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Grace Zhaohui Liu

Russell K.H. Ching

Nancy Tsai

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# E-Government and Lessons from E-Commerce: A Preliminary Study

Grace Zhaohui Liu  
American Management Systems, Inc.  
Sacramento, CA, USA  
grace.liu@ams.com

Russell K.H. Ching  
Management Information Science Department  
California State University, Sacramento  
Sacramento, CA 95819, USA  
chingr@csus.edu

Nancy Tsai  
Management Information Science Department  
California State University, Sacramento  
Sacramento, CA 95819, USA  
sytsai@csus.edu

## Abstract

As businesses become more involved and savvy with electronic commerce (e-commerce), electronic government (e-government) can learn many lessons from them. The tremendous growth in e-commerce will spur many governments to launch comparable e-government services. The recent passage of federal law in the US has institutionalized e-government. Thus, many government bodies will become greatly involved with the Internet and its associated technologies in providing an array of government services that were once confined to *brick and mortar* operations. However, in deciding which applications will be most effective in serving their constituents and given their limited resources, governments might learn from the practices of businesses. As in the case of business to business (B2B) e-commerce, the exchange of information within and between government agencies will comprise the bulk of interactions or transactions. The results of a preliminary e-commerce survey suggest several areas that may prove to be more effective for e-government Extranet and Intranet applications.

## 1. Introduction

The shift from goods to services has led to an information-based economy that has been fueled by rapid and continual advances in information technology (IT) [19]. Consequently, more organizations have become engaged in various forms of electronic commerce (e-commerce), and information has become their primary resource. As e-commerce expands at phenomenal rates in

the private sector, electronic government (e-government) is beginning to take a hold. Estimates placed business-to-business (B2B) e-commerce spending between \$92 and \$142 billion [1], [14], and business-to-customer (B2C) at \$33 billion in the US during 1999 [1]. By the year 2004, total e-commerce spending in the US is expected to exceed \$3.2 trillion [14]. Based on the projected general population estimates of the U.S. Census Bureau for 2002 and the estimated proportion of adult Internet users projected by Gartner [9], 45 percent, the current number of adult Internet users (in the US) is estimated at 93.2 million people. This represents approximately 42 percent of the global Internet users [8] and it is expected to double by 2005 [9]. In contrast, approximately 40 million people in the US sought information from government web sites in 1999. However, this was expected to increase to 68 million in 2001, a 70 percent jump in two years [21]. The vast difference in the number of users and the sheer volume of transactions as suggested by the value of electronic markets strongly suggest the existence of many untapped opportunities for e-government. However, capitalizing on these opportunities may pose major challenges for resource-constrained governments and their agencies.

Generally, e-government entails the delivery of government services and information via the Internet [6]. Its applications can be placed into four groups: government information to citizens, external interactions between government and citizens (i.e., submitting forms, registration and tax returns, voting, bidding on government contracts, etc.), internal interactions between government agencies and their employees (i.e., access personnel information, file forms, manage budget and

accounting functions, paychecks, etc.), and interaction between government agencies at the federal, state or local level to share information. Although many predict e-government will lead to a total government cost savings between 1 and 2.3 percent and a .2 to .4 percent increase in productivity [13], many challenges in determining where to begin lie ahead. Several development and implementation options can be pursued, but some applications may result in greater benefits than others. Given the private sector's experience and success with its development of e-commerce, government might closely examine what has been done to avoid costly mistakes and direct resources to those applications that will benefit both government and the public the most [4], [13]. Based on the responses of several organizations, Intranet applications on document management, the posting of electronic forms, education and training, and the broadcast of information prove to result in enhanced communication, increased efficiency and productivity, and improved decision making. Extranet portal applications provide one-stop e-government service that facilitates easy access to citizens and business.

The purpose of this paper is to identify some of the more successful applications in e-commerce and suggest their application to e-government. A preliminary survey was conducted with several private and public organizations to identify the categories in which Intranet and Extranet applications were developed and to gauge the perceived benefits that resulted from their applications. Experiences from a statesponsored e-government implementation project will also be related and discussed.

