Searching for an agile approach to methods and methodology in the mobile arena.

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Abstract
This paper describes an investigation into the synthesis of user information behavior models and technological models of mobile computing to provide a new approach to smart/mobile user testing. Smartphone take-up has exploded growing faster than any consumer technology in history. This technology has altered the way we communicate and has become a key source of information that has surpassed email as the core communication mechanism (Naughton, 2012). To design tests for mobile applications that are workable and useful to a Smartphone user there needs to be an appreciation of the many situations and contexts. Tests need to consider different technological configurations and environments, ignoring these factors could have serious implications on use and device interaction. It has been noted that many mobile testing practices "lack the realism" (Kjeldskov & Stage, 2004). With a field evolving rapidly researchers are developing new test methods and adapting existing ones to support these technological advancements. These methods need to be continually challenged to support the mobile development community.

Keywords: information models, information behavior, mobile informatics, cognitive modelling, user experience design, user testing, field testing
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1 Introduction

Smartphone take-up has exploded growing faster than any consumer technology in history. This technology has altered the way we communicate and has become a key source of information that has surpassed email as the core communication mechanism (Naughton, 2012). To design tests for mobile applications that are workable and useful to a Smartphone user there needs to be an appreciation of the many situations and contexts. Tests need to consider different technological configurations and environments, ignoring these factors could have serious implications on use and device interaction. It has been noted that many mobile testing practices "lack the realism" (Kjeldskov & Stage, 2004). With a field evolving rapidly researchers are developing new test methods and adapting existing ones to support these technological advancements. These methods need to be continually challenged to support the mobile development community. The aim of this research is to investigate user information behavior models and technological models of mobile computing to provide a new approach and model to support user testing. This hybrid user testing model will test mobile devices in a naturalistic setting aimed at supporting testing agility.

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Background:

The challenges facing a testers ability to accurately map a mobile users experience has been acknowledged by a number of researchers within the Human Computer Interaction (HCI) field, Lindmth, T., *S.* Nilsson and P. Rasmussen, (2001) being one of the most prominent. They analysed the implementation of mobile tests discussing a range of environmental and configuration factors that "might make the result irrelevant since it fails to take the context of its use into consideration" (Lindmth et al, 2001, p. 1). In their paper they look at different testing contexts confirming that a setting can be easily arranged and manipulated for computers in a lab, which are more or less in the same context as office and home computers. The mobile context is substantially different as there are so many influences on the tester and the person using the mobile device (Lindmth et al, 2001). Modeling experiences and interactions between complex environments and configurations is a challenge and one that Olsen fittingly defines as "Chaos", these factors can hinder the tester and chaos is defined as the limited ability to communicate with each other often hindered by data formats, processing capabilities and interaction styles (Olsen, 1998). Testers are evaluating mobile users but struggling to "model the properties and viability in such a way that we can begin to solve the problem" (Olsen, 1998, p. 4). Mobile testing strategies need to be adaptive and have the ability to model or at least simulate realistic contexts, environments and configurations to help solve the problem, test a design assumption or a behavioral response.

Testing strategies tend to be built around models. Models have been introduced, developed and refined pushing forward the user-testing discipline as the technologies change with time. For example, quantitative models (GOMS, KLM, Fitts or ACT R etc.) and qualitative (heuristics, contextual enquires or cognitive walk-through etc.) have been used within a variety of different settings with varying levels of success. In one of the earliest papers evaluating mobile interactions on the move Johnson (1998) stated that testers are well equipped to model cognitive aspects of users, their tasks and to model aspects of collaborations. These models have stood the test of time working extremely well in many lab-based configurations, but how do they fare in an increasingly mobile information society? There have also been a number of attempts to build models within mobile computing, Olsen stated a need to master the chaos and Kristoffersen and Ljungberg (1999) created a Basic reference model of Mobile Informatics. The model aims to "reflect the ways in which using IT in mobile setting differs from using IT in stationary settings" (Kristoffersen & Ljungberg, 1999, p.13). Their research categorised mobility and put them into three components: environment (observable, physical surroundings of the situation), modality (archetypes, called wandering, travelling and visiting) and applications (technology, data and program).

