n/a	y	n	n
y	y	n	n
n	y	n	n
n/a	n/a	n/a	n/a
n	y	y	y
n/a	y	n/a	n/a
y	n	y	y
n	y	n	n
n/a	y		
y	n	n/a	n/a
y	y	n/a	n/a
n/a	y		
n/a	y		
n	y	n	n
n	y	y	y
y	y	n/a	n/a
n	y	y	y
y	n/a	n/a	n/a
n	y	y	y
n	y	y	n/a
n	y	y	n
n	y	y	y
n/a	y	n/a	n
y	y		
n	y		
n	n	n	n
y	n		
n/a	y	n/a	n/a
y	y		
y	y	n/a	n/a
y	y	n/a	n/a
n	y	y	y
n	y		
y	y	n/a	n/a
y	y	y	y
n/a	y	n/a	n/a
n	y	y	y
y	y	n	n
n	y	n/a	n/a
n	y		
y	y	y	y
n	n		
n	n		
n/a	y	n	n
n	y		
y	y	n/a	n/a
y	y	y	y

Appendix III: Survey Instrument for the 2001 E-Mail Follow-Up Survey

Survey instrument is adopted from the 2001 NASPO survey to update information and fill in missing information.

1. Is the central procurement office posting solicitation/bids on the Web?
2. Is the central procurement office posting contract award information on the Web?
3. Has the state enacted digital signature law?
   1) If yes, what is the citation?
   2) If yes, please provide a summary of the law.
4. Does the state use digital signatures to route and approve documents internally?
5. Is the state accepting digital signatures as legally binding signatures from the vendor community on the procurement documents?
   1) If yes, which documents?
6. Has the state central procurement office developed procedures or have statutes governing Internet bidding?
7. Has the state central procurement office conducted bids via the Internet?
8. Has the state central procurement office conducted reverse auctions?
9. Does the state utilize electronic ordering?
   1) If yes, is the ordering system state or vendor maintained?
10. If the ordering system is state maintained:
    1) What standard do you use?
    2) What service provider does the central procurement office use?
    3) Is there a vendor fee or a fee to the customer?
11. Does the central procurement office maintain records of the overall dollar volume of purchase issued by central purchasing and delegated agencies (Yes, No, Other agency)?
12. Can the central procurement office tracks dollars spent by type of commodity or service (Yes, No, Other agency)?
13. Can the central procurement office track dollars spent by vendor (Yes, No, Other agency)?

Automated Procurement System

14. Does the central procurement office have an automated procurement system?

    If yes, please indicate if the system supports the following capabilities:

    1) a) Vendors automatically purged

       b) Vendors automatically selected

       c) Notice distribution of Invitation to bids and Requests for proposal via E-mail, Fax, Hard copy, or Other?

    2) On demand electronic distribution of Invitation for Bids and Requests for Proposals (via Fax on demand, Internet download, Other)?

    3) Vendor performance (via Vendor notes screen, Vendor performance screen, or Linked vendor notes and performance screens)?

4) a) Can purchase order form be easily modified?

b) Do purchase orders look as they are printed?

c) Can blanket purchase orders or contract be used?

d) Can contracts be searched for goods and services?

5) a) Are Invitation to Bid templates available?

b) What standard PC Suites software can be used in Invitation to Bid?

c) Do you have the ability to use standard terms and conditions language in an Invitation to Bid?

d) Do you have the ability to choose standard language for each Invitation

e) Can the Invitation to Bid be downloaded from the Internet?

f) Can the system handle sealed bids?

6) a) Can appropriate terms and conditions be copied to purchase orders and contracts?

b) Can purchase order and contract be printed at remote location?

c) Capable for online requisitioning from the agency customer?

d) Is the system capable of electronic routing and approvals?

7) Is the system capable of workload assignment and status?

8) Will the system document purchasing process milestones or timelines?

9) Will the system provide lead-time analysis?

10) Will the system record and prompt for pending action?

11) Does the system have commodity code capability?

12) Does the system have keyword search?

13) Which commodity codes are utilized?

14) Does the program allow for forms to be downloaded?