## 2. Review

Although the convenience of e-government will quickly win the favor of most people, the real motivation may lie in legislative pressures to reduce the cost of government operations. For many state government agencies, budgetary constraints, a steadily increasing population, and freezes on government hires place added burdens on their ability to service the public. In essence, fewer resources are available to perform an increasing amount of work. A possible solution is e-government, adopting an IT-based business model to electronically managing their charges. Rather than gathering information or transacting business at a physical location or over the phone, people will be able to conduct these tasks online over the Internet with 24x7 (i.e., 24 hours, 7 days a week) accessibility from nearly anywhere in the world. In many cases, successful e-government applications have increased efficiency and resulted in reductions to the cost of processing a transaction [5], [7], [17].

E-government's growth in popularity can be attributed to many factors. Heeks [12] identifies three of them: an unsustainable level of public expenditure that has not produced efficient government services, a resurgence of neo-liberal thinking emphasizing the efficiency of market competition and the need make government more business like, and the rapid

development of IT and the increasing awareness of its value. Government wastes, project delays and cost overruns, mismanagement of resources, and inadequate organizational and management skills have motivated lawmakers to seek nontraditional solutions, such as electronic services (e-services) and e-government. As in the case of the private sector, current e-government initiatives focus on four relationships [3]: government to citizens (G2C), government to government (G2G), government to employees (G2E), and government to business (G2B). Although 34 percent of the initiatives concern providing G2C services, 63 percent involves G2G (20 percent), G2E (23 percent) and G2B (20 percent) e-government applications. This suggests that a majority of e-government will be developed for the Intra- and Extranet.

The long-term push toward an information economy has also fueled the demand for e-services over the Internet [19]. In the private sector, eservices focus on understanding the customers' needs, and responding with goods and services often tailored specifically toward meeting those needs. Many businesses have begun investing in customer relationship management (CRM) systems to manage their interactions with their customers through dialogs [18] and build loyalty [15]. In pursuing such ambitious endeavors, businesses have shifted their focus from being production-centric to service-centric [19]. In a similar move, eservices bring government services to citizens through e-government, but with the benefits people enjoy from e-commerce [2]. Asfaw et al. [2] cite three important e-government issues European nations face: citizens should benefit from e-government as they do from e-commerce, government agencies should benefit from the efficiencies reflected in lower Internet transactions costs, and e-government should be capable of providing a competitive advantage in attracting businesses to the government's jurisdiction by streamlining processes (i.e., securing licenses and permits, submitting tax and employee periodic reports, etc.). The applicability of these issues is ubiquitous and can be extended to all implementations of e-government. Thus, the objectives of e-government can parallel those of e-commerce, but from a different perspective.

Throughout the US, e-government has been gaining momentum. Recent developments in the U.S. Congress reflect greater interests in establishing an e-government stronghold. The E-Government Act of 2001 calls for creating a federal office for the country's chief information technology officer (CIO). Along with the functions of promoting e-government, the CIO would provide leadership and oversee the Internet access of government services and information, the implementation of government-wide information policies, and other functions prescribed by the Paperwork Reduction Act [21]. If enacted, the E-government Act will institutionalize e-government, and provide it with the necessary legislation to ensure its expansion.

Currently, the U.S. Patent and Trademark Office (USPTO) embraces e-government through its electronic trademark filing system that allows customers to interact

with the agency through the Internet [7]. The system also allows USPTO attorneys to conduct patent and trademark searches online and publish its gazette on the Internet. E-government has helped USPTO improve the quality of their interactions with customers, increase worker productivity, and retain highly trained examiners. By 2003, the office expects to handle 80 percent of its applications (for patents and trademarks) and communications electronically.

Another federal agency, the Department of Housing and Urban Development (HUD), has called on e-government to help improve its regulatory management requirements with owners and managers of government assisted housing [5]. HUD has divided its system to fit the needs of critical five areas: active partners performance system, mortgage delinquency and default monitoring, financial assessment subsystem, tenant assessment subsystem, and resident service and satisfaction survey. The system meets the three strategic objectives set by HUD: to reduce paperwork for HUD's partners and clients, to provide greater accessibility for clients to interact with HUD, and to improve HUD's affordable homes program's integrity. Overall, the system has improved HUD's operations and allowed it to keep participating owners and managers (of government assisted housing) abreast of federal and state regulatory requirements. Although limited in their scope when compared to the e-commerce applications in the private sector, the USPTO and HUD systems serve as a prelude to what can be achieved with e-government. To become fully e-government, organizational changes will have to be implemented to transition government agencies to information-centric business models that will allow them to take advantage and reap the benefits of e-government.

