M-Government – Mobile Technology for e-Government

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ABSTRACT

e-Government is generally defined to be a set of new technology tools used in enhancing the way a government is functioning. Online vote, online consultations and online business surveys are examples of the services provided by such a system. It is not only the transfer of existing services online, but also the adoption of new ICT (Information and Communications Technology) procedures wherever necessary to enhance the services or the addition of new services to serve better the citizen. Components of the e-Government include online information and online interaction with the administration, from a diversity of hardware like Desktops, Laptops, Touch Screens or Mobile Devices such as PDAs (Personal Digital Assistant). The purpose of this paper is to discuss some technical and policy consideration of mobile technology in the context of e-Government, which can be better known as m-Government.

Keywords: m-Government – Mobile Technology for e-Government

1. Introduction

The terms "government" and "governance" are currently in widespread use, sometimes interchangeably. It is important to develop a distinction between the two. Government is an institutional superstructure that society uses to translate politics into policies and legislation. Governance is the outcome of the interaction of government, the public service, and citizens throughout the political process, policy development, program design, and service delivery. Governments are specialized institutions that contribute to governance. Representative of governments seek and receive citizen support, but they also need the active cooperation of their public servants. Governance is the outcome of politics, policies, and programs.

e-Government (from electronic government, also known as eGov, digital government, online government or in a certain context transformational government) refers to government's use of information technology to exchange information and services with citizens, businesses, and other arms of government. e-Government may be applied by the legislature, judiciary, or administration, in order to improve internal efficiency, the delivery of public services, or better processes of democratic governance. The primary delivery models are Government-to-Citizen or Government-to-Customer (G2C), Government-to-Business (G2B) and Government-to-Government (G2G) and Government to its employees (G2E). The most important anticipated benefits of e-Government include improved efficiency, convenience, and better accessibility of public services. The word 'e-Government' is in itself a self-understanding phrase. 'e' being small we can say 'e-Government' as providing better Governance by use of ICT tools.

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While e-Government is often thought of as "online government" or "Internet-based government," many non- Internet "electronic government" technologies can be used in this context. Some non-internet forms include Telephone, Fax, PDA, SMS (Short Message Service) text messaging, MMS (Multimedia Messaging service), wireless networks and services, Bluetooth, CCTV (Closed-Circuit Television), Tracking Systems, RFID(Radio Frequency Identification), Biometric Identification, Road Traffic Management and regulatory enforcement, Identity Cards, Smart Cards and other NFC applications; polling station technology (where non-online e-voting is being considered), TV and radio-based delivery of government services, email, online community facilities, Newsgroups and Electronic mailing lists, Online Chat, and Instant Messaging technologies. There are also some technology-specific sub-categories of e-Government, such as mGovernment (Mobile Government), uGovernment (Ubiquitous Government), and gGovernment (GIS/GPS applications for e-Government). There are many consideration and potential implications of implementing and designing e-government, including disintermediation of the government and its citizens, impact on economic, social, and political factors, and disturbances to the *status quo* in these areas.

3. m-Government and e-Government

m-Government is a subset of e-Government. e-Government is the use of information and communication technologies (ICTs) to improve the activities of public sector organisations. In the case of m-government, those ICTs are limited to mobile and/or wireless technologies like cellular/mobile phones, and laptops and PDAs (Personal Digital Assistants) connected to wireless Local Area Networks (LANs). m-Government can help make public information and government services available "anytime, anywhere" to citizens and officials. m-Government should not be seen as something brand-new: for example, wireless technology has always been an important part of law enforcement. Only today, police officers are as likely to use a laptop wirelessly connected to the Internet as the good old two-way radio. When officers spot a suspicious vehicle they can directly search databases that provide information on who owns the vehicle, if it has been reported stolen or has been reported at a crime scene, and if the owner is wanted by police or has jumped bail. Health and safety inspectors can now file their reports from the field in real time using a Pocket PC or handheld terminals, eliminating paper forms and the need to re-enter the data collected when they get back to the office.

