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Towards a Framework to Understand M-Government

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ABSTRACT

The emergence of mobile technology has enabled the transition from e-government to m-government. Despite the great potential and positive expectation for m-government applications, m-government is still in the infancy stage and its applications are limited. This paper bases on the theory of task-technology-fit (TTTF) and proposes a framework to understand mobile technology and its implications in m-government applications. Based on the framework proposed, we reviewed mobile technology and government tasks, and categorized current m-government applications. Benefits and challenges of m-government applications are also discussed.

Keywords

M-government, task technology fit

INTRODUCTION

The emergence of mobile technology has not only changed the way of conducting business, as demonstrated by the fast growth of mobile commerce, it has also enabled the transformation of the way governments deliver their services (Sharma and Gupta, 2004). Since 1990s, public sector organizations across the globe, both at the local and national levels, have been applying the Internet technology and other ICTs in innovative ways to deliver services, engage citizens, and improve efficiency, a practice commonly known as electronic government (e-government) (Eyob, 2004; Lee et al., 2005). An explosion in the use of mobile technology, such as using mobile phones, laptops and personal digital assistants (PDAs) to connect to wireless networks, has forced the governments to prepare themselves to transit from e-government to m-government (Sharma and Gupta, 2004). M-government has arisen as the extension or supplement of e-government (Lallana, 2004; Moon, 2004; Sharma and Gupta, 2004). Broadly defined, m-government refers to the government's efforts to provide information and services to public employees, citizens, businesses, and other organizations through wireless networks and mobile devices (Moon, 2004).

Promoted by demands for a more responsive government, governments all over the world are trying to explore the potential utility and feasibility of m-government. Government agencies have used mobile technology to promote rapid information exchange inter and intra-governmentally, as well as between government and citizens and businesses (Moon, 2004). Government agencies are also capitalizing mobile technology to improve efficiency and effectiveness of governmental processes.

However, m-government is still in the infancy stage and its applications are limited. It is predicated that the focus of m-government applications during the next few years will remain primarily on applications related to public safety and employee mobility, such as law enforcement and emergency services, public heath and field services (Gartner, 2002). Governments are proceeding to m-government applications with cautions due to some issues, risks and concerns of using mobile technology (Moon, 2004).

Although there is a general sense of the areas in which mobile technology can be applied in government sectors (e.g., Lallana, 2004; Moon, 2004; Sharma and Gupta, 2004), very little is known about the implications of mobile technologies, how mobile technologies support governmental services and processes, and how government agencies decide and implement right m-government applications. However, such knowledge is important, as it will help to determine the opportunities and requirements presented by emerging mobile technology (Gebauer and Shaw, 2004). Therefore, this paper bases on the theory of task-technology-fit (TTTF) and proposes a framework to understand mobile technology and its implications in m-government applications. The objectives of this paper are as follows. First, the framework proposed in this study is offers a systematic way to understanding mobile technologies and its implications in m-government applications. Second, this

provides a comprehensive review of existing m-government applications in leading m-government countries. Third, an in-depth discussion on benefits and challenges of m-government applications is provided.

A FRAMEWORK FOR UNDERSTANDING M-GOVERNMENT

Prior research on technology innovation has pointed out the importance of matching information technologies with the tasks to be supported, as a precursor to technology use and subsequent benefits (Goodhue and Thompson, 1995; Gebauer and Shaw, 2004). The theory of Task-Technology Fit, which was proposed by Goodhue and Thompson (1995), suggests that a fit between the features and functions provided by the technology, and the tasks to be supported, will result in better performance. From the standpoint of the theory of Task-Technology Fit, the features and functions that are provided by the technology should be able to support the different types of tasks; if a new technology does not offer a benefit, it won't be used (Klaus et al., 2003).

In the context of m-government, the theory of Task-Technology Fit provides a foundation for us to understand the application of mobile technology in government agencies. The theory of Task-Technology Fit suggests that to understand m-government, we need to look at the underlying technologies of m-government, and the type of tasks that are performed by government agencies. The potential of m-government can be fully achieved only if mobile technology can support and facilitate the tasks performed by the users of government services. Based on the idea of Task-Technology Fit, a framework (see Figure 1) has been proposed in this paper to help us better understand m-government. Following this framework, we reviewed technologies used in m-government, and their features and characteristics. As m-government extends e-government applications into mobile environment, e-government tasks are reviewed and categorized. We then summarized existing m-government applications.