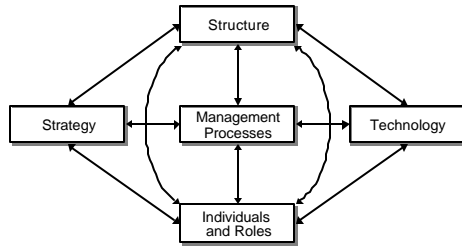
Many state governments have approached e-government through portals to promote e-services, integration and information sharing among agencies. Portals act as gateways that allow Internet users (i.e., constituents, government personnel) to access an array of government services and resources through a single web site in a similar manner to *one stop shopping*. In several cases, they will contain links to various agency web sites. For users, portals reduce their search costs as they provide a single point of contact for online government services [10]. Government agencies benefit from portals in many ways, such as to provide package services in a similar manner to those offered by businesses, reduce the service-processing costs, and improve government accessibility. Some of the recent developments (with portal web sites) include:

- MyGov in California allows people to personalized their e-government services (similar to MyYahoo) by selecting those most relevant to their needs;
- An ambitious e-government project in Hawaii will allow tax payers to file their income tax returns online. Not only will the system improve the tax agency's services to tax payers and its internal efficiency, but it may also increase tax revenues by increasing the accuracy

of the returns, reducing the time for the state to act upon delinquent tax returns, and decreasing the time to collect taxes owed to the state. The state anticipates similar processing cost savings on a single tax return to those reaped in the state of Texas where the cost dropped from \$1.66 to 33 cents [16];

- MyCalifornia extends several services to California citizens, including automobile registration, tax forms and refund status, fishing and hunting permits, hazardous waste disposal instructions, and state contracting information [17];
- NC@YourServices in North Carolina features e-procurement, online government purchasing, and involved the collaboration of many state and local agencies [17];
- PowerPort of Pennsylvania provides simplified online access to wide variety of government services, such as information and forms for business interested in locating to Pennsylvania, filing income tax returns, a calendar of state-wide events, the governor's press releases and more [17].

In spite of these instances of success, e-government still faces many challenges and management issues. As in the case of commercial enterprises entering e-commerce, government agencies will be confronted with organizational issues, especially those involved with the radical change from one business paradigm to another. Paradigms embodied in traditional (*bricks and mortar*) business models drastically differ from those in e-commerce business models. Whereas traditional business models concentrate on the physical acquisition of resources and placement of products and services, IT-enabled e-commerce business models focus on information (and its ensuing knowledge) as the organization's primary resource. Hence, the paradigm shift dictates that organizations engage in e-commerce develop their solutions through information leveraging, rather than methods, such as physical optimization models. The transition to e-government will hold the same challenges to government agencies, moving from solving problems with physical solutions to electronically leveraging information both within the agency and between it and its partners (i.e., other agencies). Led by changes to the agency's strategy and its adoption of Internet-enabled IT, changes to the organization structure, management processes, and the roles and individuals will be required to functionally realign them. The MIT90 framework [20] illustrates the interrelationships of these five components (Figure 1). Essentially, changes to any of the components will result in compensatory changes in the others.



**Figure 1. MIT90 framework**

Increasing interests in e-commerce and recent endorsements of the concept have raised the demand for e-government and ensured its future. Many of the current e-government applications, though, focus on supplying government information to citizens, and supporting external interactions between government and citizens (G2C). Little progress appears to have been made in developing applications for internal interactions between government agencies and their employees (G2E), and those between government agencies (G2G). Yet, in e-commerce, the greatest benefits (and profits) arise from B2B interactions and transactions. Most e-commerce activities appear concentrated on B2B with B2B spending anywhere between three to four times greater than that of B2C. Businesses that benefit the most from e-commerce tend to be organizationally e-commerce designed, particularly capable of leveraging information, distributing information both within itself and between partners in vertical and/or horizontal integration alliances. For e-government to achieve the same levels of success as e-commerce, perhaps governments should examine the factors contributing to its (e-commerce's) success and adopt (or adapt) them.

