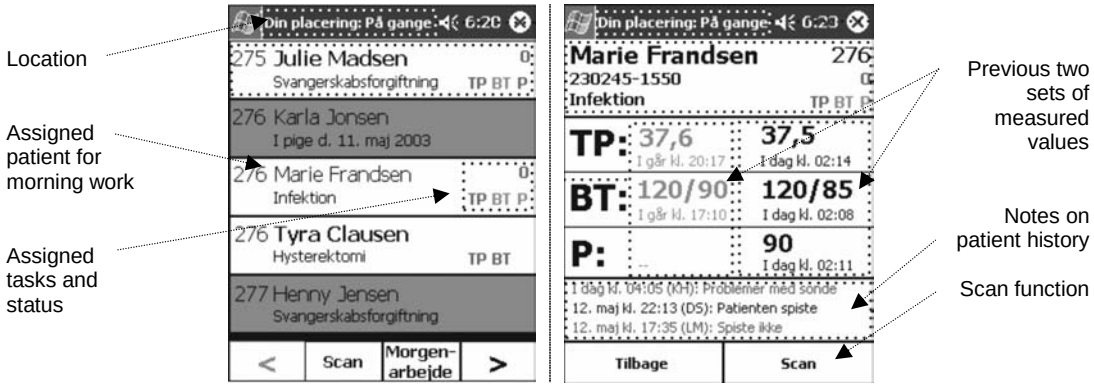
EXPLORING CONTEXT-AWARENESS AS MEAN FOR SUPPORTING MOBILE WORK AT A HOSPITAL WARD

Aspects of mobility are important and necessary in many work activities. Luff and Heath (1998) outline the necessity for mobility in various work situations such as health consultations, construction sites, and public transportation. Emerging mobile and hand-held devices provide new opportunities for supporting mobility in work. One issue to consider when designing mobile systems is context-awareness. Schilit and Theimer (1994) define context-awareness in mobile computing as the ability of an application to discover and react to changes in the environment. Context-awareness holds many promising features for improving the effectiveness and usability of information technologies (Dey, 2001). Most context-aware mobile systems aim to support users in private situations including e.g. mobile tourist guides (Pospischil et al., 2002). There seems to be a lack of focus of context-awareness for users acting in more professional situations, e.g. conducting work tasks. We explore the idea of context-awareness in mobile systems for user acting in professional work situations. This is done through the design and implementation of an experimental context-aware prototype for a particular set of work tasks.

We selected a hospital ward as case for our study for exploring context-awareness in mobile work where we conducted a number of ethnographic studies. First, we interviewed the matron of the ward and three nurses. Secondly, we observed work tasks as carried out by two nurses, and thirdly we conducted in-situ interviews with these two nurses. Based on these observations and interviews, we analyzed the work to identify a suitable work situation where a context-aware mobile system could be designed and implemented. We selected the work activity called morning procedure as it involved mobility and integrated some potential barriers of successful work conduction, e.g. nurses frequently require information at different locations, nurses register redundant information, and nurses note down values by handwriting. The morning procedure includes among other activities the measuring of temperatures, blood pressures, and pulses of admitted patients, and the preparation of patients for scheduled operations. The morning procedure was illustrated and documented in a number of scenarios which represented fictive, but typical, work scenarios. These scenarios were verified by nurses from the ward and served as specification for the design of the mobile system.

We designed and implemented an experimental prototype, called MobileWARD, on a PocketPC that could seamlessly support the morning procedure. For this experimental prototype, we implemented some the contextual sensing functionalities through a control center. This control center was operated by the members of the design team and included the sensing of physical location, the barcode scanning of patients, and the trigger of temporal-oriented events. The mobile system was designed to support the work tasks during morning procedure under two conditions. First, the system should be context-aware in the sense that it should integrate the ability to discover and react to changes in the environment. Secondly, all interface design should incorporate a visual layout that would enable finger-based interaction.

Two screen shots from MobileWARD are illustrated in figure 1. MobileWARD is context-aware as it is able to discover and react to changes in the physical and social environment. MobileWARD dynamically recognises the physical location of the nurse and at the top of the interface, the nurse can see the current physical location as interpreted by the system; here she is in the corridor. Thus, moving from one location to another location is detected by the system. The location informs the presentation of information on the screen. In the figure where the nurse is placed in the corridor, the system presents information on the list of assigned patients for the morning procedure. Entering a ward, the system detects the change in physical location and presents information on only one ward. Here, the system also recognizes the social environment as it integrates information of patients admitted to the particular ward and thus presents information on only these patients. Furthermore, a barcode scanner enables identification of individual patients. The above information is all spatial-oriented. Context-awareness is also embodied as temporal-oriented information. The system provides information on previous measurements on temperature (TP), blood pressure (BT), and pulse (P) along with assigned times of measurements. This is illustrated in the right-hand side of figure 1.



We conducted laboratory-based and field-based evaluations to assess the idea of context-awareness. Our results indicate potential applicability of context-awareness in mobile work. However, our evaluations identified 16 usability problems of which some concerned context-awareness. The automatically updating of the interface layout caused a number of problems, e.g. one of the test subjects was reading information on the device while walking into a ward and she got confused when the system changed the interface layout without notice or without having her trigger the event. Thus, further research needs to be conducted with particular focus on the understanding of context-awareness in mobile work and potential limitations of context-awareness in mobile work.

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