Chapter 4.12
The MOBEL Project:
Experiences from Applying User-Centered Methods for Designing Mobile ICT for Hospitals

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ABSTRACT

This chapter presents results and experiences from the MOBEL (MOBile ELectronic patient record) project at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. MOBEL was a multidisciplinary research project established in 2000. The problem area of the project was communication and information needs in hospital wards, and the aim of the project was to develop and explore methods and prototypes for point of care clinical information systems (PoCCS) that support clinicians in their patient-centered activities. The chapter summarizes four sub studies performed during the project. Each study presents different approaches to user-centered design of PoCCS. Findings from these studies confirm the need for mobile information and communication technology (ICT) in hospitals. Furthermore, the studies demonstrate how more user involvement and complementary approaches to traditional requirements engineering (RE) and system development methods can be useful when developing mobile information and communication systems for clinicians.

INTRODUCTION

The Information and communication systems that are employed in today's health organizations are still to a high extent designed according to what can be called the desktop computer interaction model. The underlying assumption of this model is that support must be given to an individual user at a stable location. This model works well in most office environments, where users interact with information systems at their office desk, performing mostly isolated and well-demarcated tasks. However, as will be argued in this chapter, the model does not readily apply to clinical work. Clinical work is inherently different from office work in a number of important aspects. This implies that different types of systems are needed to support clinical work and moreover that different approaches and methods are used for designing these systems. This insight motivated the MOBEL (MOBile ELectronic patient record) project that will be presented in this chapter.

The MOBEL project consisted of four separate studies (denoted here as *Study A* to *D*). They have each pursued a set of different research questions, but seen together they form a continuum of *user-centered* design approache*s*. The main research focus of *Study A* was to obtain in-depth understanding of information- and communication practices amongst physicians in a mobile clinical setting. *Study B* aimed at developing a method for performing structured observation and analysis of clinical work as a basis for empirical based requirements engineering. In *Study C*, the focus was on involving users more actively in the system design process, by including health personnel in role playing workshops. And finally, the main focus of *Study D* was to investigate evaluation criteria for sensor-based interaction techniques providing mobile health care personnel point of care access to medical information.

This chapter summarizes the objectives, research approaches and findings of the MOBEL studies. The objective of the chapter is to contribute to the body of knowledge that is relevant for designing mobile ICT for hospitals. Findings from the project confirm the aforementioned characteristics of clinical work, and stress the need for mobile ICT in hospitals. Furthermore, the studies demonstrate how more user involvement and complementary approaches to traditional requirements engineering (RE) and system development methods can be useful when developing mobile information and communication systems for clinicians.

The next section of the chapter briefly presents the problem area and an overview of the project. In the following sections *studies A* to *D* are described in more detail, and finally, a summary and some concluding remarks are given.

THE MOBEL PROJECT

The MOBEL project was established in 2000 as an interdisciplinary research project under the strategic area of medical technology at the Norwegian University of Science and Technology (NTNU).[1] The basic insight motivating the project was that clinical work has some specific characteristics that distinguish it from what can be referred to as 'office work'. The most prominent of these characteristics are:

- **It is inherently *mobile*:** Clinicians have to move between patients who are physically distributed and interact with colleagues at different locations. There is not one, stable workplace.
- **It is information intensive:** Doing clinical work requires a lot of information. This involves information about the nature and stages of the patient's disease(s), his clinical condition, the actions taken and the actions planned. Furthermore, a lot of information is produced as a result of clinical work.
- **It is highly *collaborative*:** Clinicians work in teams. Their work involves shared re-

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