On the other hand, citizens are able to save time and energy by further accessing the Internet and government networks through mobile phones and other wireless devices. In Malaysia, for example, citizens can verify their voting information, such as the parliamentary and state constituencies where they are to vote, using SMS (Short Message Service). Alternatively, citizens can request that real-time information is sent to their mobile phone, PDA, or pager as an e-mail or text message. As another example, the California state government has established a Web page where citizens can register to receive wireless PDA and cell phone notification services for energy alerts, lottery results, traffic updates and articles from the Governor's pressroom. m-Government is not only about efficiency but it also allows for citizen activism. In Philippines, citizens are able to help enforce anti-pollution laws by reporting smoke-belching public buses and other vehicles via SMS. SMS is also being used to get citizens involved in the fight against crime and illegal drugs.

m-Government is not a replacement for e-government, rather it supplements it. While mobile devices are excellent access devices, most of them, particularly mobile phones, are not suitable for the transmission of complex and voluminous information. Despite the emergence of more sophisticated handsets, mobile phones do not have the same amount of features and services as PC-based Internet applications. For example, SMS limits messages to 160 characters, whereas email allows a nearly infinite quantity of characters and multimedia content. Even PDAs or Pocket PCs that support email have display and other limitations. Internet-connected PCs are still the preferred device to take part in online political discussions,

to search for detailed public sector information, and to transact most types of e-government service. Mobile applications also rely on good back office ICT infrastructure and work processes: government networks and databases, data quality procedures, transaction recording processes, etc.

m-Government is particularly suited for the developing world where Internet access rates are low but mobile phone penetration is growing rapidly, particularly in urban areas. Globally, the number of mobile phones has surpassed the number of fixed/wired phones. This is also the case in many individual nations, including 49 middle-income and 36 low-income countries. Among these countries are Burkina Faso, Chad, Honduras, Indonesia, Jordan, Mexico, Mongolia, Nigeria, Philippines, Saudi Arabia, and South Africa.

3. m-Government Guiding Principles

Some guiding principles can be laid out for those planning m-government systems, as discussed below.

Firstly, it should be accepted that m-Government is not a substitute for e-Government. Not all applications can run on mobile devices nor should they. Not all wireless connections are cost competitive compared to wired connection. m-Government should be conceived and developed as part of the overall e-Government strategy and programme. The exact mix of m-Government and traditional e-Government applications depends on the respective conditions of each country. An important determinant would be the state of the nation's information infrastructure.

It is easy to build expectations but difficult to regain trust. Citizens who are turned off by their experience with m-Government are not only harder to lure back but will also bad mouth it to other. Thus it is important to:

- Choose m-Government applications wisely. Make sure they are non-trivial but also be careful that they are not the most difficult.
- Make sure that the application is user-friendly. Balance your need for information with the comfort (or frustration) level of the user with the technology.
- In deploying m-Government applications ensure that citizens get exactly what the application claims to be able to deliver in the shortest possible time. If it is a channel to receive complaints, be sure to regularly get back to the complainants about the status of their complaint until it is resolved.
- Ensure that there are suitable back-office systems in place to deliver on m-Government promises.

4. Critical Issues for m-Government Applications

Privacy and Security - While all traffic on the Internet is subject to interception, some hackers are spying on corporate wireless networks from outside buildings, where they can scan e-mail and documents. Wireless networks broadcast signals over the public airwaves so they are vulnerable. Privacy and security issues must be addressed in the planning phase, and may impact the timing or selection of a specific type of wireless service. Specific programs have been developed and released on the Internet to facilitate access to 802.11b networks using the Wired-Equivalent Privacy (WEP) encryption system. AirSnort and WEPCrack are tools that can be used to grab passwords and other sensitive data. Additional security protocols are being developed for 802.11 networks, and some vendors are offering enhanced security features in specific products.

Accessibility – As government entities pursue plans to provide access to m-Government information and services via text to wireless access devices, they should also facilitate making the information more accessible for all citizens via the Web and other communications technologies. The new Voice Extensible Markup Language protocol is being developed to make information on Web sites accessible to disabled and other users by telephone. This technology could make Web site information accessible by voice commands.

The World Wide Web Consortium's draft VoiceXML 2.0 standard integrates markup languages for common dialogs, grammar, speech synthesis and natural language semantics.

5. Future Trends and m-Government Issues

Mobile Authentication - As states deal with citizens and businesses over a variety of different technologies (Desktop, Laptop, Cell Phone, PDA, etc.), it will be ever more important to set uniform policy for how to conduct a specific transaction. This policy should be applicable no matter what technology the user has chosen to use to conduct the transaction on that day. The authentication of an individual should not be restricted to a specific device, or to how they access the service. Industry is proposing several options for authentication and on-line payments systems. The Microsoft initiative is called Passport, the American On Line (AOL) initiative is called Magic Carpet, and a group has proposed an open, distributed system with implementations available from multiple technology providers and identities issued by many parties operating in a web of trust called the "Liberty Alliance." Several credit card associations are planning similar initiatives using smart cards.