15) Is the system EDI capable?

16) Does the system support online receiving?

17) Does the system provide integrated electronic commerce?

18) Does the system support delegated authority?

19) Is the system integrated with an asset management system?

Purchasing Cards

15. Does the state have a purchasing card?

16. What are the typical dollar limits placed on the card (Single limit, Daily limit, Cycle purchase limit)?

17. Does the state allow purchasing cards to be used for purchasing from statewide contracts?

18. What is the estimated monthly transaction volume using the purchasing card?

19. Which credit card and bank is the state using?

20. Does your state use a credit card for travel?

    1) If yes, is it the same credit card as for general procurement?

21. Is use of purchasing cards optional?

22. Does the state fund the purchasing card program through a fee-based cost recovery? If yes, what is the fee?

23. What products/services are disallowed for use with the purchasing card program?

24. Do the purchasing card transactions electronically post to your statewide accounting system?

25. Does the state remit monthly payments via wire transfer/ACH?

26. Do you have a fleet management purchasing card?

    1) If yes, what fleet card processor is the state using?

27. Is there a state travel office?

28. Is the travel office within the CPO? If no, where is it located?

29. Does the travel office administer contract for Travel Agency Service?
    1) If no, how are these services provided to the agencies?
    2) Does the state administer contracts for air fares?
30. Does the state administer contracts for car rental?
31. Does the state administer contracts for hotel/motel?
32. Have you made any cost saving through e-procurement?
    1) If yes, how much cost did you save last year?
33. Have you made any time saving through e-procurement?
    1) If yes, how much time did you save last year?

Endnotes

1. Definitions of related terms are available at the website of National Electronic Commerce Coordinating Council:http://www.ec3.org/InfoCenter/02_WorkGroups/2000_Workgroups/eprocurement/definitions.htm.

2. This research is supported by a generous grant from The PricewaterhouseCoopers Endowment for The Business of Government. The author wants to thank the excellent research assistance of Jwa Young Poo, Deserai Anderson-Utley, Hae Won Kwon, and Jongyun Ahn.

3. Definitions of related terms are available at the website of National Electronic Commerce Coordinating Council: http://www.ec3.org/InfoCenter/02_WorkGroups/2000_Workgroups/eprocurement/definitions.htm.

4. This section builds on a previous paper (Moon, 2002). Some parts of the paper reappear in revised form in this section.

5. EDI standards have been established to promote any commonly used data (documents) found in routine business transactions.

6. BUYNET can be accessed via the Purchasing and Contracting website: www.co.san-diego.ca.us/cnty/cntydepts/general/prchcntr/newfctns.hts.

7. Advantages and disadvantages of each model are well summarized in NECCC (2001a), *Electronic Procurement: Funding Models and Measurement to Success*.

Also see Johnson (2002), Financing and Pricing E-Service. In Gant, Gant, and Johnson, State Web Portals: Delivering and Financing E-Service. The Pricewaterhouse-Coopers Endowment for The Business of Government.

8. Punch-out includes product selectors and product configurators. Product selectors refer to the technical applications that allow buyers to figure out specific applications of a product based on detailed characteristics of the product. It helps and supports selecting an appropriate product for a given application. Product configurators are a little different from product selectors in that they are equipped with the capacity to customize particular products within given criteria. For more details, see NECCC (2001b), p. 8.

9. There are 3-digit (class), 5-digit (item), 7-digit (group), and 10-digit (detailed item description) codes. For example, 615-45-29-028 is a 10-digit code. 615 indicates general office supplies, 45 is for file folders (regular, legal, and letter sizes). 615-45-29 indicates file folders, double tab, legal size, manila, standard height (overall 14-3/4 in. x 9-1/2 in.). 615-45-29-028 is file folders, one-third cut, 9-1/2 point, 100/box. The 3-digit level code does not require licensing but 5-digit and more upper-level codes require licensing. For more details, see NECCC (2001b), pp. 14–15.