The need for user behaviour models

The Reference Model has supported user testing in mobile computing research community by providing a testing context. A citation analysis shows that subsequent papers that have used and adapted this reference model (e.g. Pirhonen, A., Brewster, S. A. and Holguin, C. 2002; Goodman, J., Brewster, S.A., & Gray, P.D. 2004; Kaikkonen, A., Kallio, T., Kekäläinen, A., Kankainen, A., & Cankar, A. (2005); Roto et al, 2004; Barnard and Yi, 2007; Schmiedl, G Blumenstein, K & Seidl, M. 2011); Sun and May, 2013). On deeper analysis these research papers tend to focus on fragmented or small design aspects within the application not the overall experience and barriers facing

the mobile user. The research methods tended to use mini or predefined scenarios such as, testing metaphors (Pirhonen et al, 2002), opening and closing applications (Kaikkonen et al, 2005) or map locations and navigation structures (Schmied et al, 2011). Discounting or not following up the information processing behaviours and seeking approaches, a key motivator when interacting with the mobile device, could impact on the ability to evaluate the application and usability of the device.

Using information needs, as a starting point, will complement and support the context formed by the Kristoffersen and Ljungberg reference model. There has been a huge number research studies in the information needs field many have presented sound models to help explain user behaviour and information seeking approaches (Wilson, 1981 & 1997; Ellis's, 1989; Kuhlthau's, 1993; Spinks, 1997; Choo, C., Detlor, B. and Turnbull, D, 1999). Many of these models fit with traditional information research supporting the diverse information seeking approaches on-line and off-line but as mentioned by McKenzie (2002) they seem to be limited in their ability to describe everyday life information seeking. She goes on to state such models tend to focus on active information seeking, to the neglect of less-directed practices (McKenzie, 2002, p. 20). These neglected practices could be; configuration factors, contextual factors, environmental factors, motion or modality, social concepts and psychological concepts of information needs and user behaviour. This does not to say all models ignore these factors it depends their research and focus. However, the model of information behaviour presented by Wilson (1996) introduced "intervening variables" which took on the psychological and environmental factors to a need associated with the information user. Saracevic' 1997 stratified model of IT interaction took this further identifying; cognitive, affective and situational but not really considering the modality issues associated with new mobile users. Both of these support elements of a mobile user and could complement the mobile user tests.

Reviewing these user behaviour models it became apparent that Wilson's model provides the researcher with a clearer path or adaptive framework to complement Reference Model. Fusing these models together creates a hybrid model that aims to bridge the gap between HCI/usability testing and user/information needs taking into account mobile use and context. The model builds upon the environmental and modality settings by Kristoffersen and Ljungberg with Wilsons intervening variables to provider a flow to aid the test. The flow will evolve into "information based" scenarios that will guide tester enabling them to plan the configuration factors, contextual factors, environmental factors, motion or modality etc.

2 Conclusion

The research will implement this hybrid model to assess (by ethnographic means) mobile testing practices. This type of research is based around an investigative exploration of the students' ability to understand the hybrid model and how they might evaluate this to support agile approaches within natural mobile testing environments. Depicting this type of social phenomenon in a natural setting allows the researcher to follow the interpretivist paradigm, specifically empirical interpretivism (Pickard, 2007) which, considers complex interactions and acknowledges that researcher and research influence each other direct and indirectly. Ingwersen (1984) explains researchers who apply the social perspective to set a context "see information users first of all as the members of a particular community, social category or group" (Ingwersen, I984, p.88). The hybrid model identifies the user groups as a social category in this case within a University context. This interaction with the model on their course will consequently impact

upon the overall research output. The success of the research outputs is determined by field tests conducted by the students, observed by the researcher. The tests take place in the real/natural contexts and as such tests tend to relax experimental controls to produce more naturalistic conditions (McNeil and Chapman, 2005). McNeil and Chapman also explain that 'field experiments appeal to interpretivists because they tend to focus on how the real world is interpreted by people who inhabit it' (McNeil and Chapman, 2005, p. 77). Interpretivists take the view that multiple realities based on individual interpretation exist and they advocate interaction with research participants to generate outputs in contrast to the positivism tendency to test hypotheses.

Contribution to Knowledge

This hybrid model aims to support the research field in two ways; firstly informed by original synthesis of information behavior and mobile computing models, how theoretical modelling can be implemented for practical use and secondly demonstrate how information modelling can support critical thinking within experimental computing practice.

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