### 3. Lessons from an e-Commerce Survey

A preliminary e-commerce survey was conducted to determine the types of Intra- and Extranet applications that were most frequently pursued and the perceived results of their e-commerce applications. Fifty private companies and government agencies in California that were engaged in developing successful e-commerce applications were contacted. Of the 50 sent, 32 usable surveys (i.e., 23 from the private sector, 9 from government) were received for a return rate of 64 percent. The high return may be attributed to advance planning; organizations were contacted in advanced and agreed to participate in the survey. Because all organizations were well-established and experienced in developing e-commerce applications, their responses can be considered an accurate reflection of all organizations in the state.

Among the several items in the instrument, two groups focused on Intra- and Extranet applications. Intranet applications reside on an internal server, and are distributed through a network behind the organization's firewall and launched through a user's web-browser. Thus, they are private and can be accessed only from within the organization. Participants were asked of which

Intranet nine applications that were listed had their organizations implemented. The results appear in Table 1. The top four applications were document management (78.1 percent), post electronic forms (71.9 percent), education and training (71.9 percent), and broadcast information (65.6 percent). Based on these results, organizations are more inclined to develop informational Intranet applications.

Intranet Applications	Number Implemented (Percent)
Document management	25 (78.1)
Post electronic forms	23 (71.9)
Education and training	23 (71.9)
Broadcast information	21 (65.6)
Project management	19 (59.4)
Team collaboration	18 (56.3)
Software distribution	17 (53.1)
Inbound logistics	5 (15.6)
Other	2 (6.3)

**Table 1. Intranet applications**

The perceptions of Intranet benefits were measured on a seven-point Likert-type scale (1 = not benefited, 7 = greatly benefited). Table 2 shows the means and medians of the five items. The survey responses indicate that greatest perceived gains from Intranet applications are from enhanced communication (6.2), increased efficiency (5.6), increased productivity (5.5), and better decision making (5.3). Respondents benefited to a lesser extent from reduced cost (4.9). These perceptions suggest that most organizations develop Intranet applications to enhance and improve their distribution of information.

Perceived Intranet Benefits	Mean/Median (1 = not benefited, 7 = greatly benefited)
Enhanced communication	6.2/6
Increased efficiency	5.6/6
Increased productivity	5.5/6
Better decision making	5.3/5
Reduced costs	4.9/5

**Table 2. Perceived Intranet benefits**

Extranet applications tend to be directed toward supporting the interactions between organizations, often those engaged in partnerships or alliances. Characteristically, Extranets connect their individual Intranets together, therefore they are private. As in the case of Intranet applications, participants were asked to indicate which of the listed 12 Extranet applications their organizations had implemented. Table 3 displays the results. The results suggest that Extranet applications tend to involve interactive support and provide information. Customer service and support (65.5 percent), post electronic forms (46.9 percent), marketing and

advertising (46.9 percent) and products/services catalog information (43.8 percent) applications were more frequently implemented.

Extranet Applications	Number Implemented (percent)
Customer service and support	21 (65.6)
Post electronic forms	15 (46.9)
Marketing and advertising	15 (46.9)
Products/service catalog information	14 (43.8)
Electronic data interchange (EDI)	12 (37.5)
Collaboration between business partners	12 (37.5)
Portal	11 (34.4)
Sales	11 (34.4)
Publish information among business partners	10 (31.3)
Production and inventory control between business partners	9 (28.1)
Electronic funds transfer (EFT)	7 (21.9)

**Table 3. Extranet applications**

Participants were also asked to indicate the perceived benefits they received from Extranet applications. Table 4 summarizes the responses to the 11 items. Enhanced communication (6.2), increased productivity (5.5) and greater efficiency (5.5) ranked among the five highest perceived benefits as they did among those for Intranet benefits. Improved customer satisfaction (5.6) and better coordination between business partners (5.3) also appear among the top five.