10. The UNSPSC is accepted as the universal standard by the Electronic Commerce Code Management Association (ECCMA) and can be used without any licensing fees. There are four levels in the code hierarchy (segment, family, class, and commodity). Each hierarchical level has two to three digits for the code. For more details, see NECCC (2001b), pp. 15–17.

11. The NASPO surveys are summarized in NASPO Survey of State and Local Government Purchasing Practices (1998) and NASPO Survey of State and Local Government Purchasing Practices (2001a).

12. Nonresponding states are Alaska, Kentucky, and New Hampshire.

13. The seven states that did not respond are Alabama, Delaware, Florida, Maryland, New Hampshire, Oregon, and Wisconsin.

14. It should be noted that the 2001 NASPO survey reflects state e-procurement from 2000 since the survey was conducted in 2000 and published in 2001.

15. Nonresponding states are Florida, Georgia, Illinois, Indiana, Maryland, Montana, Nebraska, New Hampshire, New Jersey, New York, Oklahoma, Texas, Vermont, Virginia, and West Virginia.

16. For more details, see Kalkota and Whinston (1997), p. 142.

17. They are California, Connecticut, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, Ohio, Pennsylvania, South Carolina, Utah, and Wyoming.

18. The states include California, Connecticut, Kentucky, Louisiana, Massachusetts, Mississippi, Ohio, Pennsylvania, South Carolina, Utah, and Wyoming.

Bibliography

Accenture, *State of North Carolina E-Procurement Due Diligence Final Report*. January 26, 2001.

Anderson, Kim. "Reengineering Public Sector Organizations Using Information Technology." In *Reinventing Government in the Information Age,* New York, Routledge, 1999, pp. 312–330.

Atwater, Kristin. "Virginia Revolutionizes Virtual Sphere of Procurement." *Government Procurement,* June 2001, pp. 7–10.

Bozeman, B. and S. Bretschneider. "Public Management Information System: Theory and Perception." *Public Administration Review* (46) 1986, pp. 475– 487.

Bretschneider, S. "Managing Information Systems in Public and Private Organizations: An Empirical Test." *Public Administration Review* (50) 1990, pp. 536–545.

Brown, Douglas. "Information Systems for Improved Performance Management: Development Approaches in US Public Agencies." In *Reinventing Government in the Information Age,* ed. Richard Heeks. New York, Routledge, 1999, pp. 113–134.

Cats-Baril, W. and R. Thompson. "Managing Information Technology Projects in the Public Sector." *Public Administration Review* (55) 1995, pp. 559–566.

Caudle, Sharon. "Federal Information Resource Management after the Paperwork Reduction Act." *Public Administration Review* (4) 48, 1988, pp. 790–799.

Caudle, Sharon. "Strategic Information Resources Management: Fundamental Practices." *Government Information Quarterly* (1) 13, 1996, pp. 83–97.

Daukantas, Patricia. "PTO Starts E-government Shift." *Government Computer News* (33) 2000, p. 198. http://www.gcn.com/vo119_no33/news/3327-1.html. Accessed September 7, 2001.

Fletcher, P. "Local Government and IRM: Policy Emerging from Practice." *Government Information Quarterly*. (14) 1997, pp. 313–324.

Fountain, J. "The Virtual State: Toward a Theory of Federal Bureaucracy." In *democracy.com? Governance in Networked Word,* ed. Elaine Ciulla Kamarck and Joseph S. Nye. Jr., New Hampshire, Hollis Publishing Company, 1999.

Fountain, Jane. *Building the Virtual State: Information Technology and Institutional Change*. Washington, D.C., Brookings Institution Press, 2001.

General Accounting Office (GAO). *Purchasing Cards: Control Weaknesses Leave Two Navy Units Vulnerable to Fraud and Abuse*. Washington, D.C., 2001.

Gore, Albert. *Creating a Government That Works Better and Costs Less: Reengineering Through Information Technology.* Report of the National Performance Review, Washington D.C., U.S. Government Printing Office, 1993.

Government and the Internet Survey. "Handle with Care. *The Economist* (8176) 355, 2000, pp. 33–34.

Gunyou, John and Jane Leonard. "Getting Ready for E-commerce." *Government Finance Review* Vol. 14, No. 5, 1998, pp. 9–12.

