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Human-Computer Interaction – INTERACT 2009

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Proceedings, Part I

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Foreword

INTERACT 2009 was the 12th of a series of INTERACT international conferences supported by the IFIP Technical Committee 13 on Human–Computer Interaction. This year, INTERACT was held in Uppsala (Sweden), organized by the Swedish Interdisciplinary Interest Group for Human–Computer Interaction (STIMDI) in cooperation with the Department of Information Technology at Uppsala University.

Like its predecessors, INTERACT 2009 highlighted, both to the academic and to the industrial world, the importance of the human–computer interaction (HCI) area and its most recent breakthroughs on current applications. Both experienced HCI researchers and professionals, as well as newcomers to the HCI field, interested in designing or evaluating interactive software, developing new interaction technologies, or investigating overarching theories of HCI, found in INTERACT 2009 a great forum for communication with people of similar interests, to encourage collaboration and to learn.

INTERACT 2009 had Research and Practice as its special theme. The reason we selected this theme is that the research within the field has drifted away from the practical applicability of its results and that the HCI practice has come to disregard the knowledge and development within the academic community. However, to continue to develop and prosper, the HCI community needs to pay more attention to the cooperation and mutual learning between research and practice. We witness accidents happening in health care, airplanes crashing due to problems in their operation, we see tremendous money losses due to inefficiencies in computer support. On a smaller scale we find many tools and applications that are, if not difficult, annoying to use for reasons that are well known. At the same time we see an amazing development of new IT designs, games, robots and applications designed for pleasure and fun. IT is an essential source for efficiency and productivity in work as well as a large source of problems. For the future we need to learn from the positive development and reach for an understanding of the mechanisms behind the successes in order for us to let such processes influence the more challenged application domains. We hope that INTERACT 2009 provided such an inspiring meeting between research and implementation.

INTERACT 2009 brought the conference to Sweden and the Nordic countries. Through conferences such as NordiCHI, the Nordic countries have come to be recognized as one of the major local communities within the field of HCI. Nordic participants are one of the biggest regional participation categories at HCI conferences in the world. The Nordic tradition of HCI focuses on utility, equality, participation and quality of our everyday life and work. We aim at continuing these traditions while being in the forefront of development of the HCI field.

We hope that INTERACT 2009 will be remembered as a conference that brought research and practice closer together, focusing on making the computerized world a better place for everyone, regardless of functional abilities or particular requirements.

August 2009

Jan Gulliksen
Lars Oestreicher

Note from the Technical Co-chairs

You are holding the proceedings of the 12th Human–Computer Interaction Conference INTERACT 2009. The creation of this document is really a testament to the enthusiasm and collegial spirit amongst the HCI research and practitioner community worldwide. Thank you to all the authors who chose INTERACT 2009 as the vehicle to publish their research: a total of 723 submissions were received for the conference this year. Of these submissions, 244 were accepted for presentation at the conference. These include:

- 104 Full Research Papers
- 79 Short Research Papers
- 7 Interactive Poster Papers
- 17 Workshops
- 12 Tutorials
- 3 Special Interest Groups
- 6 Demonstrations
- 3 Panels
- 13 Doctoral Consortium Papers

The acceptance rate for the research papers was 29% of full papers submitted for review and 20% of initial abstracts submitted. The acceptance rate for the short research papers and interactive posters was 39%. Each research paper was reviewed by between three and six members of the International Programme Committee.

Our sincere gratitude goes to all the International Programme Committee members who willingly helped out and ensured the high quality of the INTERACT Conference papers was properly maintained. Although some people had to be bullied into reviewing (sorry about that), everyone submitted their reviews on time without a murmur of complaint. Thank you all for the effort that you so obviously put into this task.

Finally we wish to express a special thank you to the Proceedings Publication Chair, Marco Winckler, who painstakingly put this volume together.

August 2009

Paula Kotzé
Tom Gross

IFIP TC13

Established in 1989, the International Federation for Information Processing Technical Committee on Human–Computer Interaction (IFIP TC13) is an international committee of 30 member national societies and 7 Working Groups, representing specialists in human factors, ergonomics, cognitive science, computer science, design and related disciplines. INTERACT is its flagship conference, staged biennially in different countries in the world.

IFIP TC13 aims to develop the science and technology of human–computer interaction (HCI) by encouraging empirical research, promoting the use of knowledge and methods from the human sciences in design and evaluation of computer systems; promoting better understanding of the relation between formal design methods and system usability and acceptability; developing guidelines, models and methods by which designers may provide better human-oriented computer systems; and, cooperating with other groups, inside and outside IFIP, to promote user-orientation and humanization in system design. Thus, TC13 seeks to improve interactions between people and computers, encourage the growth of HCI research and disseminate these benefits worldwide.