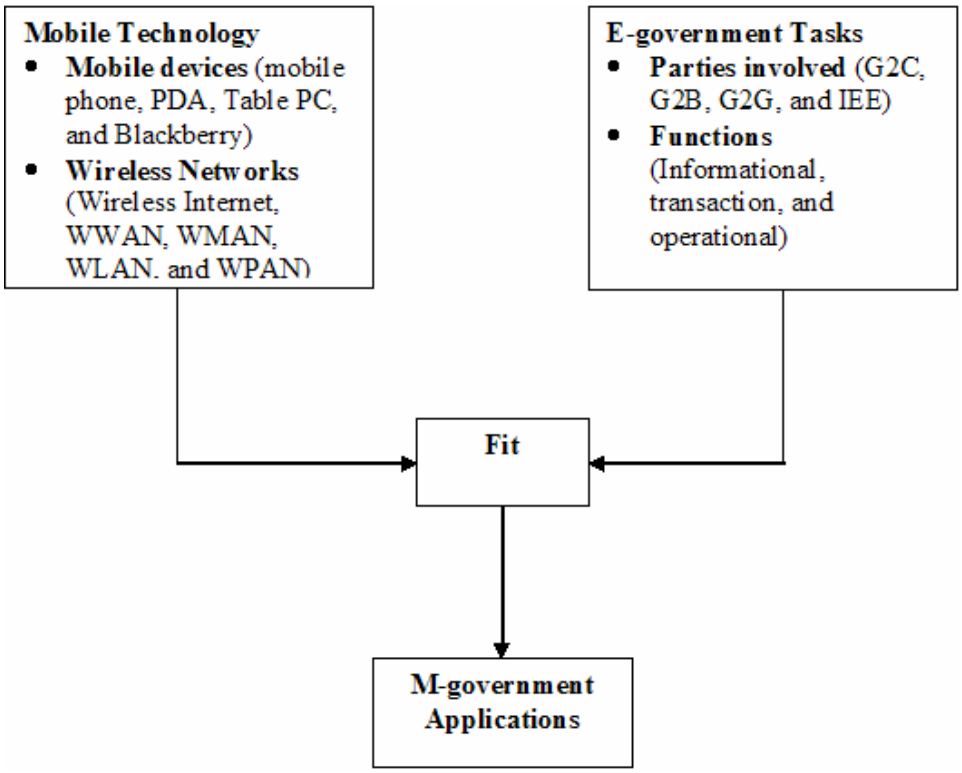

Figure 1: A framework for understanding m-government

Mobile Technology

In this paper, we adopted a general definition of mobile technology, in which mobile technology includes both technological infrastructure for connectivity and mobile information devices (Varshney and Vetter, 2000). Therefore, mobile technologies possess two unique characteristics – "mobility" and "wireless."

Mobility is the most touted advantage of mobile technology (Sarker and Wells, 2003), which is enabled by the use of mobile devices that are portable and are not restricted to desktops (Sharma and Gupta, 2004). A mobile device enables the citizens to get access to government information at any time and any place; it also allows government personnel to access the database and update information on the spot, which is especially beneficial for field investigators. Some of the widely used mobile devices include mobile phone, Personal Digital Assistant (PDA), Tablet PC, and Bleckberry.

Wireless refers to the method of transferring information between a computing device such as a laptop or a PDA and a data source, such as an agency database server, without a physical connection (Sharma and Gupta, 2004). Therefore, wireless networking technology is especially appropriate for situations where installation of physical media is not feasible and/or on-the-spot access to the information is required (Malladi and Agrawal, 2002).

There are five main categories of wireless networks: Wireless Internet, Wireless Wide Area Networks (WWAN), Wireless Metropolitan Area Network (WMAN), Wireless Local Area Network (WLAN), and Wireless Personal Area Network (WPAN) (Chen and Nath, 2004). These categories are different in their coverage area, throughput (amount of data that can go through per unit of time), and even users. WLANs, WMANs, and WWANs are used mostly for business applications. WPANs and Wireless Internet are used for businesses and consumers. All wireless network but WLANs and WPANs require the services of wireless providers.