Hart-Teeter, Inc. *EGovernment: The Next Revolution*. Washington, D.C., Council for Excellence in Government, 2000.

Hiller, Janine and France Bélanger. *Privacy Strategies for Electronic Government*. The PricewaterhouseCoopers Endowment for The Business of Government, 2001.

Joint Task Force on Information Technology of the National Association of State Purchasing Officers and the National Association of State Information Resource Executives (JTFIT). *Buying Smart: State Procurement Saves Millions*. White paper. National, 1996. http://www.naspo.org/whitepapers/buyingsmart.cfm. Accessed October 13, 2001.

Johnson, Craig. "Financing and Pricing E-Service." In Gant, Gant, and Johnson. *State Web Portals: Delivering and Financing E-Service*. The PricewaterhouseCoopers Endowment for The Business of Government, 2002.

Kalakota, Ravi and Andrew Whinston. *Electronic Commerce: A Manager's Guide*. Reading, Addison Wesley Longman, Inc., 1997.

Layne, Karen and Jungwoo Lee. "Developing Fully Functional E-Government: A Four Stage Model." *Government Information Quarterly* (2) 18, 2001, pp. 122–136.

Maryland Department of General Services. *eMaryland @ Marketplace 2001 Annual Report*. 2001.

Moon, M. Jae. "Evolution of Municipal E-Government: Rhetoric or Reality." *Public Administration Review* (4) 62, 2002, pp. 400–409.

Moon, M. Jae and Stuart Bretschneider. "Does the Perception of Red Tape Constrain IT Innovativeness in Organizations? Unexpected Results from a Simultaneous Equation Model and Implications." *Journal of Public Administration and Research and Theory* (2) 12, 2002, pp. 273–292.

Morehead, Nicholas. "Minnesota Tests Reverse Auctions." *Civic.com*. July 18, 2001.

Multi-State EMall™ Team. *Pilot Project Evaluation: A Multi-State Cooperative Procurement System on the Internet*. Office of the Comptroller, Operational Services Division, October 12, 1999.

Multi-State EMall™ Team. *Multi-State eMall: Procurement Powered by Intelisys*. Presented at NASPO 2000 Marketing Meeting. http://www.state.ma.us/emall/. Accessed April 10, 2002.

Musso, Juliet, Christopher Weare, and Matt Hale. "Designing Web Technologies for Local Governance Reform: Good Management or Good Democracy." *Political Communication* (1) 17, 2000, pp. 1–19.

National Association of State Procurement Officials. *NASPO Survey of State and Local Government Purchasing Practices*. 1998.

National Association of State Procurement Officials. 2001a. *NASPO Survey of State and Local Government Purchasing Practices*. 2001.

National Association of State Procurement Officials. 2001b. *NASPO State and Local Government Purchasing Principles and Practices*. 2001.

NECCC. 2000a. *Electronic Payments Primer.* National Electronic Commerce Coordinating Council Symposium 2001. Presented at the NECCC Annual Conference. Las Vegas, Nevada, December 13, 2000.

NECCC. 2000b. *Funding E-Procurement System Acquisition.* National Electronic Commerce Coordinating Council Symposium 2000. Presented at the NECCC Annual Conference. Las Vegas, Nevada, December 13, 2000.

NECCC. 2000c. *E-Government Strategic Planning: A White Paper.* National Electronic Commerce Coordinating Council Symposium 2000. Presented at the NECCC Annual Conference. Las Vegas, Nevada, December 13, 2000.

NECCC. 2001a. *Electronic Procurement: Funding Models and Measurement for Success.* National Electronic Commerce Coordinating Council Symposium 2001. Presented at the NECCC Annual Conference. Las Vegas, Nevada, December 10–12, 2001.

NECCC. 2001b. *Is the Lack of E-procurement Standards… a Barrier to Implementation? A Government and Supplier Perspective.*National Electronic Commerce Coordinating Council Symposium 2001. Presented at the NECCC Annual Conference. Las Vegas, Nevada, December 10–12, 2001.

