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Research Methods in Mobile HCI

Trends and Opportunities

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Abstract

This panel addresses the past, present and future of mobile HCI research in terms of methods and focus. The panel takes its offset in a new literature survey following up from Kjeldskov and Graham's survey from Mobile HCI 2003 [6]. Based on this, and their own experiences, the panelists will outline and discuss their views on current methodological trends in mobile HCI research, and suggest and discuss what opportunities they see for responding to these trends and pushing the research field further forward.

Keywords

Research methods; research purpose; literature survey

ACM Classification Keywords

A.1. [General Literature]: introductory and survey

General Terms: Design, Human Factors

Introduction

Only a decade ago mobile HCI was still very much in its infancy as an academic research area. Widely commercially successful devices had only been around for about a decade, and as the leading conference MobileHCI (www.mobilehci.org) had only a few years of history behind it. As a consequence only a small body of knowledge existed about this emerging research field in terms of methodology, interaction design, and real world use, and no coherent sets of methods and

techniques for mobile HCI had yet been established. Driven by the saturation and technological maturity of mobile devices throughout society, there was, however, a huge interest in the new interaction design possibilities of this fast expanding area of computing. In 2002 this situation motivated a comprehensive literature survey of mobile HCI research by Kjeldskov and Graham [6]. The purpose of this was to provide a snapshot of state-of-the-art and current practices, and through this identify shortcomings and opportunities for future research directions. The literature survey was presented at Mobile HCI in Udine in 2003 the second time this conference ran as a full and independent international event, and contributed to bringing the issue of research methodology on the agenda within mobile HCI.

The review looked at 102 articles published between 2000-02 in the most central outlets of its time and classified them in terms of their research method and purpose inspired by a study in Information Systems by Wynekoop and Conger [15]. This provided a picture of how mobile interaction design research was being done, and for what intent, and brought to attention a number of trends characterizing the field, and a number of assumptions influencing its focus and approach.

The literature survey revealed a strong bias towards applied research for engineering and laboratory experiments for evaluation. Put simply, mobile HCI research in the early 2000s was dominated by building new systems in a trial-and-error manner, and evaluating them in laboratory settings – if evaluating them at all. There was very little going on in terms of trying to understand the phenomenon of mobility itself in relation to interaction design and technology use,

and to use such insight when designing and building actual interactive systems. Nor was much attention given to the role of real world context in relation to understanding, building or evaluating interactive mobile systems [6]. In essence this echoed a fundamental segregation between use- and technology-centeredness depending on whether the involved researchers were primarily interested in people or systems. On a more general level, it was apparent that methodology seemingly played a very small role. The approaches taken often remained unexplained, their suitability unchallenged, and their limitations and alternatives not discussed.

Only a few years later, mobile HCI research had already started to change. The methodological opportunities proposed were indeed taken up by the community, and today, a decade later, the research field appears to have matured considerably and is making use of a much wider palette of research methods in interesting combinations, and for a much wider range of purposes.

This trend was confirmed by a follow-up survey by Kjeldskov and Paay [7] reviewing all research articles concerning the design of mobile interactions published in top outlets in 2009. From this survey it is apparent that the research field of mobile interaction design has grown substantially in the last decade and is now a substantial part of mainstream HCI and interaction design research. Out of the 246 full and short papers in the Proceedings of the annual ACM Conference on Human Factors in Computing Systems (CHI) that year, almost a fifth concerned human-computer interaction with mobile systems or devices. It is also clear that there has been an increase in the level of empirical research, and that a more diversified set of methods for

this has evolved. For example, the use of field studies have notably changed and diversified into at least three noteworthy sub categories of field ethnographies, field experiments, and field surveys.

At the same time, however, there is also evidence that the segregation into camps primarily interested in *people* or in *systems* apparently persists. The first aims primarily at understanding mobile user experiences theoretically and conceptually, and the second aims primarily at building new mobile systems and evaluating them in use. This segregation of course stems from the multi-disciplinarity of the research field, but maintaining such a divide sadly sustains the unfortunate implicit assumption that in mobile interaction design research people and technology can, or perhaps even *should*, be studied separately. In turn, such an assumption can be partially responsible for researchers in the people- and technology- oriented camps continuing to investigate the same types of questions and problems as before, rather than defining and exploring new ones in closer collaboration.

Based on this, and their own experiences, the panelists will outline and discuss their views on current methodological trends in mobile HCI research, and suggest and discuss what opportunities they see for responding to these trends and pushing the research field further forward.

Panelists

Jesper Kjeldskov is Associate Professor at Aalborg University's Department of Computer Science, and Honorary Fellow at The University of Melbourne. He has worked with Mobile HCI since early 2000s and currently has a particular interest in interaction design for digital ecologies and mobile and pervasive computing for domestic use contexts. Jesper's position is that in order to continue informing the creation of better interactive mobile devices and systems, we need to widen our scope beyond the individual mobile device and an individual user's interaction with it and, in doing so, transcend beyond the dichotomy of people- or technology- oriented research and design. Such clear-cut distinction tends to cause the potentially fruitful dialectics between the two approaches to disappear [11], and if one of the two approaches is considered 100% good and the other 100% bad, from either side of the divide, then one is destined to subsume the other. Dialectic thinking, on the other hand, encourages us to develop a synthesis at a higher stage of the opposing interests, as also discussed by Dahlbom and Mathiassen [1]. This is not simply a matter of finding a balance between the two, but about transcending beyond opposing views and shaping a modified unit of analysis a higher level of abstraction [9]. This might, for example, be done by departing from traditional user- or technology-centred ways thinking all together: viewing instead the design of mobile interactions in a broader perspective – as a matter of continual form and context convergence.

