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*Published in:*  
DHRS 2006

*Publication date:*  
2006

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

### *Citation for published version (APA):*

Kanstrup, A. M., & Christiansen, E. (2006). Mobility at a medical ward: design challenges and decisions for an m-learning application. In O. W. Bertelsen, M. Brynskov, P. Dalsgaard, O. S. Iversen, M. G. Petersen, & M. Wetterstrand (Eds.), DHRS 2006: Proceedings of the sixth Danish human-computer interaction research symposium (pp. 31-32). Department of Computer Science, Aarhus University. (DAIMIPB; No. 580).

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# Mobility at a Medical Ward: design challenges and decisions for an m-learning application

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## ABSTRACT

The paper reports from the MINI-project in which the authors are currently designing a mobile e-learning service for physicians in clinical training. The paper presents results from the analysis trying to grasp what mobility means in this specific context and which design challenges and decisions have been made on this basis.

## Author Keywords

Mobility, medical ward, m-learning, design requirements.

## INTRODUCTION



During their first years of medical practice physicians need to operationalize their knowledge from medical studies, in the terms of Dreyfus & Dreyfus going from knowing that to knowing how in stages from novice to competent [1]. Even as novices in practical ward the physicians often work alone with patients, analysis of results, diagnosis, and initial care decisions. For learning

support their pockets are stuffed with reference-books, look up tables, instructions, and personal notes, cf. picture one.

The aim of the MINI-project is to experiment with design of mobile e-learning (/m-learning) to support physicians especially in this first period of work. The design process has been planned as a modified version of the user driven innovation process which the authors underwent in the FEEDBACK-project [3] modified primarily because the team of physicians with whom we co-operate have very little time for participation. The process has, so far, consisted of lab-preparations and design in iteration with observations, conversations, and workshops with physicians at the ward. In this paper we present analytic results on the particularities of mobility in order to understand opportunities as well as constraints for design of mobile e-learning within this specific context. As pointed out by Hosbond and Nielsen, "It is striking that very little research has been directed at establishing requirements that do not merely reflect on the mobile technologies, but also the

organizational and social context of mobility" [2]. This paper is such an attempt: to sum-up analytic findings of what 'mobility' means in this specific organizational and social context. Central design challenges and decisions are presented on this basis for a prototype currently under way.

## LEARNING 'IN THE POCKET' – MAX 3 MINUTES AND A CALL FOR PERSONAL SPACE

As illustrated in picture one present learning support seems to be 'in the pocket'. Trying to understand why, limits in time and personal learning space seems to be central: As for limits in time the pocket is close to the physician and as for personal learning space the pocket seem to be the only (or most?) personal space for the physicians. Picture two shows the shared office of the 16 registrars.



One fixed shared PC is located in this office; other PCs are located in shared offices at the ward. Spaces are typically shared, which also include learning spaces. Shared learning spaces are found and organized formally e.g. at shifts, morning conferences, and x-ray conferences, where physicians reflect with each other (picture three is such an example from a morning conference analyzing x-rays).

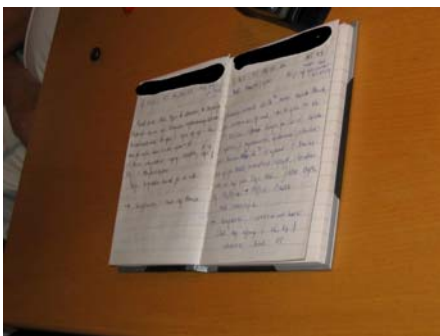


A consequent design aim has been to design a personal learning space/an “e-Pocket”. Tablet PCs and flat panel displays at the ward were rejected by the physicians for being too big and too un-personal. Hence, the hardware choice is PDA’s.

Limits in time, e.g. for preparations are described by a physician explaining that “*When you are called, you don’t run, you walk, because then you have time to look up some information on the way*”. Preparations are typically made ‘on the way’ i.e. in hallways, elevators, toilets, or by making a minor backstage at the bedside while nurses talk to patients. Time is by the physicians limited to max. 3 minutes. “*If you have more time you sit down in an office or at a PC at the ward*”. The timeframe of 3 minutes has set the challenge for information architecture and interaction techniques and made us consider non-text interaction techniques (cf. a following section).

### KEEPING TRACK – INTERRUPTIONS AND MULTITASKING

During our visits shadowing doctors on duty we saw how their rhythm of work consists of breaks away from one thing, having to pay attention to another, re-assuming the first, being disrupted again, etc. In the short intervals, where they shift their attention they try to mentally prepare for the next thing. They are multitasking and trying hard to treat one case at a time. But fact is that they are constantly interrupted. Hence keeping track seems to be an obvious way of supporting their learning (and memory). In their pockets they keep notebooks (cf. picture four). Notes are short and ephemeral because they are ‘intermediaries’, made quickly, on the move and used for memory and (sometimes, if time allows for it) to follow up on patient records, the diagnosis, outcome, etc.



A consequent design aim has been to provide for personal notes. Major constraints are here (again) related to interaction techniques and information architecture in order to design for track which can be made and which are afterwards easy to find. Acknowledgement of the overwhelmingly many interruptions and seeing how the physicians try to fight them, also made us realized that any idea of notifications or alerts is from the outset not good. An aim must be to design against interruptions.

### THE HARDWARE AS INTERFACE – INTERACTING WITH HANDS AND VOICE

The physician uses her voice and her hands all the time. She talks to colleagues, to secretaries, to patients. She uses her hands to touch the patients to feel them, to calm them. The hands are for patients, the voice is part of all action. Watching the hands of even novice physicians when they grip the dictaphone is remarkable: they are safe, sure, in control, they hold and click the button, and Whola! They start dictating.



This trait of interaction has made us try to go for dictating as a possible way of interaction when taking notes. More generally it has made us aware that when dealing with mobile technologies the hardware must be seen as a major part of the user-interface supporting interaction with e.g. shortcuts/buttons for dictating (c.f. [4]).

### ACKNOWLEDGMENTS

Thanks to physicians at Randers Central Hospital for participation in observations and workshops, to chief physician Niels Boye for co-operation and initiative in the project, to Pernille Bertelsen and Christian Nøhr at Aalborg University for their contribution to the analysis, and to the reference group for constructive discussions: Zenaria, Motorola, Acure, and TopNordic. The MINI-project is supported by The Danish Ministry of Science and Technology’s grants for mobile e-learning.

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