Neef, Dale. *eProcurement: From Strategy to Implementation.* Upper Saddle River, New Jersey Prentice Hall, 2001.

Norris, Donald and Kenneth Kreamer. "Mainframe and PC Computing in American Cities: Myths and Realities." *Public Administration Review* (6) 56, 1996, pp. 568–576.

Norris, Pippa. "Who Surfs? New Technology, Old Voters, and Virtual Democracy." In *democracy.com? Governance in Networked Word,* ed. Elaine Ciulla Kamarck and Joseph S. Nye, Jr., New Hampshire, Hollis Publishing Company, 1999, pp. 71–94.

Nye, Jr., Joseph. "Information Technology and Democratic Governance." In *democracy.com? Governance in Networked Word,* ed. Elaine Ciulla Kamarck and Joseph S. Nye, Jr., New Hampshire, Hollis Publishing Company, 1999, pp. 1–18.

O'Hara, Colleen. "GSA Moves Ahead with Reverse Auctions." *Federal Computer Week*, June 6, 2001.

Preston, Morag. "E-government US-style." *New Statesman* (4517) 129, Special Supplement, 2000.

Robinson, Brian. "Down Payment on E-Procurement." *Federal Computer Week,* August 20, 2001.

Sarkar, Dibya. 2001a. "States Team up for E-Buying." *Civic.com.* August 22, 2001.

Sarkar, Dibya. 2001b. "States Premature on E-Procurement." *Government e-Business.* September 3, 2001.

Sarkar, Dibya. 2001c. States Buy into E-Buying." *Civic.com.* April 2, 2001.

Schriener, Juday and William Angelo. "Procurement Going Paperless." *ENR.* October 2, 1995, p. 13.

Sprecher, Milford. "Racing to E-government: Using the Internet for Citizen Service Delivery." *Government Finance Review,* (5) 16, 2000, pp. 21–22.

The Virginia Governor's Task Force on Procurement Assessment, 2000. *Report of the Governor's Task Force on Procurement Assessment: Recommendations to Improve Virginia Government's Procurement Systems.* February 3, 2000.

Utah Division of Purchasing and General Services. Description of the Utah/Colorado E-Procurement System. http://www.purchasing.state.ut.us/eps/description.htm. Accessed October 22, 2001.

Ventura, Stephen. J. "The Use of Geographic Information Systems in Local Government." *Public Administration Review,* (5) 55, 1995, pp. 461–467.

Weare, Christopher, Juliet Musso, and Matt Hale. "Electronic Democracy and the Diffusion of Municipal Web Pages in California." *Administration and Society,* (1) 31, 1999, pp. 3–27.

West, D.M. *E-Government and the Transformation of Public Service Delivery.* Presented at the American Political Science Association Annual Meeting. San Francisco, August 30–September 2, 2001.

White House Press Office. "President Clinton and Vice-President Gore: Major New E-Government Initiatives." *US Newswire*. June 24, 2000. http://web.lexis-nexis.com/universe…d5=0f245defaacf01afe17703e5dfd7da67. Accessed September 7, 2001.

Wood, Lawrence. "The Beginning of the End of Paper Procurement." Government Finance Review. June 2000, p. 38.

ABOUT THE AUTHOR

M. Jae Moon is assistant professor at the George Bush School of Government Affairs and Public Service in Texas A&M University. Before joining the Bush School, he was at the Graduate School of Public Affairs at the University of Colorado at Denver (1998–2002), where he was named Teacher of the Year in 1999 and 2001. He also taught several summer classes (in organization and management) to MPA and JD students at the Maxwell School of Citizenship and Public Affairs at Syracuse University. He has taught master's and doctoral courses in public management, organizational change and management, globalization and public policy, technology and environmental program management, and research methodology.

His research interests include public management, information technology, and comparative public administration. His research has recently appeared in major public administration and policy journals, including *Technology Forecasting and Social Change, Governance, Public Administration Review, Journal of Public Administration Research and Theory, Public Performance and Management Review, International Review of Public Administration,* and *Administration and Society*.

