Methodological Approaches to HMI

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Preface

The design and the evaluation of human-machine interaction (HMI) are increasingly addressed by interdisciplinary research groups and by applied sciences such as information science. This development is a necessary consequence of the fact that technologies for advanced applications require advanced knowledge about the users and the specific interaction processes. The asset of such interdisciplinary approaches is their ability to combine the knowledge as well as the practical expertise of researchers of different disciplines. At the same time, however, these approaches require the interdisciplinary research groups to at least sensitize their members to the often conflicting theoretical frameworks, definitions, and vocabulary (for a possible approach see Bischof et al., 2013). One major problem lies in the development, correct selection and discussion of adequate methods that are required to assess and evaluate HMI and its design.

First, unreflected adoptions of validated instruments from social sciences by researches from different disciplines may lead to misapplications or misinterpretations of gathered data. This problem is often caused by a less intense review of literature on social-scientific methods. However, a thorough review is necessary in order to understand a method's suitability for specific research scenarios. Especially, the implicitly embedded meta-theoretical premises of different methodologies (e.g. positivism and constructivism) already entail possibilities and limitations, but are often not reflected appropriately.

Second, the application of validated methods does not automatically guarantee successful research. For example, disciplines such as psychology and sociology should reconsider the applicability of their methodology according to the specific scenarios in HMI research. For example, the blindfolded use of questionnaires for many research questions related to the design and the assessment of communication technology should be reconsidered. But also methods, such as camera-aided observations, can only contribute to the research success, if we know which levels of analysis are adequate for the specific research interest.

The aim of the assembled contributions is not to tighten the manifold methods of the heterogeneous disciplines that contribute to the research in HMI towards a single paradigm (Reiter-er, 2006), but to sensitize researchers to the fact that different technologies and their related

research questions require different methodological approaches to HMI. The following abstracts of the presentations at the workshop "Methodological Approaches to HMI" aim to address different methodological aspects of HMI-research within interdisciplinary research groups.

In the first contribution, Michael Heidt tackles the problem of interdisciplinary work on digital artifacts by emphasizing the "translation" between heterogeneous perspectives. He argues that the source code, from which digital artifacts emerge in the first place, could serve as a common ground for interdisciplinary work. However, social scientists are often not trained to work with this form of symbolic representation and therefore more adequate methodologies of social science research are required, which take the practice of coding into account. This should, in the long run, sensitize researches from different disciplines for the perspective of each other.

In the second contribution, Maximilian Speicher, Andreas Both, and Martin Gaedke present INUIT – a new measure, which aims at measuring the usability of web interfaces. The model was first specified with regard to ISO-based design guidelines and then evaluated by several e-commerce experts. The authors also report data about the first application of the new evaluation utility. The resulting web-based questionnaire can be used to gather ecologically valid data without the need to fill out lengthy online-questionnaires. This should facilitate faster iteration cycles in the development and evaluation of new web interfaces.

The third contribution by Mei Miao and Gerhard Weber identifies three main problems and challenges in developing and designing multimodal applications for blind people. Since blind users are insufficiently involved in such processes and developers normally not blind, their mental models usual differ widely. In order to cope with these problems the authors present a phase model for blind user-centered design process. Correlating blind user-centered methods are proposed: User analysis through telephone interviews and the reconstruction mental models by methods like teaching back and thinking aloud (Sasse 1991).

In the fifth contribution, Kalja Kanellopoulos an Michael Storz present an example of qualitative methodology for interdisciplinary work. Their contribution focuses the coordination of cooperative work between computer scientists and social scientists by reference to their own work on the user-centered design of a multi-user multitouch table. Centrally they discuss the intertwining processes of framing / reframing and prototyping for such interdisciplinary development processes.

References

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