Mobile Payments – In Europe and parts of Asia, citizens can use their mobile phones to dial a special number on a vending machine and obtain a beverage. The same technology can let them call a bank or brokerage firm and trade stocks. In the U.S., the federal government regulates billing practices for mobile pay-per-call services, and is in the process of revising the rules that may include allowing non-telecommunications related charges. This would allow mobile phones to be used as payment devices. Issues to be addressed include a mechanism that constitutes prima facie evidence of authorization (e.g., a dialed call) and authentication. As states consider m-Government services, they may need to address new regulations for mobile payments and the associated authorization and authentication requirements.

Location-Aware Applications – The use of the Global Positioning System (GPS), emergency 911 (e911), and other technologies (e.g., Bluetooth and/or radio beacons) will provide another option for m-Government applications to be tailored to a specific location. The citizen or government employee will be able to access specific information about services, facilities and specific requirements in the immediate area:

City Guides – location of historical structures/buildings, government offices and interactive commercial services as Yahoo-Earth is doing.

Permit Requirements – digging in an area with underground pipes or cables. Obtaining a drilling permit in a rural area and the associated filings with ground water districts and natural resources/environmental entities.

The Telephone Number Mapping (enum) Working Group of the IETF (Internet Engineering Task Force) is defining a DNS-based architecture and protocols for mapping a telephone number to a set of attributes (e.g. URLs) that can be used to contact a resource associated with that number. RFC 2916 is currently on the standards track and addresses the use of the Domain Name System (DNS) for storage of E.164 numbers and how DNS can be used for identifying available services connected to one E.164 number (Note: E.164 simply defines a worldwide numbering plan, with country code and the specific number). While both of these initiatives may offer additional capabilities to support mobile applications for government workers, they will also raise additional privacy concerns for general public use.

6. Content and Presentation Management Issues

Publishing web pages has evolved from the primary function of a "Webmaster" to a distributed model where functional staffs that are directly responsible for the content are expected to post information. For

agencies with strong web development policies and standards, this did not present a problem. For all the others it resulted in inconsistent page design, usability and accessibility problems. Content Management Systems (CMS) helped resolve this problem by adding a formal structure to the web publishing process and required agencies to adopt enterprise-wide web design standards. The majority of CMS products do a good job managing the presentation of information, providing the display in a standard web browser. Wireless devices do not use standard browsers, nor is there a single standard for all wireless devices.

Wireless devices also have different display capabilities that are limited by display size, support for color and graphics. The other issue that needs to be addressed is the input capability of wireless devices, e.g., lack of a full keyboard, buttons, and pen-based. Some devices use WAP (Wireless Application Protocol) and WML (Wireless Markup Language), and other technologies are used in specific devices (e.g., cHTML - Compact HTML used in I-Mode cell phones, HDML - Handheld Device Markup Language, Web Clippings - PalmVII, and xHTML - Extensible HTML). While government organizations may adopt a specific standard for mobile employees, citizen access to government information and services may require agencies to support multiple standards/technologies.

Extensible Markup Language (XML) - The solution to presentation management may also facilitate other e-Government initiatives, and that is in the use of the Extensible Markup Language (XML) and Extensible Style sheet Language (XSL). The use of both technologies allows information content to be formatted for specific wireless devices. The World Wide Web Consortium (W3C) has released the XML Schema as a W3C Recommendation, indicating that the specification is stable and contributes to Web interoperability. The recommendation covers the following three parts:

- Part 0: Primer, at http://www.w3.org/TR/2001/REC-xmlschema-0-20010502/
- Part 1: Structures, at http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/
- Part 2: Data types, at http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/

Simple Object Access Protocol (SOAP) - Another technology that may facilitate m-Government. A solution is the Simple Object Access Protocol (SOAP). SOAP is a lightweight protocol for the exchange of information in a decentralized, distributed environment. It is an XML based protocol that consists of three parts: an envelope that defines a framework for describing what is in a message and how to process it, a set of encoding rules for expressing instances of application-defined data types, and a convention for representing remote procedure calls and responses. The XML, XSL and SOAP infrastructure will also facilitate applications communicating directly with each other over the Internet. Additional information is available at http://www.w3.org/TR/SOAP, and from the Organization for the Advancement of Structured Information Standards (OASIS), an international consortium that creates interoperable industry specifications based on public standards related to structured information processing, at http://www.oasis-open.org.

