Framing the Context of Use for Mobile HCI

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ABSTRACT

The need to better understand the role of context has emerged after the revolution of mobile computing, as such devices are used in heterogeneous circumstances. However, it is difficult to say what context of use in mobile human-computer interaction actually means. This study summarises past research in mobile contexts of use and not only provides a deeper understanding of the characteristics associated with it, but also indicates a path for future research. This article presents an extensive and systematic literature review of more than 100 papers published in five high-quality journals and one main conference in the field of HCI during the years 2000-2007. The authors' results show that context of use is still explored as a relatively static phenomenon in mobile HCI. Its most commonly mentioned characteristics are linked to social, physical, and technical components, while transitions between the contexts were rarely listed. Based on this review, a descriptive model of context of use for mobile HCI (CoU-HMCI) summarising five components, their subcomponents and descriptive properties is presented. The model can help both practitioners and academics to identify broadly relevant contextual factors when designing, experimenting with, and evaluating, mobile contexts of use.

Keywords: Context of Use, Human Computer Interaction, Mobile, Mobile Context of Use, Usage Context

INTRODUCTION

Mobile computing has emerged a specific research focus within human-computer interaction (HCI) and has gone beyond conventional desktop computing environments during the last ten years. In this change, interest in studying contexts of use has dramatically increased. Still, context of use is not the focus of interaction research, but it is something framing, surrounding and influencing the interaction between users and mobile computers. For designers, it is appealing to know the contextual characteristics that can be taken into account in effectively supporting user's actions. For user experience researchers, it is desirable to understand the features or properties of usage context influencing an experience. For modern mobile usability practitioners, conducting experiments on the field settings, it is important to understand and report the relevant contextual conditions as a necessary part of evaluation. However, when exploring and understanding what context of use is about, researchers and practitioners face a variety of definitions, frameworks and models (e.g., Bradley & Dunlop, 2005; Cheverts et al., 2000, 2001; Dey, 2001; Dourish, 2001).

There are multiple ways to approach and categorize context of use. Understanding context is one of the main aims of ethnographical research (Dourish, 2001, 2004; O'Hara et al., 2006, 2007), whereas research into context-awareness targets the modeling of features (Cheverts et al., 2000, 2001; Dey, 2001), and usability or user-experience researchers see context of use as a part of a holistic picture of experience (see e.g., Hassenzahl & Tractinsky, 2006; Roto, 2006). Recently Bradley and Dunlop (2005) presented a prominent multidisciplinary model of context by combining theories from the fields of linguistics, computer science and psychology. According to their model, context of use is characterised by task, physical, social and temporal components of context. Furthermore, similar categorisations have been presented not only in the mobile HCI (Roto, 2006; Väänänen-Vainio-Mattila & Ruuska, 2000) and mobile work contexts (Wigelius & Väätäjä, 2009) but also in consumer studies (Belk, 1975). Besides these, technical, application or domain contexts have also been underlined as relevant factors for human-computer interaction (ISO 13407, 1999; Väänänen-Vainio-Mattila & Ruuska, 2000). While previous works provide a good base for viewing characteristics of usage context, their perspective is limited for mobile HCI.

Mobile usage contexts are heterogeneous and dynamic (e.g., Kaasinen, 2003; O'Hara et al., 2007; Tamminen et al., 2005; Väänänen-Vainio-Mattila & Ruuska, 2000). The usage sessions may contain transitions between contexts and within contexts (Tamminen et al., 2005): for example between personal and shared use; temporally, between waiting and hurrying; from walking to standing or sitting; or between multi- and unitasking (Cui et al., 2006; Kaasinen, 2003; O'Hara et al., 2007; Tamminen et al., 2005; Väänänen-Vainio-Mattila & Ruuska, 2000). To date, there have not been any wide scale attempts to understand special characteristics of these contexts in which the mobile interaction takes place. Rather, the previous reviews have either modelled general characteristics without underlining mobile interaction (Bradley & Dunlop, 2005), or their focus has been upon the research methods used in mobile HCI (Kjeldskov & Graham, 2003).

The goals of this paper are two-fold: firstly, we summarise the past research into mobile contexts of use and determine to what extent its different characterizing components have been studied; secondly, in order to understand what context of use in human-mobile computer interaction actually is perceived to be, we develop a descriptive model which both underlines special characteristics of mobile HCI and deepens the current knowledge of it. This paper presents an extensive and systematic literature review based on the review methods presented by Schwarz et al. (2007). Our review examines over 100 papers published in the five high-quality journals and one main conference in the field of HCI during the years 2000-2007. The results of our work will benefit both academics and practitioners in the mobile HCI community in understanding the special characteristics of mobile contexts and assist in directing future research in this area.

The paper is organized as follows: The next section gives an overview of context of use – what it is and what kind of features are associated with it, this section forms the base for our review. The review of our review research methods and materials is presented. The results in the form of a descriptive model of context of use for mobile HCI (CoU-HMCI) including five components, their subcomponents and descriptive properties is also summarized.

CONTEXT OF USE

Definitions and Approaches

Originally, the concept 'context' referred to language meaning 'con' 'text', i.e., with text (see Winogard, 2001). Webster's Online Dictionary (n.d.) defines context as a "*the set of facts or circumstances that surround a situation or event; "the historical context"*. In the field of HCI, definitions of context give a broad overview to the major relevant factors. According to Dey (2001), *"Context is any information that can be used to characterise the situation of an entity. An entity is a person, place, or object that is*

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