Perceived Extranet Benefits	Mean/Median (1 = not benefited, 7 = greatly benefited)
Enhanced communication	6.2/6
Improved customer satisfaction	5.6/6
Increased productivity	5.5/6
Greater efficiency	5.5/6
Better coordination between business partners	5.3/6
Reduced costs	4.9/5
Increased profitability	4.8/5
Competitive advantage	4.8/4
Improved inventory control	4.8/4
Reduced production time	4.5/4
Increased sales and market share	4.4/5

**Table 4. Perceived Extranet benefits**

The responses from participants of the survey suggest general trends toward developing applications

that will result with the greatest acceptance, benefit and support of the organization's strategy. The perceived benefits can be translated to application objectives. Thus, both provide an insight to what governments should focus on with e-government.

#### 4. Discussion

While businesses have learned to use Intra- and Extranet applications to gain competitive advantages and efficiencies, interests in the public sector have been slow to develop. However, recent developments suggest that government has begun to take notice of their benefits. Traditionally, governments at all levels face constraints imposed by their bureaucratic structure and legislative rules. In contrast to businesses, governments are less motivated by the economic gains in adopting new technologies. Yet, in recent years increasing public pressures have led to the expansion of e-government. Most of the efforts to deploy e-government applications have primarily targeted supporting administrative tasks and automating governing functions. Given the vastness of e-commerce, e-government has many opportunities to explore and lessons to be learned.

Few differences separate government and private sector Intranet applications. As in the case of most businesses, government agencies can use the Intranet as a tool and arena for document management, posting electronic forms, training and broadcasting information. The nature of government often places burdensome demands on the physical movement of paper documents. Even simple, routine administrative tasks require enormous loads of paper work. Many government agencies have found that the Intranet provides an inexpensive, secure and convenient means for disseminating information. Using the Intranet for document management facilitates communications between employees, and in return, lends speed to complex decision making process. The paper-less flow of documents and information also results in enhanced efficiency and productivity as information is exchanged immediately.

Global businesses have relied upon the Intranet as an important communication link between geographically distributed sites. The same can be applied to e-government to link and bridge an agency's geographically dispersed districts. For example, the State of Hawaii relies upon its Intranet to distribute documents among its four districts, each of which is composed of one or more islands separated by miles of open seas. Before the implementation of their Intranet, hard copy documents were mailed among the districts. Physical delivery naturally means slower responses and longer waits than e-mail, Intranet-site access or document distribution over a Local Area Network (LAN). The Hawaii Department of Taxation takes advantage of Intranet technologies and now posts its tax codes and tax law changes through the Intranet. As a result, every tax clerk has immediate and complete access to them. Consequently, the easy access and convenience greatly bolsters their customer service and significantly improves

their responses, both in time and quality, to customer inquiries. The state also uses its Intranet to log production system incidents and reports. The department's system administrator and operators can now monitor the system from anywhere and at anytime through their Intranet website. These successful e-government applications reflect what many global companies, such as Intel, Hewlett-Packard and others, have learned in the past, and have helped e-government enhance communication within an agency, and improve efficiency and productivity through time savings.

A few of survey respondents noted that their organization's Intranet was often used for software distribution. Many organizations have found that sending a technician to upgrade a user's computer can be very expensive in terms of both the technician's time and employee downtime (i.e., productivity while the computer is down). A solution commonly used to overcome this problem in the private sector involves an Intranet approach. Intranet users can download software and software patches at anytime with no or very little assistance from the technical support staff. This helps reduce downtime since the upgrades can be implemented as soon after they are available (versus waiting for someone to install them). Many government agencies are also beginning to use the Intranet to inform the computer help desk staff of software problems and track the help ticket status, another common practice in the private sector. With a simple Intranet help desk application, users can log onto the Intranet site and write a help ticket; help desk staff will then be assigned to fix the problem and clear the ticket. The system maintains the history and the status of the help ticket. Thus, the ticket can be tracked and retrieved anytime. The Secretary of State's Office in California uses an expert system to determine the severity of the user's problem. Those problems that cannot be easily identified by the expert system are forwarded to technical experts. Otherwise, they are handled in a routine manner.