Wireless Application Service Providers (WASPs) - Some government entities may not have the technical staff to support the required programming and deployment to link applications to multiple types of wireless devises. This has resulted in a new breed of service providers that can manage and configure application content for a range of wireless devices. The WASPs host and manage wireless applications for a variety of devices and protocol languages. WASPs may provide a solution until wireless technologies become less complex and more standardized.

7. m-Government in India (Case Study)

In India data entry related to village information and amenities available in different villages are done at concerned Panchayats which in turn is connected to a central server (available at District Collectorate or State Head quarter), using the wireless technology in particular Mobile phones people residing in

surrounding villages can have the requisite information on a particular village on their Mobile phones from their houses without surfing the Net. We can take an example which is not exactly m-Government but transformation towards m-Government using mobile devices; the Karnataka state government in India has computerised land records. The only problem is that the servers storing these records are in district headquarters and are not easily accessible to villages that, while perhaps only 70 Km. away, are without phone lines. Enter DakNet, a "store and forward wireless broadband network" that uses a Mobile Access Point (MAP) mounted on a regular passenger bus to transmit information between village and district headquarters. A villager can request information about their land records (or other services) through a PC in a WiFi-enabled village kiosk (WiFi stands for 'wireless fidelity': a radio-based protocol for transmitting information). The request will be stored in the computer until a bus with an MAP passes and collects the information wirelessly. The information will then be transferred to the district headquarters when the bus is within range of the WiFi-enabled systems based at headquarters. The villager gets their response when the bus 'delivers' the information back to the PC in the village kiosk. This can include delivery of land record and related service transactions.

At present most of the State Governments in India have implemented Treasury Information System in either Client Server mode or Web Based (3-Tier Architecture). Certain reports are also being generated as per the demand of the concerned Finance department either in off line mode or online in case the application software is Web Based. But no one can find out the volume of instant withdrawals being made from the individual Treasury using the said application. Here we can incorporate the use of Mobile Technology to flash the instant withdrawals being made from a particular Treasury in form of SMS (Short Messaging System). The moment, the amount of withdrawals being made is more than a certain cut off amount as fixed by Finance Department, the concerned authority of finance department will receive a SMS regarding the withdrawals being made who in turn can make an enquiry at the same instant of time if required. This may prove to be a better live example which transforms a Government from e-Government to m-Government. This example is already in place in the State of Haryana where the farmers are able to know the price of different commodities on Mobile, transforming the Government system to m-Government.

Now a days in India every villager are well acquainted with the use of mobile phones rather than surfing Net, the literacy rate being low in most of the villages of our country. Obviously the Government can plan the deficit in a mobile fashion instead of sitting and planning in a closed-door room. Some day one can expect m-Government to over ride the e-Government.

8. Concluding Remarks

m-Government development focus mostly on infrastructures, including mobile networks and applications. After the necessary infrastructures is developed and sufficient mobile density is reached, governments will have to deal with the more difficult task of regulating and developing legal aspects of mobile applications and use of the mobile services. This is also the problem that governments face when implementing e-Government. At this stage, roles of legal interventions in developing mobile market can be bought to the forefront and will determine further success of m-Governments initiatives. The main advantage of m-Government over e-Government in developing and transitional countries is that they have more advanced mobile infrastructure than Internet base. However, accessibility doesn't mean actual use of services. Citizens can mistrust m-Government services and transactions until their privacy and security won't be ensured by government. Legislation needs to be accurately developed to assure legality and legitimacy of related transactions, thus promoting wider service acceptance by citizens. Although the current mobile infrastructures and applications in most developing countries do not allow providing intellectual public services, but it does not mean there is a lack of applicable policy. As in case of e-Government, m-Government has its development stages: one way communication, interaction and transaction. Being at the

early stages of m-Government implementation process, governments should take advantage of existing second generation (2G) networks and start providing simple informational and interactive services, such as providing brief information relating to administrative procedures via Short Message Services (SMS). The transition to the transactional stage and provision of value added public services, such as providing platforms for downloading and exchanging administrative forms of doing different administrative transactions requires deployment of the next generation of mobile networks (i.e. third generation (3G) networks) that allow mobile users to access the Internet via high speed mobile connections. Deploying 3G networks is becoming a worldwide mobile trend; since May 2006, 196 cellular operators in 84 countries have launched third generation (3G) networks. With the adoption of 3G services by citizens and development of contents for mobile platforms by administrative agencies, governments can start providing more effective services at less cost. In that way, m-Government strategy based on mobile infrastructures suggests more gradual development of m-Government services requiring less initial investments, as far as it relies on existing mobile networks, which will be later, upgraded to 3G networks by cellular operators.

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