Categorizing E-government Tasks

M-government is the extension of e-government to mobile platforms. More specifically, m-government is concerned with the final delivery of e-government services. Therefore, it is important to understand the tasks performed in e-government applications.

Based on the parties involved in e-government applications, e-government practices can be classified into five categories: government to citizen (G2C), government to business (G2B), government to government (G2G), government internal effectiveness and efficiency (IEE), and overarching infrastructure (Lee et al., 2005).

Koh and Prybutok (2003) categorized e-government functions into informational, transactional, and operational functions. Informational functions include online publishing and broadcasting. Transactional functions consist of online procurement and payments. Operational functions refer to online customer services such as permit/license renewal, voter and property registration, and other internal governmental operations.

Similarly, Bose (2004) divided current e-government applications into three broad categories: access to information, transaction services, and citizen participation (Bose, 2004). The most common e-government application is providing citizens with access to information through web portals. Citizens can also use government website to complete transactions, e.g., filing income taxes electronically, applying for passports, and renewing licenses. The least developed but fast-growing e-government application is direct citizen participation in government decision-making.

The above mentioned literatures have categorized e-government applications based on the parties involved, as well as functions provided in e-government applications. These categorizations are not contradictory to each other, rather, they are complementing to each other. The two dimensions, parties involved as well as functions provided in e-government applications will be used to classify existing m-government applications.

M-government applications

Realizing the great advantages of mobile technologies, governments have started to introduce m-government applications all over the world. However, current applications have focused on G2C and IEE (Internal Efficiency and Effectiveness) applications. This is not surprising. It is estimated that at least 30 percent of the government workforce is mobile (Caldow, 2000) given that governments have a large segment of the workforce that is involved in law and compliance enforcement, transportation and logistics, and health and social services. This calls for deployment of mobile applications. Also, citizen access is the key driver for m-government application. When the mobile devices and wireless networks have reached a critical mass, citizens can interact with the government in an immediate and real-time manner: they are able to get access to

governmental services or information at any time from any place; governments can communicate with their citizens through wireless channels via mobile devices more efficiently and effectively when the need arises (Sharma and Gupta, 2004).

Also, due to the immature mobile technology, current m-government applications focus on simple information exchange between government agencies and citizens. Hence, existing m-government applications are informational and operational in the nature, rather than transactional. The m-government applications enabled by mobile technologies can be categorized into several groups.

Citizen access to governmental services or information (G2C/Informational). Citizens can get access to government services or information through wireless Internet or SMS. SMS has been widely adopted in various countries to provide citizens real-time governmental information or alert of governmental services. For example, in the U.S., The Parking Day text service in Iowa sends text messages to drivers reminding them to mover their cars on street-cleaning days and "opposite side of the street" days. These reminders can help the drivers avoid getting tickets (Miller, 2003). In Singapore, citizens can choose to receive SMS alerts for a variety of e-services such as: renewal of road tax, medial examinations, passport renewal notifications, and season parking reminders.

Emergency Notification (G2C/Informational). SMS can also be used as a means for government to send notification or broadcast to citizens during emergencies. For example, at the height of SARS crisis, the Hong Kong government sent a blanket text message to mobile phones in a bid to scotch fears emanating from rumors about intended government actions to stem the disease. In U.K., the London Police includes text messaging in their alerting service options which can send alerts to businesses in London about security threats, including bomb alerts. In the U.S., the Federal Aviation Administration (FAA) sends notification to passengers during emergency to inform them about real-time airport status information.

E-democracy (C2G/Opearational). Mobile technologies can also help improve citizen involvement and participation in decision making and rule making. Examples of e-democracy include the "Lobbyist-in-a-Box" in the Commonwealth of Virginia where the citizens can track the progress of bills as they move through the legislative process. The status of the bill is updated every hour and citizens are notified of bill changes. In the Philippines, one half of the cabinet agencies have SMS-based services that allow citizens to ask for information or to comment and complain about government officials and services. In China, over 150 million mobile phone owners can now send SMS to the 2,987 deputies of the National People's Congress (Lallana, 2004).

