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Human–Computer Interaction is a multidisciplinary field focused on human aspects of the development of computer technology. As computer-based technology becomes increasingly pervasive – not just in developed countries, but worldwide – the need to take a human-centered approach in the design and development of this technology becomes ever more important. For roughly 30 years now, researchers and practitioners in computational and behavioral sciences have worked to identify theory and practice that influences the direction of these technologies, and this diverse work makes up the field of human–computer interaction. Broadly speaking it includes the study of what technology might be able to do for people and how people might interact with the technology.

In this series we present work which advances the science and technology of developing systems which are both effective and satisfying for people in a wide variety of contexts. The human–computer interaction series will focus on theoretical perspectives (such as formal approaches drawn from a variety of behavioral sciences), practical approaches (such as the techniques for effectively integrating user needs in system development), and social issues (such as the determinants of utility, usability and acceptability).

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Tibor Kunert

User-Centered Interaction Design Patterns for Interactive Digital Television Applications

 Springer

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The content of this book has been accepted as PhD thesis by the Faculty for Electrical Engineering and Information Technology of the Technical University of Ilmenau, Germany.

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Summary

For new technologies such as interactive digital television, often a lacking acceptance by end users can be observed, that is partly caused by applications that are difficult to use. To lessen this problem in future, guidance is needed for designing easy-to-use applications early in the life cycle of the respective technology. Accordingly, in this book, guidance for designing the user interface of interactive digital television applications is developed. First the context of use of interactive television applications, designers' need of guidance and end users' needs are analysed, revealing a hierarchy of recurrent design problems for these applications. Then proven solutions for these problems are identified empirically by systematic variation building, prototyping and usability testing. The results are documented in the form of a language of design patterns that includes comprehensive guidance for designing interactive television user interfaces. To take full advantage of the potential of design patterns, a new approach to them is presented that guides designers in exploring design alternatives and evaluating their specific trade-offs. The approach presented is generic to let it be applied to other platforms and technologies too. Iterative evaluation of the pattern language presented for interactive television leads to design guidance that not only supports usability but also meets designers' needs. The developed pattern language for interactive television can be used for designing specific applications, for inspecting usability, for defining corporate style guides and for developing application templates to streamline the process of production.

Foreword

With the overwhelming success of the book “Design Patterns: Elements of Reusable Object-Oriented Software” by Erich Gamma, Richard Helm, Ralph Johnson and John M. Vlissides, the so-called “Gang of Four” (GoF) patterns have become very important in software development. While each pattern encapsulates a proven solution to a recurrent software design problem, a collection of interrelated patterns provides developers with a communication platform for disseminating elegant, reusable solutions to commonly encountered specification challenges.

While the original GoF patterns focussed on software design problems, the idea of patterns quickly conquered other areas of software engineering as well. Especially in the domain of human–computer interaction (HCI), patterns have been becoming an effective way of communicating design decisions, helping user interface (UI) designers to cope with the ever-increasing number of new devices and versatile application domains. With “User-Centred Design Patterns for Interactive Television Applications” Tibor has developed a pattern collection which fits right into this context. In his research he realised that *first* the emerging domain of interactive TV applications demands novel solutions for UI and interaction design and *second* patterns are the right packaging mechanism.

As a strong advocate of user-centred design, Tibor describes each pattern from a user-centric rather than a technology-centric perspective. For each pattern, the contexts of use and user goals are taken into account, with the goal in mind of maximising the user experience. Each provided solution is carefully evaluated by a suite of usability studies. The presented patterns are both hierarchically structured and indexed by design problems. This enables the developers to either conveniently navigate along the pattern tree or quickly jump to a pattern by looking up a particular design problem.

I am convinced that this book will not only be very useful for designers and software developers implementing interactive TV applications, but also be interesting for a broader audience who are interested in learning more about interactive TV or human-centred design. Furthermore, the book will be very useful for the scientific HCI community in general and for the HCI pattern community in particular since it presents a novel and generic framework for HCI design patterns including a method for pattern development and evaluation.

I have been observing Tibor's work for several years. It has been a pleasure for me to discuss several aspects of his findings and serve on his PhD reviewing committee.

October 2008

Peter Forbrig

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Abbreviations

3D	three-dimensional
ARD	Arbeitsgemeinschaft der öffentlich-rechtlichen Rundfunkanstalten Deutschlands
BBC	British Broadcasting Corporation
DVB	Digital Video Broadcasting
HD-TV	high-definition television
iTV	interactive digital television
MHEG	Multimedia and Hypermedia information coding Expert Group
MHP	Multimedia Home Platform
MPEG	Moving Pictures Expert Group
PAL	Phase Alternating Line
URL	Uniform Resource Locator
ZDF	Zweites Deutsches Fernsehen