Preface

In recent years, mobile technology has been one of the major growth areas in computing. Mobile devices are becoming increasingly diverse, and are continuing to shrink in size and weight. Although this increases the portability of such devices, their usability tends to suffer. Ultimately, the usability of mobile technologies will determine their future success in terms of end-user acceptance and, thereafter, adoption. Widespread acceptance will not, however, be achieved if users' interaction with mobile technology amounts to a negative experience. Mobile user interfaces need to be designed to meet the functional and sensory needs of users. In recognition of this need, a growing research area focusing on mobile human-computer interaction has emerged, and will likely continue to grow exponentially in the future.

The resource disparity between mobile and desktop technologies means that successful desktop user interface design does not automatically equate to successful mobile user interface design. Desktop user interface design originates from the fact that users are stationary (that is, seated at a desk) and can devote all or most of their attentional resources to the application with which they are interacting. As a result, the interfaces to desktop-based applications are typically very graphical (often very detailed) and use the standard keyboard and mouse to facilitate interaction. This has proven to be a very successful paradigm that has been enhanced by the availability of ever more sophisticated and increasingly larger displays. In contrast, users of mobile devices are typically in motion when using their device, which means that they cannot devote all of their attentional resources, especially visual resources, to the application with which they are interacting; such resources must remain with their primary task, often for safety reasons. Additionally, the form factor of mobile devices typically limits the applicability of standard input and output techniques, making mobile human-computer interaction design ineffective if we insist on adhering to the tried-and-tested desktop paradigm.

The design and evaluation of mobile human-computer interaction, unlike desktop-based interaction, needs to be cognizant of the implications brought to bear by complex contextual factors affecting both users and technology. Such contextual influences include, but are not limited to, the physical environment in which a mobile device is being used, the impact of multitasking behavior typically exhibited by users of mobile devices (e.g., using a device whilst driving), and the social context in which a device is used (e.g., consider social acceptability of interaction). All in all, designing the user interface for mobile applications is a very complex undertaking that is made even more challenging by the rapid technological developments in mobile hardware.

Not only is the design of human-computer interaction for mobile technologies difficult, so too is the evaluation of such designs. In fact, the most appropriate means by which to effectively evaluate mobile applications is currently a hotly debated topic in the field of mobile human-computer interaction. Evaluation techniques for mobile technology require as much consideration as the design of the user interfaces themselves; for the results of evaluations of mobile applications to be meaningful, the manner in which the evaluations are conducted needs to be, and is, the focus of considerable research in itself.

The purpose of the *Handbook of Research on User Interface Design and Evaluation for Mobile*

Technology is to offer a compendium of current research knowledge concerning the key issues surrounding the design and evaluation of mobile user interfaces such that students, researchers, educators, and practitioners alike may all derive benefit from the experience of leading experts working in this field. Its aim is to expose readers to, and heighten their awareness of, the complexity of issues concerning mobile human-computer interaction. Amongst the chapters included in the handbook, alternative points of view are included for some of the field's hotly debated topics in order to encourage readers to think out of the box and embrace the challenge of new paradigms both for interaction design and evaluation. Reliance on the tried-and-tested desktop design and evaluation paradigms has not worked; the mission of this handbook is to encourage people to *think out of the box* to ensure that novel, effective user interface design and evaluation strategies continue to emerge and, in turn, the true potential of mobile technology is realized.

To elicit the best and most balanced coverage of issues critical to the design and evaluation of mobile technologies, researchers from around the world were invited to submit proposals describing their intended contribution to the handbook. All proposals were carefully reviewed by the editor, with a view to assembling the finest contributions from leading experts in the field. Upon receipt of full chapter submissions, each submission was subjected to double-blind peer review, and only the best were then selected for final inclusion in the handbook. In many instances, the chapters were subjected to multiple revisions before final acceptance. The result of this rigorous process is a comprehensive collection of current research articles of high scholarly value written by distinguished researchers from many prominent research institutions and groups around the world.

ORGANIZATION OF THIS HANDBOOK

The goal of the *Handbook of Research on User Interface Design and Evaluation for Mobile Technology* is to improve our appreciation of the current and future challenges associated with the design and evaluation of user interfaces to mobile technologies. To achieve this goal, the handbook includes a comprehensive collection of 64 quality research contributions from leading experts around the world. It covers issues ranging from the use of ethnographic methods for design of mobile applications to instrumented lab-based methods for their evaluation. Additionally, each chapter includes a collection of related key terms and their definitions, contributing to a comprehensive compendium of terms, definitions, and concepts central to the field of mobile human-computer interaction.

Although most chapters touch on a number of the issues critical to user interface development for mobile technologies, and many include discussion of case studies for illustrative purposes, to assist you when searching for specific information, the 64 chapters have been organized according to their primary contribution. Hence, the handbook is organized into five sections that examine the following topics:

- **Section I: User Interface Design for Mobile Technologies**
  - Use of ethnography to inform mobile user interface design
  - Use of the technology acceptance mobile for mobile services to guide the design of mobile technologies
  - The impact of user characteristics on the design of mobile user interfaces
  - Wearable technologies and their design implications
  - Contextual information and awareness in mobile application design
  - Design of in-car user interfaces
  - Design of mobile learning applications
  - Adaptive and intelligent user interfaces in mobile computing

- Rapid prototyping, modeling, and simulation tools for mobile applications
- Ecologies of interacting artifacts for ubiquitous technologies

- **Section II: Novel Interaction Techniques for Mobile Technologies**
  - Classification of mobile interaction techniques
  - Novel interaction paradigms
  - Unobtrusive interaction
  - Visual interaction
- **Section III: Assistive Mobile Technologies**
  - Overview of key issues and trends for designing and evaluating mobile assistive technologies
  - Design for various special needs groups, including seniors, mental health interventions, and visually impaired users
  - Implications for designing the interface to smart wheelchairs
- **Section IV: Evaluation Techniques for Mobile Technologies**
  - Theoretical overview
  - Adaptation of traditional methods to suit mobile human-computer interaction
  - Method selection and combination strategies
  - Novel evaluation methods
  - Classification of usability factors for mobile technologies
  - Lab v. field evaluations
- **Section V: Case Studies**

The handbook provides literally thousands of references to existing literature and research efforts in the field of mobile human-computer interaction, and it includes a comprehensive index to support quick and convenient look up of topics and concepts. This handbook is an ideal reference for veteran and novice educators, researchers, students, and practitioners in the field of mobile human-computer interaction who require access to current information in this emerging field. The complementary combination of theoretical and practical content will enable readers to draw parallels with their own research or work, and apply and/or further the research efforts of others in their own projects.

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