Dr. Moon earned a B.A. in political science from Yonsei University, Korea (1988), an M.A. in international politics from Kyunghee University, Korea, and a Ph.D. in public administration from Syracuse University.

KEY CONTACT INFORMATION

To contact the author:

M. Jae Moon
Assistant Professor
George Bush School of Government and Public Service
Texas A&M University
2143 Academic Building West
4220 TAMU
College Station, Texas 77843-4220
(979) 862-3469
fax: (979) 845-4155

e-mail: jmoon@bushschool.tamu.edu

GRANT REPORTS

E-Government

Managing Telecommuting in the Federal Government: An Interim Report (June 2000)

Gina Vega
Louis Brennan

Using Virtual Teams to Manage Complex Projects: A Case Study of the Radioactive Waste Management Project (August 2000)

Samuel M. DeMarie

The Auction Model: How the Public Sector Can Leverage the Power of E-Commerce Through Dynamic Pricing (October 2000)

David C. Wyld

Supercharging the Employment Agency: An Investigation of the Use of Information and Communication Technology to Improve the Service of State Employment Agencies (December 2000)

Anthony M. Townsend

Assessing a State's Readiness for Global Electronic Commerce: Lessons from the Ohio Experience (January 2001)

J. Pari Sabety
Steven I. Gordon

Privacy Strategies for Electronic Government (January 2001)

Janine S. Hiller
France Bélanger

Commerce Comes to Government on the Desktop: E-Commerce Applications in the Public Sector (February 2001)

Genie N. L. Stowers

The Use of the Internet in Government Service Delivery (February 2001)

Steven Cohen
William Eimicke

State Web Portals: Delivering and Financing E-Service (January 2002)

Diana Burley Gant
Jon P. Gant
Craig L. Johnson

Internet Voting: Bringing Elections to the Desktop (February 2002)

Robert S. Done

Leveraging Technology in the Service of Diplomacy: Innovation in the Department of State (March 2002)

Barry Fulton

Federal Intranet Work Sites: An Interim Assessment (June 2002)

Julianne G. Mahler
Priscilla M. Regan

Public-Sector Information Security: A Call to Action for Public-Sector CIOs (July 2002)

Don Heiman

The State of Federal Websites: The Pursuit of Excellence (August 2002)

Genie N. L. Stowers

State Government E-Procurement in the Information Age: Issues, Practices, and Trends (September 2002)

M. Jae Moon

Financial Management

Credit Scoring and Loan Scoring: Tools for Improved Management of Federal Credit Programs (July 1999)

Thomas H. Stanton

Using Activity-Based Costing to Manage More Effectively (January 2000)

Michael H. Granof
David E. Platt
Igor Vaysman

Audited Financial Statements: Getting and Sustaining "Clean" Opinions (July 2001)

Douglas A. Brook

An Introduction to Financial Risk Management in Government (August 2001)

Richard J. Buttimer, Jr.

Human Capital

Profiles in Excellence: Conversations with the Best of America's Career Executive Service (November 1999)

Mark W. Huddleston

Leaders Growing Leaders: Preparing the Next Generation of Public Service Executives (May 2000)

Ray Blunt

Reflections on Mobility: Case Studies of Six Federal Executives (May 2000)

Michael D. Serlin

A Learning-Based Approach to Leading Change (December 2000)

Barry Sugarman

Labor-Management Partnerships: A New Approach to Collaborative Management (July 2001)

Barry Rubin
Richard Rubin

Winning the Best and Brightest: Increasing the Attraction of Public Service (July 2001)

Carol Chetkovich

Organizations Growing Leaders: Best Practices and Principles in the Public Service (December 2001)

Ray Blunt

A Weapon in the War for Talent: Using Special Authorities to Recruit Crucial Personnel (December 2001)

Hal G. Rainey

A Changing Workforce: Understanding Diversity Programs in the Federal Government (December 2001)

Katherine C. Naff
J. Edward Kellough

Managing for Results

Corporate Strategic Planning in Government: Lessons from the United States Air Force (November 2000)

Colin Campbell

Using Evaluation to Support Performance Management: A Guide for Federal Executives (January 2001)

