Chapter XLV

Evaluating Context-Aware Mobile Interfaces for Professionals

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ABSTRACT

Evaluation refines and validates design solutions in order to establish adequate user experiences. For mobile user interfaces in dynamic and critical environments, user experiences can vary enormously, setting high requirements for evaluation. This chapter presents a framework for the selection, combination, and tuning of evaluation methods. It identifies seven evaluation constraints, that is, the development stage, the complexity of the design, the purpose, participants, setting, duration, and cost of evaluation, which influence the appropriateness of the method. Using a combination of methods in different settings (such as Wizard-of-Oz, game-based, and field evaluations) a concise, complete, and coherent set of user experience data can be gathered, such as performance, situation awareness, trust, and acceptance. Applying this framework to a case study on context-aware mobile interfaces for the police resulted in specific guidelines for selecting evaluation methods and succeeded to capture the mobile context and its relation to the user experience.
INTRODUCTION

In designing mobile support systems, evaluating designs at various stages in the development process is used to refine and adjust the design when needed. Furthermore, evaluation validates that the user needs and requirements are met for the intended user group. Thorough evaluations are required when the risks and costs of errors are high, when innovative interactive support systems, such as context-aware systems, are developed, or when the system is designed for use in a dynamic and critical environment. These needs for evaluation are even higher for mobile user interfaces, because of the dynamic use context, specific constraints of devices and risks of negative transfer from desktop experiences to mobile experiences (Nagata, 2006).

Due to these three issues, the user experience of mobile user interfaces is still an important bottleneck for services in the professional domain (Marcus & Gasperini, 2006). Realizing adequate user experiences is done by selecting the right method, based on specific constraints for evaluation of mobile, context-aware applications. Combining evaluation methods should capture the dynamic context aspects and their relations to the user experience in a complete, concise, and coherent way (cf. Neerincx & Lindenberg, in press). Finally, tuning of techniques and measures should ensure that the obtained results are relevant to the application domain.

Application Domain

The professional domain can be characterized as an environment where mobile workers are dependent on correct and relevant information to make critical decisions, where individuals are trained for their tasks and where tasks are goal-directed. In these domains, context-aware mobile devices have not yet become widespread in these domains.

Evaluation for the professional domain is distinguished from other domains by the following aspects. First of all, evaluation methods and measures should be tuned to specific user experience criteria within the application domain. For example, it seems less relevant (although interesting) to ask police officers about their emotional response toward the interaction with a mobile device. It seems more relevant to measure how many more criminal cases get solved in less time than before the introduction of the device. Secondly, not all situations for which the device is intended can be assessed in the field. Situations may not happen frequently enough or the risks are too high. For these situations, other research settings such as simulators may prove useful. Finally, access to professional end-users for evaluation purposes may be limited due to busy schedules and limited resources. The following case study is used to focus the discussion of evaluation methods for mobile context-aware interfaces and to provide an example from the professional application domain.

Case Study: Evaluating a Mobile Support System for Police Officers

For mobile police officers, increasingly more (multimedia) information becomes available to perform their tasks. In addition, both the interaction possibilities with devices and the momentary user needs for information or services continuously change over time and place (Baber, Haniff, Sharples, Boardman, & Price, 2001). Finally, shared situation awareness (SA) and communication within or between teams are vital for task execution, but may be diminished due to distributed persons and locations. Both theory and police practice show a clear need for interfaces that attract and guide the attention of individual officers or teams to relevant, high priority information or objects in a mobile setting (Streefkerk, Van Esch-Bussemakers, & Neerincx, 2006). The PAUI (Personal Attentive User Interface) project aims at designing and evaluating an adaptive user interface to support mobile police officers.
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