Location-based services (G2C/Informational, or IEE/Operational). Coupled with GPS, mobile technologies are enabling government agencies to provide some location based services to citizens, and to coordinate government workers based on their locations. In Seattle, GPS is used to provide a mobile traffic map to help commuters make a better drive-time choice. The Maryland County has the enhanced 911 in its emergence communications system to help dispatchers and rescue personnel locate emergency callers who use cellular phones.

Field inspections (IEE/Operational). Mobile technologies can benefit field workers who are on the move and need to access the database or information from outside the offices. This segment of workforce includes police officers, traffic enforcement units, and social workers. For example, the Texas Comptroller's office develops tax collection solutions which enable field collectors to access taxpayers' information remotely and to perform document collection activities on the spot. In Korea, a project called "M-police" has been implemented to assist police officers in capturing suspects and finding missing cars. The project enables police officers to retrieve detailed information on missing vehicles, driver's licenses, vehicles histories, and pictures of suspects from the server, by using mobile devices.

DISCUSSIONS

The framework proposed in this paper also provides a foundation to evaluate m-government applications, that is, to assess benefits and challenges of m-government by examining the fit between mobile technology and the e-government tasks it support. If there is a match between the features offered by the technology and the tasks it support, governments can benefit significantly from expanding e-government services into mobile platform; on the other hand, the limitations and drawbacks of mobile technology also pose potential challenges to m-government.

Benefits of M-government

First, m-government can improve the delivery of government information and services. This is a significant benefit for citizens and governments. For citizens, they can get immediate access to certain government information and services on an anywhere and anytime basis. For governments, they can use the scalable and swift wireless channels to send time-sensitive information, such as terror and severe weather alerts, to citizens quickly and directly.

Second, m-government can increase efficiency and effectiveness of government employees. With the help of mobile technology, government employees can accesses to the information needed in the real-time manner and update records on the spot. This not only reduces some burden of logistics, but also facilitates them to make informed decisions and actions.

Finally, m-government can open up additional channels for citizen participation, thus promoting democracy. Communication through mobile devices encourages citizens to make use of the technology to express their points of view to government officials, law makers, and community representatives. Citizens can be more empowered to discuss the issues of concern, make decisions about factors that affect their lives, participate in formulating and implementing policies, and take actions to achieve the desired change.

Challenges of M-government

Although mobile technologies have great potentials for m-government applications, there still exist some obstacles to their wide diffusion. The E-Government Act of 2002 of the U.S. government specifically recognizes three areas of challenges for e-government: 1) governments are not doing enough to maximize the use of their online services; 2) governments are not receptive to private and public services providers who may contribute to innovative electronic service delivery; and 3) governments lack necessary incentives and institutional structures to realize the full potential of electronic service delivery (E-government Act, 2002). Besides those political and organization issues that were inherited from e-government, m-government also faces some challenges that are unique to mobile technologies.

Security and Privacy. Security and privacy have been considered as main barriers to e-government (Norris and Moon, 2005). These two issues continue to be main obstacles for m-government applications (Sharma and Gupta, 2004). While all information on the Internet is subject to interception, wireless networks signals are broadcasted over the public airwaves, making them more vulnerable for hacking and interception. Also, as mobile devices are small and portable, they can be easily stolen or lost, putting the data stored in them at constant risk of falling into wrong hands. Disclosing critical information such as personal information and tax information on wireless Internet makes citizens more concerned of privacy issues in m-government. In addition, location-based information, along with other citizens' personal information available from traditional channels, poses greater potential for invasion of citizens' privacy.

Accessibility. The wireless network, at its infancy right now, has limited coverage area. As government agencies pursue plans to provide access to government information and services via text to wireless access devices, they should also facilitate the information more accessible for all citizens via the Web or other communication technologies (Sharma and Gupta, 2004).

Usability. For any m-government application to survive and become a viable means of government service usability is a necessary condition, that is, m-government applications can be reached easily with minimum effort (AlShaali and Varshney, 2005). If the device or website is difficult to use, citizens will be reluctant to use and government employees' productivity will decrease due to the time needed to get work done.

CONCLUSION

This paper propose a framework based on the theory of Task-Technology Fit to help us better understand how mobile technology support government tasks. Following the framework, we reviewed current mobile technology, categorized e-government tasks, and reviewed and summarized existing m-government applications. We then discussed about the benefits and challenges of m-government based on the framework.

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