Kathryn Newcomer
Mary Ann Scheirer

Managing for Outcomes: Milestone Contracting in Oklahoma (January 2001)

Peter Frumkin

The Challenge of Developing Cross-Agency Measures: A Case Study of the Office of National Drug Control Policy (August 2001)

Patrick J. Murphy
John Carnevale

The Potential of the Government Performance and Results Act as a Tool to Manage Third-Party Government (August 2001)

David G. Frederickson

Using Performance Data for Accountability: The New York City Police Department's CompStat Model of Police Management (August 2001)

Paul E. O'Connell

New Ways to Manage

Managing Workfare: The Case of the Work Experience Program in the New York City Parks Department (June 1999)

Steven Cohen

New Tools for Improving Government Regulation: An Assessment of Emissions Trading and Other Market-Based Regulatory Tools (October 1999)

Gary C. Bryner

Religious Organizations, Anti-Poverty Relief, and Charitable Choice: A Feasibility Study of Faith-Based Welfare Reform in Mississippi (November 1999)

John P. Bartkowski
Helen A. Regis

Business Improvement Districts and Innovative Service Delivery (November 1999)

Jerry Mitchell

An Assessment of Brownfield Redevelopment Policies: The Michigan Experience (November 1999)

Richard C. Hula

Determining a Level Playing Field for Public-Private Competition (November 1999)

Lawrence L. Martin

San Diego County's Innovation Program: Using Competition and a Whole Lot More to Improve Public Services (January 2000)

William B. Eimicke

Innovation in the Administration of Public Airports (March 2000)

Scott E. Tarry

Entrepreneurial Government: Bureaucrats as Businesspeople (May 2000)

Anne Laurent

Implementing State Contracts for Social Services: An Assessment of the Kansas Experience (May 2000)

Jocelyn M. Johnston
Barbara S. Romzek

Rethinking U.S. Environmental Protection Policy: Management Challenges for a New Administration (November 2000)

Dennis A. Rondinelli

The Challenge of Innovating in Government (February 2001)

Sandford Borins

Understanding Innovation: What Inspires It? What Makes It Successful? (December 2001)

Jonathan Walters

A Vision of the Government as a World-Class Buyer: Major Procurement Issues for the Coming Decade (January 2002)

Jacques S. Gansler

Contracting for the 21st Century: A Partnership Model (January 2002)

Wendell C. Lawther

Franchise Funds in the Federal Government: Ending the Monopoly in Service Provision (February 2002)

John J. Callahan

Managing "Big Science": A Case Study of the Human Genome Project (March 2002)

W. Henry Lambright

Leveraging Networks to Meet National Goals: FEMA and the Safe Construction Networks (March 2002)

William L. Waugh, Jr.

Government Management of Information Mega-Technology: Lessons from the Internal Revenue Service's Tax Systems Modernization (March 2002)

Barry Bozeman

Making Performance-Based Contracting Perform: What the Federal Government Can Learn from State and Local Governments (June 2002)

Lawrence L. Martin

21st-Century Government and the Challenge of Homeland Defense (June 2002)

Elaine C. Kamarck

Moving Toward More Capable Government: A Guide to Organizational Design (June 2002)

Thomas H. Stanton

Transforming Organizations

The Importance of Leadership: The Role of School Principals (September 1999)

Paul Teske
Mark Schneider

Leadership for Change: Case Studies in American Local Government (September 1999)

Robert B. Denhardt
Janet Vinzant Denhardt

Managing Decentralized Departments: The Case of the U.S. Department of Health and Human Services (October 1999)

Beryl A. Radin

Transforming Government: The Renewal and Revitalization of the Federal Emergency Management Agency (April 2000)

R. Steven Daniels
Carolyn L. Clark-Daniels

Transforming Government: Creating the New Defense Procurement System (April 2000)

Kimberly A. Harokopus

Trans-Atlantic Experiences in Health Reform: The United Kingdom's National Health Service and the United States Veterans Health Administration (May 2000)

Marilyn A. DeLuca

Transforming Government: The Revitalization of the Veterans Health Administration (June 2000)