Keith Cheverst is a Senior Lecturer in the School of Computing and Communications at Lancaster University. His research focusses on exploring the obdurate problems associated with the user-centred design of interactive systems in complex or semi-wild settings and the deployment and longitudinal study of these systems to gain insights into issues of user adoption and appropriation. Keith's position is that, unfortunately, there are many pragmatic issues that make it problematical for academic researchers to follow approaches, such as action research, that might achieve a suitable balance between technology and people. Consider current funding models for example, typically one has to specify and fully justify, a-priori, the technology/equipment required for his or her project - i.e. knowing in advance what the technology solution/intervention will be for your particular user group despite the fact that any 'understanding the setting' phases of the project may not have happened yet... Projects such as Equator (http://www.equator.ac.uk/), an Interdisciplinary Research Collaboration (IRC), supported by the EPSRC, which ran for six years, provided an ideal platform for supporting the balanced research that we might strive for because resources could be channelled 'on the fly' to support the development of appropriate technology interventions following comprehensive 'understanding of setting' phases. Resources, such as appropriate technical skills, funding for equipment (and also crucially time) could be channelled to support further technology development, deployment and evaluation phases as necessary. Typically, my coping strategy for balancing person and technology (given constraints such as accessible skill sets and equipment procurement) is based around the use of technology probes [5] and identifying settings where it can be argued that the chosen technology probe will provide some value to the user group and research community.

Marco de Sá is a Research Scientist at Yahoo! Research in Santa Clara. Marco is looking at new ways to design mobile experiences for retrieving, accessing and visualizing relevant contextual information on the users' surroundings and integrating these activities with social networks, information and shared data. Marco's position is that to design the mobile and ubiquitous experiences of the future, a broader vision of context and users will be necessary to accommodate both the evolving technology but also the social interactions that are constantly emerging and changing. Connectivity is no longer confined to the user-service or user-information paradigms but to user-social and user-world interactions where our capabilities and activities extend themselves between locations, people and objects [2]. In addition, a decoupling from some of the traditional design metaphors, inherited from long standing HCI research, is fundamental so that mobile experiences become equally accessible to savvy users and users who have never interacted with any type of technology. To do so, the research methods currently used must follow new directions and acknowledge the multitude of new requirements and opportunities presented by new technology but also consider the constraints faced by designers and researchers both in the academia and industry. We must continue inventing new ways to design, prototype and evaluate highly rich

experiences [3], especially in the wild, with quick turnaround cycles while still simulating complex infrastructures without incurring into costly development processes.

Matt Jones is a Professor and Head of Computer Science at Swansea University. He has worked on mobile interaction issues for the past seventeen. He has been a Visiting Fellow at Nokia Research and was given an IBM Faculty Award to work with the Spoken Web team in IBM Research India. His research work has focussed on the fusion of physical and digital spaces in challenging contexts. See www.undofuture.com for more. Matt's position is that we will continue to need conventional methods such as the relatively small-scale controlled lab and field deployments. So, for example, as new mobile materials become available - such as projected displays - we will need to experiment to find out how fast, efficient and error prone they are [12]. I'm also interested in exploring new methods including: "in the wild" approaches that see ideas emerge and be tested without preconceived notions of need or success; techniques that are viable and ethical in developing world contexts [4]; and, ways of exploiting the sensors in always connected smartphones to provide new insights into service use and effectiveness [13].

Roderick Murray-Smith is a Professor of Computing Science, at Glasgow University, where he runs the "Dynamics, Inference and Interaction" research group. He works in the overlap between machine learning, interaction design and control theory. He works closely with the mobile phone industry, having worked together with Nokia, Samsung, FT/Orange, Bang & Olufsen and Microsoft, and his academic research has been used in a range of commercial products by major manufacturers. Rod's position is that we are still missing foundational theory for interactive systems in general, and that this is even more pressing in the case of mobile interaction. Some of the divisions in the HCI community are clear in the review [10], which worries about the willingness of many to throw away the scientific approach in place of design-driven methods, and as Oulasvirta says "There are many constructive fields in engineering where rigorous science and constructive efforts are symbiotic. We should learn from them. The real synthesis will strike a healthier balance" [10]. Rod is interested in understanding how to design, build and test the next generation of mobile devices which will be ever more dependent on a huge number of sensors (physical and virtual). These developments give users the chance to create embodied interaction loops in a range of novel ways, but that at the moment we lack the conceptual and practical tools to do this in other than a very ad hoc manner. He outlined some of the challenges to the Mobile HCI research community in [8], and [14] provides an example of one approach to fundamental theories of interaction.

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