Chapter LX
UI Design for Mobile Technology in a Closed Environment

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ABSTRACT

This chapter reports on a case study linking several technology devices that monitor a range of vital signs in patients recently discharged to a hospital ward from the Intensive Care Unit (ICU). Apart from presenting an interesting technological challenge, this closed environment creates unique logistical and physical ergonomic challenges as well as cognitive and perceptual design problems for mobile technology. Devices include desktop computers, touch monitors, and several types of remote mobile devices including PDAs. A number of important design issues are addressed, such as deciding which
visual details can be safely eliminated from a small display, or if permission should be given to turn off the alarm functions, among others. Lack of direct access to users compromised the ecological validity of several parts of the evaluation and alternative evaluation methods had to be devised.

INTRODUCTION

Designing applications for mobile devices is always an interesting challenge. Users demand more and more capabilities on devices continually decreasing in size, expect more and better integrated services, require the interaction model and display to resemble their desktop, and desire new applications to be usable without much investment in learning to use them. While present-day mobile computing is a far cry from Mark Weiser’s (1991) conception of ‘calm’ computing (Rogers, 2006), mobile technologies do open the door to ubiquity and to fulfilling a variety of aims. For example, with a focus on seniors and vulnerable people, a number of technologies designed to track, sense, and alert have been introduced (Mynatt, Melenhorst, Fisk, & Rogers, 2004). However, deciding what to video, sense, and track is an ongoing issue. As Rogers (2006) so aptly asks “is it right to be videoing and sensing people when they are sleeping, eating, etc., especially when they are not at their best?” (see also, Anderson & Dourish, 2005). While the motivation behind such applications is innocently altruistic, it does not take much imagination to see many of the risks associated with providing family members, physicians, or insurance companies with such powerful technological capabilities. To some extent, heavy social, ethical, legal, and privacy concerns are hampering rapid progress in the field as technological development would allow.

For exactly these reasons, it is often very difficult or even impossible to observe primary users in action to help the analyst gain a sufficiently detailed understanding of the users’ context, constraints, and work habits to generate useful user interface designs (Bennett et al., 2006). This is especially true in closed environments such as in hospitals and military contexts. For the same reasons as mentioned, researchers in medical environments are unlikely to be granted access to actual patient records or to live patient data even if this would not involve live observations. This means that many of the usual investigative and evaluative methods applied in user-centered design simply cannot be used. Requirements must be gathered from indirect data and secondary sources, and evaluation of successive prototypes must rely on artificial data and on quasi-laboratory studies before a clinical trial can be performed.

This chapter presents a case study reporting the challenges involved in the analysis, design, and evaluation of a system that tracks, records, and alerts medical staff about the state of vulnerable, seriously ill patients. The target population is nurses, physicians, and respiratory therapists caring for patients who are being discharged from an intensive care unit or other critical-care unit into a regular hospital ward. The system is about to undergo clinical trial; thus, it has not been implemented yet. Indeed, a fully integrated system allowing remote continuous monitoring of multiple patients’ vital signs does not yet exist; the way in which this exacerbates the challenges of defining and capturing the users’ needs as well as designing and evaluating the system is reported.

The next section describes the integrated system and the context in which it will be implemented, followed by a brief outline of the state of current physiological monitoring equipment. A brief summary of existing systems providing similar, albeit not integrated, capabilities is then presented. This is followed by a discussion of the challenges involved in conducting the user needs analysis in a closed environment. A method originally developed to generate future system users’ requirements for novel mobile features to support feature bundling is outlined and amended to suit the present purposes. The challenges involved in the design of the various components of the present.
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