

## Chapter 4.12

# Handhelds for Digital Libraries

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### ABSTRACT

The present chapter introduces digital library services' utilization through handheld devices, such as personal digital assistants (PDAs) and smartphones. It argues that handheld devices proliferation justifies the term digital library in terms of anywhere-anytime access, and retrieval and management of information. Furthermore, these devices constitute powerful information harvesting tools that help users enhance their interaction with information spaces, both of physical and digital form. The chapter presents the services that can be accessed by means of portable devices and analyzes the main sociotechnical issues that arise and influence user interaction. Factors that affect acceptance of these devices are discussed, and future trends are presented to outline the research landscape for the forthcoming years.

### INTRODUCTION

During the last years, computer technology has been evolving from the mainframe and personal computing eras to the third one, that of ubiquitous computing. Wireless communication networks and mobile computing were similarly affected by the evolution in computing devices. As a result, people can choose among dozens of portable devices, capable of establishing radio connections, to join a computing network, such as the Internet, and realizing the vision of ubiquitous information access and delivery services. On the other hand, the Web lacks authority and quality control, is inadequately indexed, and the search interfaces are ineffective and simplistic. These reasons, along with the need for anytime access to information and the need to retrieve relevant and accurate information from anyplace, lead to the creation of digital libraries (DLs).

In this chapter we present the reasons why handhelds, like personal digital assistants (PDAs), smartphones, TabletPCs, and the most recent ultra mobile PCs (UMPCs) can be used as tools to access DL content. The approach of this chapter is user-centered and focuses on the services that can be supported by these handhelds, the interaction for use in DLs, and the acceptance of such devices.

## **BACKGROUND**

The term PDA was coined in 1992 by John Sculley for a handheld device that offered work organizing tools, like a calendar, scheduler, address book, memos, clock, and a calculator. The potential they introduced in information delivery was quickly recognized and soon these devices were utilized, mainly, by health sciences libraries (Jones, Rieger, Treadwell, & Gay, 2000; Rios, 2004; Smith, 2002). Meanwhile, bigger screens were made available and were able to depict colorful graphics. Computing power, memory, and storage capabilities increased, and data input methods, like handwriting and virtual keyboards, were implemented. Audio playback was made available and both size and weight reached the ideal measures. Wireless networks also evolved, making anywhere information delivery a reality. Moreover, smartphones appeared, providing telephony and other communication services like e-mail, three-way communications (conferencing), and Internet access.

Apart from the physical libraries, DL organizations also found the wireless connectivity features quite attractive. Handhelds could be used to access multimedia content on a 24/7 basis. They could also keep notes and other information for reference, or even be used as communication tools. During the last years many researchers have been studying issues that arise by the usage of such devices for information retrieval tasks. In early years of the current decade, several prototypes

were implemented in various settings, such as James Madison University (McCabe, 2004), Oulu University, Finland (Aittola, Ryhänen, & Ojala, 2003), and Cornell University (Jones et al., 2000). Students from an informatics class in J.M. University used a PDA to view and edit patient records whereas students in the Oulu and Cornell universities used the PDAs to help them navigate in the university's library, access the OPAC, locate books of their interest, communicate with other persons on the network (including library personnel), take notes, scan or photograph topics from the books retrieved, and transfer data on a personal storage area. Participants in the studies expressed enthusiasm for the ability to combine mobile information access with other activities such as writing or organizing materials. Map guidance to locate a book was preferred over traditional shelf classification. Even though the service was considered easier to use from a desktop terminal, the usage of a portable device in larger libraries was appreciated. However, as Jones et al. note (2000), "their enthusiasm declined significantly when either technology purchase or student fees were suggested" (p. 98).

## **SERVICES ACCESSED WITH HANDHELDS**

Among the advantages of DLs over physical libraries, two are of great importance: anytime and anywhere access to the library's content. Even though the existence of DLs goes back at the late 80s, the term "*anywhere*" was strongly associated with indoor places, like a home or company office where a wireline connection to the Internet or some other database system was available. Only recently, with the rapid growth of wireless communications and mobile computing, the term "*anywhere*" really reflects outdoor connections. Handhelds are used to fill this spatial gap among access points, by enabling connections to remote information providers from any point, giving a

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