Chapter X
Using Interaction Design to Improve Usability of a PHR User Interface Based on Visual Elements

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ABSTRACT

This chapter presents a case study of using interaction design methods for exploring and testing usability and user experience of a Personal Health Record (PHR) user interface based on visual and graphical elements. To identify problems and improve the design of PHR user interface we conducted two task-oriented usability testing based on the think-aloud technique for observing users during their interaction with a high-fidelity PHR prototype, and questionnaires and semistructured interviews for measuring user satisfaction. Our study demonstrates that a user-centered approach to interaction design involving the final users in an iterative design-evaluation process is important for exploring innovative user interfaces and for identification of problems in the early stages of the development cycle of a PHR.

INTRODUCTION

The Markle Foundation's Connecting for Health working group in its report "Connecting Americans to their healthcare" (Markle Foundation, 2004) defines Personal Health Record (PHR) as: "an electronic application through which individuals can access, manage and share their health information in a secure and confidential manner" (pp. 13). In the last years, PHR has been gaining great attention from healthcare institutions and organizations, due to its potential for a more active involvement of citizens in their care and improvement of relationships and communication between patients and their healthcare providers (Brailer, 2004; Cohn, 2007). Recently, in its report on the prevention of medication errors (IOM, 2007), the Institute of Medicine has identified PHR systems as a viable technology to support consumers' self-management.

Worldwide research institutions, government and healthcare authorities have identified PHR as a top priority, established broad areas for research and evaluation of PHR systems, and acknowledged the necessity of demonstration and pilot projects as a critical next step to address and exploit the full potential of PHR-based systems and services (Brailer, 2004; Cohn, 2007; Markle Foundation, 2004; Tang, Joan, Ash, Bates, Overhage, & Sands, 2006).

In order to design a working system, the involvement of final users is a crucial phase, even though it is often undervalued (Nielsen, 1993). For example, in healthcare settings, it has been demonstrated that the most innovative project could fail because of a rushed interface design (i.e., an interface limited to a subjective taste) that can compromise the user's acceptability, strongly influencing the use of a system (Bates, Kuperman, Wang, Gandhi, Kittler, Volk, Spurr, Khorasani, Tanasijevic, & Middleton, 2003). This seems to be particularly true in the context of development of a PHR-based system, since we are dealing with citizens, a deeply nonhomogeneous group, due to the disparity of age, cultural level, living context, healthcare and computer literacy.

Interaction design emphasizes the importance of involving final users throughout the whole process of design of the product or system within an iterative design-evaluation process. Preece, Rogers, and Sharp (2002, pp. 170, 285) state that a user-centered approach to development "forms a central plank" of interaction design process and "the real user and their goals, not just technology, should be the driving force behind development of a product."

In the last years, several groups have applied user-centered approaches and usability testing in healthcare settings for the design and implementation of clinical information systems (Coble, Karat, Orland, & Kahn, 1997; Kushniruk & Patel, 2004; Kushniruk, Patel, Cimino, & Barrows, 1996; Zhang, Johnson, Patel, Paige, & Kubose, 2003). To our knowledge, only few studies have applied a user-centered approach to design and development of a PHR system (Tran, Zhang, Stolyar, & Lober, 2005).

During the last year, the Department of Health of the Autonomous Province of Trento (NE Italy) has promoted a feasibility study on the design of a PHR-based system. One of the preliminary research questions of the study was to explore whether and how visual design solutions can promote user's usability and acceptance of a PHR-based system. A first requirement for using a visual approach in the design of the PHR system was to create a clean nonredundant interface that would reassure and communicate calm and serenity to users and guide them through a user-friendly navigation throughout the PHR. A second, but not less important, requirement is that a user interface based on visual elements would be portable and usable in a touch-screen paradigm on mobile devices (i.e., palm top) with minor modifications.

This chapter describes the use of interaction methods, particularly usability testing, for exploring and testing usability and user experience of a

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