The main orientation is toward users, especially the non-computer professional users, and how to improve human–computer relations. Areas of study include: the problems people have with computers; the impact on people in individual and organizational contexts; the determinants of utility, usability and acceptability; the appropriate allocation of tasks between computers and users; modelling the user to aid better system design; and harmonizing the computer to user characteristics and needs.

While the scope is thus set wide, with a tendency toward general principles rather than particular systems, it is recognized that progress will only be achieved through both general studies to advance theoretical understanding and specific studies on practical issues (e.g., interface design standards, software system consistency, documentation, appropriateness of alternative communication media, human factors guidelines for dialogue design, the problems of integrating multimedia systems to match system needs and organizational practices, etc.).

IFIP TC13 stimulates working events and activities through its Working Groups (WGs). WGs consist of HCI experts from many countries, who seek to expand knowledge and find solutions to HCI issues and concerns within their domains, as outlined below.

In 1999, TC13 initiated a special IFIP Award, the Brian Shackel Award, for the most outstanding contribution in the form of a refereed paper submitted to and delivered at each INTERACT. The award draws attention to the need for a comprehensive human-centered approach in the design and use of information technology in which the human and social implications have been taken into account. Since the process to decide the award takes place after papers are submitted for publication, the award is not identified in the proceedings.

WG13.1 (Education in HCI and HCI Curricula) aims to improve HCI education at all levels of higher education, coordinate and unite efforts to develop HCI curricula and promote HCI teaching.

WG13.2 (Methodology for User-Centred System Design) aims to foster research, dissemination of information and good practice in the methodical application of HCI to software engineering.

WG13.3 (HCI and Disability) aims to make HCI designers aware of the needs of people with disabilities and encourage development of information systems and tools permitting adaptation of interfaces to specific users.

WG13.4 (also WG2.7) (User Interface Engineering) investigates the nature, concepts and construction of user interfaces for software systems, using a framework for reasoning about interactive systems and an engineering model for developing user interfaces.

WG13.5 (Human Error, Safety and System Development) seeks a framework for studying human factors relating to systems failure, develops leading edge techniques in hazard analysis and safety engineering of computer-based systems, and guides international accreditation activities for safety-critical systems.

WG13.6 (Human-Work Interaction Design) aims at establishing relationships between extensive empirical work-domain studies and HCI design. It will promote the use of knowledge, concepts, methods and techniques that enable user studies to procure a better apprehension of the complex interplay between individual, social and organizational contexts and thereby a better understanding of how and why people work in the ways that they do.

WG13.7 (Human–Computer Interaction and Visualization) is the newest of the working groups under the TC.13. It aims to establish a study and research program that will combine both scientific work and practical applications in the fields of Human–Computer Interaction and Visualization. It will integrate several additional aspects of further research areas, such as scientific visualization, data mining, information design, computer graphics, cognition sciences, perception theory, or psychology, into this approach.

New Working Groups are formed as areas of significance to HCI arise. Further information is available at the IFIP TC13 website: <http://www.ifip-hci.org/>

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Swedish Interdisciplinary Interest Group for Human–Computer Interaction

The Swedish Interdisciplinary Interest Group for Human–Computer Interaction (STIMDI) is a non-profit organization in Sweden that has the purpose of promoting cooperation between industry and academia within the field of HCI. STIMDI has been around since 1986 and also took the initiative of starting the NordiCHI conference series with NordiCHI 2000 in Stockholm. STIMDI is happy to be the co-organizer of INTERACT 2009 together with Uppsala University. More information can be found on www.stimdi.se

Uppsala University

Uppsala University is the oldest university in northern Europe. It was founded in 1477 and has about 40,000 students. Uppsala University is a complete university with all subjects that exist in its research area. It is the biggest center for HCI research in Sweden with three different departments of HCI at the Faculty of Science and Technology, at the Faculty of Social Science and at the Faculty of Medicine.

The research conducted by the HCI group at the department of Information Technology at Uppsala University concerns the analysis and design of computerized work environments. A goal is to ensure usability (satisfaction, efficiency and effectiveness) and reduce complexity for computer users. Most of the research is performed within governmental authorities, organizations and industrial settings, where the role is to guide the development of usable systems through user-centered design activities. A significant part of the research concerns complex computer systems intended for professional users in their everyday work. This also involves studying organizational aspects and work environment problems. Current research domains are:

- Human control of complex systems: high-speed ferry operation, train driver operation, train traffic control, simulators
- Administrative work environments: case-handling, call center operation
- Health care: decision support systems, tele-radiology, home health care
- Visualization: tactical control and command systems, virtual learning lab, 3D tools
- Work environment: Physical, psychosocial and cognitive work environment in computer supported work

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