Chapter LII
Framework and Model of Usability Factors of Mobile Phones

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ABSTRACT

This chapter aims at developing a framework and model for identifying and organizing usability factors of mobile phones. Although some studies have been made on evaluating the factors, there is no systematic framework for identifying and categorizing them. This chapter proposes a conceptual framework which has multiple views to explain different aspects of the interaction between users and mobile phones, and

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which describes the world of usability factors based on these views. The multiple views include user view, product view, interaction view, dynamic view, and execution view. Furthermore, based on the conceptual framework, a multi-level hierarchical model which classified usability factors in terms of goal-means relationships was developed. Next, two case studies are described, where the usefulness of the framework and model could be confirmed. Lastly, a set of checklists which make the framework and model more practical were developed.

INTRODUCTION

Usability has been regarded as one of the most important attributes affecting the quality of mobile phones and thus users’ satisfaction (Ketola & Röykkee, 2001; Lindholm et al., 2003). There is no universal definition of usability, but the usability concept specified in ISO/IEC 9126 (1998) is now widely accepted (Schoeffel, 2003). ISO/IEC 9126 defines usability as ‘the capability of the software product to be understood, learned, used and be attractive to the user, when used under specified conditions.’ Although it is the definition focusing on a software product, the definition can be applied to mobile phones taking into consideration features specific to mobile phones.

Like other quality attributes, we can view usability both from design and evaluation perspectives (Folmer et al., 2003). Usability is one of a range of non-functional requirements, such as safety and security, which should be satisfied as part of the design process. Therefore, it should be properly specified during requirements analysis and designed during the architectural and implementation phases. Conversely, usability needs to be evaluated from a user-centric point of view during all the phases of design life cycle. User perception of usability is influenced by many design factors including visual appeal, hedonic qualities, logical task sequences, and pleasure in use, as well as contextual factors including the users’ environment. Thus, it can be said that usability is not an absolute concept determined by the design activity only, but rather the relative concept that can be affected by unspecified factors.

To enable more systematic usability evaluation, a lot of studies examined factors or dimensions constituting usability and their relationships (Bevan, 1999). For example, ISO/IEC 9241 (1998) defines three dimensions: effectiveness, efficiency, and satisfaction. Nielsen (1993) gives another example of such factors: learnability, efficiency of use, memorability, errors, and satisfaction. These dimensions can be categorized into either objective or subjective dimension. An objective dimension generally aims to evaluate how well users conduct their tasks with the use of performance measures like task completion time and the number of errors. However, objective dimensions do not always predict the user’s assessment of usability because it does not reflect users’ feeling or satisfaction. Subjective dimensions therefore, need to be assessed to provide a holistic and complete usability evaluation (Treu, 1994).

Usability evaluation methods can be classified into three types: usability testing, usability inquiry, and usability inspection (Zhang, 2003). Usability testing employs representative users on typical tasks using a system or a prototype and then evaluates how user interface supports the users to do their tasks. Typical methods include co-discovery learning, question-asking protocol, and shadowing method. Usability inquiry talks to users, observes their using a system in real work, and lets them answer questions in order to understand users’ feelings about the system and their information needs. Field observation, focus groups, and questionnaire survey are typical usability inquiry methods. In usability inspection, usability experts examine usability-related aspects. Typical methods are cognitive walkthrough and heuristic evaluation. It cannot be said that one method is the best in all situations. It is thus necessary to choose an appropriate method, taking into account evaluation purposes, available time, measures to be collected, and so on.