Design of Government Information for Access by Wireless Mobile Technology

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INTRODUCTION

As the world becomes mobile, the ability to access information on demand will give individuals a competitive advantage and make them more productive on the job and in their daily lives (Satyanarayanan, 1996). In the past, government information was presented by government employees who verbally communicated with citizens in order to meet their information needs. As print technology improved, government information was, and still is in many countries, communicated to citizens using paper as the medium of delivery. Because of the cost of printing and mailing printed documents and the difficulty of updating information in a timely manner, governments are moving to electronic delivery of information using the Web. Currently, governments provide digital service to their citizens using the Web for access by desktop or notebook computers; however, citizens of many countries are using mobile devices such as cell phones, tablet PCs, personal digital assistants, Web pads, and palmtop computers to access information from a variety of sources in order to conduct their everyday business and to communicate with each other. Also, wearable mobile devices are being used by some workers for remote computing and information access in order to allow multitasking on the job. It is predicted that there will be more mobile devices than desktop computers in the world in the near future (Schneiderman, 2002). The creation of digital government will allow the delivery of government information and services online through the Internet or other digital means using computing and mobile devices (LaVigne, 2002). Also, there will be more government-to-citizen and government-to-business interactions. Digital government will allow citizens, businesses, and the government to use electronic devices in order to communicate, to disseminate and gather information, to facilitate payments, and to carry out permitting in an online environment (Wyld, 2004). Digital government will allow citizens to access information anytime and anywhere using mobile and computing devices (Seifert & Relyea, 2004).

BACKGROUND

According to O'Grady and O'Hare (2004), mobile computing will become the major computer usage model of the future. This will be possible since the digital divide is decreasing due to wireless access, increasing use of mobile devices, decreasing cost of Internet connections and computer technology, and transparent access of computer systems. Governments need to take advantage of technology-literate citizens and design and make available information for citizens to access government information digitally from anywhere and at anytime. This is important, since citizens expect the same level of service that is being given by businesses that are providing services and information anywhere and anytime (Dawes, Bloniarz, Connelly, Kelly, & Pardo, 1999). Users need just-in-time information for the job and in the community. The use of wireless mobile devices will facilitate access of government information from anywhere and at anytime. Also, computing is becoming ubiquitous, where citizens will work from anywhere and access government information from many networks using wireless mobile devices (Huber, 2004; Perry, O'Hara, Sellen, Brown, & Harper, 2001).

Before the use of mobile devices to access government information and design of information for mobile access are discussed, it is important to examine the information processing required when citizens access digital government information. Citizens acquire government information at many levels. At the lowest level, citizens may want to be aware of what is happening in government, so they will read the information in order to be informed. For example, some citizens may want to know the changes made to tax regulations. At the next level, citizens and businesses may want to access government to apply the information to complete everyday tasks. For example, some occupations require that businesses and citizens follow approved safety procedures when completing tasks. This requires comprehension and application of the information. At the highest level, citizens and businesses may want to critically analyze, synthesize, and evaluate

government information for research purposes. To achieve this, citizens will have to access government information from many sources through ubiquitous computing using mobile devices.

USE OF MOBILE DEVICES TO ACCESS DIGITAL GOVERNMENT INFORMATION

There are many benefits to the use of mobile devices to access digital government information. According to a recent report by the European Commission (2004), digital government can provide better quality public service, reduce waiting time for information and service, lower administrative costs for businesses, and allow higher productivity for the public. Using mobile devices will allow citizens to access government information from anywhere and at anytime. With the use of wireless mobile technology, users do not have to be connected physically to networks in order to access information, and the mobile devices are small enough to be portable, which allows users to take the devices to any location to send and retrieve information. For example, a worker in the field who requires specific government regulations while completing a task can use a mobile device to access the information just in time. If government regulations in a field change, the government can update the digital information to allow individuals and businesses to access the current information immediately. In addition, a worker in the field can use a mobile device to contact a government employee remotely and to request specific information for immediate use.

Mobile devices have many benefits for accessing government information; however, there are some limitations of mobile devices of which designers of government digital information must be aware when designing information for delivery on mobile devices. Some of the limitations of mobile devices in delivering government information include the small screen size for output of the information and the small input devices for accessing the information (Ahonen, Joyce, Leino, & Turunen, 2003). Designers of information must be aware of these limitations when designing government digital information for access by mobile devices and must design for ease of use. Rather than scrolling for more information on the screen, users of mobile devices must be able to go directly to the information and move back and forth with ease. Information should be targeted to the users' requests when they need it and should be presented efficiently to maximize the display of the information on the mobile device screen. The interface of the mobile device must be appropriate for individual users and the software system should be able to customize the interface based on individual user's characteristics.

Designing Government Digital Information for Mobile Devices

As the evolution of delivery medium of information changes, so does the strategy for processing the information. According to Grudin (2004), prior to writing and print, most information access and interaction were done by listening, memorizing, and speaking. With the print medium, information acquisition strategies were reading, analyzing, and writing. As government information becomes digital, acquisition strategies include searching, synthesizing, and constructing. Designers of government information for mobile devices must design for the new information acquisition and interaction strategies.

Most government information tends to be text-based, which takes longer for users to process and interpret. This is because past government information was designed for printing on paper for delivery to citizens. Designers of digital government information must use the capability of the computer to present information visually as well as textually in order to facilitate efficient processing and acquisition of the information. According to Paivio's (1986) theory of dual coding, information storage and retention is enhanced when information is represented both in verbal and visual forms. Presenting material in both textual and visual forms will involve more processing, which will result in better storage and integration of information in memory (Mayer, Fennell, Farmer, & Campbell, 2004).

In addition, because of the limited display capacity of mobile devices, government information must be designed for display using rich media such as audio, video, pictures, and graphics. Tabbers, Martens, and van Merrienboer (2004) found that for Web-based multimedia information, students who received visual cues to pictures scored higher on an information retention test compared to students who did not receive the cues for the pictures. According to cognitive psychology, information acquisition is an internal process, and the amount retained depends on the processing capacity of the user, the amount of effort expended while reading the information, the quality of the processing, and the user's existing knowledge structure (Ausubel, 1974). These have implications for how government information is designed for mobile devices. Designers must include strategies that allow the user to activate existing cognitive structure in order to conduct quality processing of the information. Mayer, Dow, and Mayer (2003) found that when a pedagogical agent was present on the screen as information was narrated to students, students who were able to ask