Chapter 38
Mobile Usability:
State of the Art and Implications

Linda M. Gallant
Emerson College, USA

Gloria Boone
Suffolk University, USA

Christopher S. LaRoche
Massachusetts Institute of Technology, USA

ABSTRACT

Context and the pervasive environment play a much greater role in mobile technology usage than stationary technology for which usability standards and methods were traditionally developed. The examination of mobile usability shows complex issues due to the ubiquitous and portable nature of mobile devices. This chapter presents the current state of mobile usability testing. More specially, topics covered are various usability testing methods, contextual complexity, audio interfaces, eye and hands-free interactions, augmented reality, and recommendation systems.

INTRODUCTION

Despite a decade of mobile device usability testing, technical challenges such as bandwidth, physical features, and financial issues slowed the progress of mobile communication (Zhang & Adipat, 2005). With recent advances in technology infrastructures, mobile communication is now faster and geographically more flexible. The removal of technological challenges such as network reliability, bandwidth, device in-puts and screen resolution necessitates the need for analyzing the multi-layered complexities of mobile usability. These include contextual factors, multimodal input and output choices, geographic locality, physical movement, and social interaction. Studies on mobile usability can be divided between studies of mobile phones with tiny screens, the arrival of smartphones such as the early Black Berry phones and the more recent full screen phones like iPhones, Android and Windows Phones (Nielsen & Budiu, 2013). Kjeldskov and Graham (2003) in a review of 42 mobile evaluations found that only 19 percent employ field studies and that 71 percent employ lab-based experiments. Kaikkonen, A., et. el. (2005) and Kjeldskov (2004) found few differences between a usability test in the lab or a usability

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tests in the field. Garzonis (2005) stated that field evaluation provide insights with the everyday use of technology, divided attention spans, and the dynamic context of use. Coursaris & Kim (2006) offer a review of 45 empirical mobile usability studies based on variables like user, task, environment and technology. The majority of these studies were done in a lab-setting. Only eleven studies were done in the field or in the lab and the field. These early studies examined effectiveness (62%) or the accuracy or completeness of achieving a goal; efficiency (33%) of task performance using a particular device; or the degree of satisfaction (20%) a product gives a user (Coursaris & Kim, 2007). "Less than 7 percent of studies explored dynamic factors, i.e. lighting and noise levels. Hence there is a lack of research on physical, psychosocial, and other environment-specific factors (Coursaris & Kim, 2007, p. 2343). Kjeldskov & Paay (2010) provide evidence of using indexicality, specific contexts, to understanding mobile human-computer interaction in different contexts. Indexes help users to interpret their environment or the interaction potential with other people in the spatial context, the physical context, or the social context.

Rahmadi & Zhong (2013) offer a study of teens mobile usage evolution based on initial opinion, knowledge and skills, context dependence, boredom, and personalization. They believe a field study is needed to observe change in usage after people become familiar with their mobile device. Another approach is to conduct a longitudinal study testing interaction with users during a prolonged period of time. This could be repeated several times until redundancy is reached or no new patterns emerge.

Jacob Nielsen and Raluca Budiu in their book on Mobile Usability (2013), explained many of the findings from their 124 phone and 35 tablet in- lab usability tests using think-aloud methodology: keep text copy short (25), enlarge interface elements (20), a limited screen space should employ limited features (26), mobile apps can perform better for some websites (34), mobile task completion averaged 62% (45), do not waste space for visuals or content that is secondary (52), consistently use of gestures, home, or back buttons (59-66), too many images can hurt download time (80), avoid early registration (81), test and retest page designs (95), reading comprehension is lower on mobile (102), speak the user's language (111), cut the fluff (110), the average user reads only 120 words per page (113), and consider what your users know when organizing content by usage, task, subtopics, one long page or alphabetical sorting (124-129).

While a small body of research is emerging in the development of techniques and standards for mobile usability evaluation, the current state of mobility usability testing is still evolving from creatively applying traditional usability methods to the specific challenges of mobile contexts.

This chapter discusses how personal mobile communication devices are evaluated for mobile usability based on technological and methodological challenges. Specifically in technological challenges, issues like contextual complexity, audio interfaces, eye and hand free interactions, augmented reality, and recommendation systems are examined. For methodological challenges, we consider expert reviews, empirical research, and methods of data collection. The social and economic impacts of mobile usability are considered before conclusions are drawn.

TECHNOLOGICAL CHALLENGES IN MOBILE USABILITY

While laboratory usability testing may be viable for particular inquiries into cognitive and visual functions; the major challenge of mobile usability is often the environmental context. This is beyond traditional usability laboratory testing and more closely follows a field methods approach to usability testing. Testing must take into account the physical and environmental situations in which mobile communication