As with the Intranet, Extranet applications reap many benefits, such as enhanced communication through the collaboration and coordination between government agencies, greater efficiencies and productivity, and improved customer satisfaction. With e-government, the Extranet can serve to link government agencies at the local, state and federal levels. In the US, a viable business model using the Extranet has been proposed to enable a system for child support welfare monitoring. Under the current system, government agencies spend an enormous amount of taxpayer-resources to track noncompliant parents (i.e., parents who do not comply with court orders that require them to make child support payments) and provide welfare benefits. Benefits may be paid to the recipient through different agencies and funding sources, and their efforts may overlap or lead to inconsistent classifications. Problems in linking child support agencies at different levels are often blamed on the agencies use of different systems, and varied computer resources and expertise. If their Intranet applications can be designed to interface with each other

in their Extranet (as in the case of B2B partners), not only will child support agencies be able to coordinate and collaborate with one another in real time and anytime, and become more efficient, but their communication and productivity would be enhanced through the exchange (transfer) of information. In the end, the recipient would receive improved services.

Although businesses possess greater experiences with their e-commerce, differences between the (organizational) missions of business and government dictate differences in their delivery of services. In contrast to businesses, which deploy portal applications mainly within the organization boundary, e-government has seen a trend toward using portals to collaborate and coordinate among different government agencies and bundle government services together that are offered to citizens. Portals are single-point Web browser interfaces used to promote the gathering, sharing, and dissemination of information as well as the provision of services to communities of Interest [11]. Businesses tend to use portals to handle structured and/or unstructured data for business intelligence, knowledge management, training, and etc. With e-government, portals allow various government agencies share information to improve the efficiency of citizen searches for and access to services.

Successful implementations lead to a serious and positive impact on the company's bottom line. Companies can find off-the-shelf products from Brio Technology, Business Objects, DataChannel, IBM, Informix, Microsoft, Oracle and Sybase that can handle these tasks. Large consumer portals, such as Yahoo, also offer lessons and models for e-government projects to follow. Thus, businesses play an important role in the portal applications used in the public sector. In recent years, governments have been learning from businesses in the area of design and rollout of internal corporate portals for knowledge assimilation and distribution. Yet, interestingly, most government portal sites are designed and maintained by private companies, and lease by government agencies.

With more government agencies using portals as the gateway for government services, a trend has been seen to design the portal website around the life event of citizens. For example, MyGov in California can be customized by a citizen (user) to include major state government services such as birth certificate, driver license renewal, car registration, state tax returns, and etc. The advantage of this model is that it promises *one stop shopping* for government services.

Many lessons from businesses' use of their Intranets and Extranets can be learned to direct e-government toward developing more effective network applications. However, they (Intra- and Extranets) by themselves cannot revolutionize government, and planners should remember that technology may provide only partial solutions. First, the Internet technology should not just be used to refurbish government with cutting-edge technologies, but should be exploited to the full-length in automating administrative tasks and government services. Secondly, the e-government services should not stop at

just digitizing the existing work processes, but should be the redesign and re-engineering of work processes and government functions. Lastly, e-government initiatives should be proactive, strategic moves but not reactive, tactical decisions.

## 5. Summary and Conclusion

A few general conclusions can be reached from the lessons reflected in the survey results. Businesses' experience with development of e-commerce applications provides governments with a wealth of knowledge that can be used to avoid making the costly mistakes and better direct their limited resources to those applications that will be most effective. E-government as well as e-commerce will continue to grow because it offers real benefits. Intranet and Extranet applications will comprise the bulk of resources, yet they may yield insurmountable benefits. The lessons that surfaced from a preliminary e-commerce survey suggest that e-government Intranet should concentrate on document management, the posting of electronic forms, education and training, and the broadcast of information. The benefits that were reported include enhanced communication, increased efficiency and productivity, and improved decision making. For Extranet applications, most respondents indicated their organizations focused on customer service and support, electronic forms posting, marketing and advertising, and products/service catalog information. To a lesser degree, though, collaboration between business partners and portal were ranked in the middle. In contrast to Intranet responses, enhanced communication, improved customer satisfaction, increased productivity, greater efficiency, and better coordination between business partners were cited most frequently as Extranet benefits. The differences between business and government objectives may account for the difference in their actually applications.

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