Gary J. Young

The Challenge of Managing Across Boundaries: The Case of the Office of the Secretary in the U.S. Department of Health and Human Services (November 2000)

Beryl A. Radin

Creating a Culture of Innovation: 10 Lessons from America's Best Run City (January 2001)

Janet Vinzant Denhardt
Robert B. Denhardt

Transforming Government: Dan Goldin and the Remaking of NASA (March 2001)

W. Henry Lambright

Managing Across Boundaries: A Case Study of Dr. Helene Gayle and the AIDS Epidemic (January 2002)

Norma M. Riccucci

SPECIAL REPORTS

Government in the 21st Century

David M. Walker

Results of the Government Leadership Survey: A 1999 Survey of Federal Executives (June 1999)

Mark A. Abramson
Steven A. Clyburn
Elizabeth Mercier

Creating a Government for the 21st Century (March 2000)

Stephen Goldsmith

The President's Management Council: An Important Management Innovation (December 2000)

Margaret L. Yao

Toward a 21st Century Public Service: Reports from Four Forums (January 2001)

Mark A. Abramson, Editor

Becoming an Effective Political Executive: 7 Lessons from Experienced Appointees (January 2001)

Judith E. Michaels

The Changing Role of Government: Implications for Managing in a New World (December 2001)

David Halberstam

BOOKS*

E-Government 2001 (Rowman & Littlefield Publishers, Inc., 2001)

Mark A. Abramson and Grady E. Means, editors

Human Capital 2002 (Rowman & Littlefield Publishers, Inc., 2002)

Mark A. Abramson and Nicole Willenz Gardner, editors

Innovation (Rowman & Littlefield Publishers, Inc., 2002)

Mark A. Abramson and Ian Littman, editors

Leaders (Rowman & Littlefield Publishers, Inc., 2002)

Mark A. Abramson and Kevin M. Bacon, editors

Managing for Results 2002 (Rowman & Littlefield Publishers, Inc., 2001)

Mark A. Abramson and John Kamensky, editors

Memos to the President: Management Advice from the Nation's Top Public Administrators (Rowman & Littlefield Publishers, Inc., 2001)

Mark A. Abramson, editor

Transforming Organizations (Rowman & Littlefield Publishers, Inc., 2001)

Mark A. Abramson and Paul R. Lawrence, editors

* Available at bookstores, online booksellers, and from the publisher (www.rowmanlittlefield.com or 800-462-6420).

About The Endowment

Through grants for Research and Thought Leadership Forums, The PricewaterhouseCoopers Endowment for The Business of Government stimulates research and facilitates discussion on new approaches to improving the effectiveness of government at the federal, state, local, and international levels.

Founded in 1998 by PricewaterhouseCoopers, The Endowment is one of the ways that PricewaterhouseCoopers seeks to advance knowledge on how to improve public sector effectiveness. The PricewaterhouseCoopers Endowment focuses on the future of the operation and management of the public sector.

About PricewaterhouseCoopers

The Management Consulting Services practice of PricewaterhouseCoopers helps clients maximize their business performance by integrating strategic change, performance improvement and technology solutions. Through a worldwide network of skills and resources, consultants manage complex projects with global capabilities and local knowledge, from strategy through implementation. PricewaterhouseCoopers (www.pwcglobal.com) is the world's largest professional services organization. Drawing on the knowledge and skills of more than 150,000 people in 150 countries, we help our clients solve complex business problems and measurably enhance their ability to build value, manage risk and improve performance in an Internet-enabled world. PricewaterhouseCoopers refers to the member firms of the worldwide PricewaterhouseCoopers organization.

For additional information, contact:

Mark A. Abramson
Executive Director
The PricewaterhouseCoopers Endowment for The Business of Government
1616 North Fort Myer Drive
Arlington, VA 22209
(703) 741-1077, fax: (703) 741-1076

e-mail: endowment@us.pwcglobal.com
website: endowment.pwcglobal.com

The PricewaterhouseCoopers Endowment for
The Business of Government

1616 North Fort Myer Drive
Arlington, VA 22209-3195