

# Preface

Semantic technologies and, in particular, ontologies as formal and shareable representations of a domain play an increasingly important role in computer science, especially for the design, development and execution of interactive systems. Semantic models can serve a number of different purposes in this context. They can be used as functional core or user interface models in model-driven analysis, design, generation, and adaptation of user interfaces.

Ontologies may enhance the functional coverage of an interactive system as well as its visualization and interaction capabilities in various ways, e.g., by providing input assistance, intelligently clustering information, guiding collaborative interaction, or adapting the user interface according to the user's context. Especially in the latter case, ontologies can be applied for representing the various kinds of context information for context-aware and adaptive systems. In particular, they have promised to provide a technique for representing external physical context factors such as location, time or technical parameters, as well as "internal" context such as user interest profiles or interaction context in a consistent, generalized manner. Owing to these properties, semantic models can also contribute to bridging gaps, e.g., between user models, context-aware interfaces and model-driven UI generation.

There is, therefore, a considerable potential for using semantic models as a basis for adaptive interactive systems. The range of potential adaptations is wide comprising, for example, context- and user-dependent recommendations, interactive assistance when performing application-specific tasks, adaptation of the application functionality, adaptation of the collaboration process, or adaptive retrieval support. Furthermore, a variety of reasoning and machine learning techniques exist, that can be employed to achieve adaptive system behavior. Last, but not least, the advent and rapid growth of Linked Open Data as a large-scale collection of semantic data has paved the way for a new breed of intelligent, knowledge-intensive applications.

To explore that potential, we have established a workshop series called *Semantic Models for Adaptive Interactive Systems (SEMAIS)*. The workshop had its debut at the ACM Intelligent User Interfaces conference in Hong Kong in 2010, and was followed by two subsequent editions in Palo Alto in 2011, and in Lisbon in 2012. At the workshop, we have seen cutting edge research spanning from the employment of

semantic models in the development and generation of interactive systems to novel interaction paradigms and applications for semantic data.

This book collects enhanced, revised, and updated versions of the best papers submitted to the three workshops editions, as well as additional original contributions. It provides insights into methodologies for designing adaptive systems based on semantic data, introduces models that can be used for building interactive systems, and showcases applications made possible by the use of semantic models.

## Book Outline

*U<sup>2</sup>Ont—A Formal Ontology on User Interfaces and Interactions* by Heiko Paulheim and Florian Probst discusses the potentials of an encompassing ontology for describing user interfaces and the way humans interact with them. The authors show how such an ontology can be constructed from existing user interface description languages and describe how it can be employed for application integration.

*Generating Models of Recommendation Processes out of Annotated Ontologies* by Hermann Kaindl et al. shows how the development of interactive systems—in that case recommendation systems—can be automated to a certain extent by the use of ontologies. They discuss a methodology for turning a product ontology into a discourse system in which users can interactively choose products. The system was tested in active online stores, showing that the semi-automatically generated discourses were competitive with manually designed ones.

*Cognitive Semantic Categories as a Basis for a Prototype Adaptive Information System* by Evangelos Kapros and Simon McGinnes introduces a methodology for generating applications offering basic general operations on a dynamic data structure. They leverage findings from neurology and cognitive semantics to derive a set of archetypal categories, which is used as a top level for automatically generating intuitive visual designs for adaptive information systems.

*A Semantic Model for Adaptive Collaboration Support Systems* by Stefan W. Knoll et al. discusses an encompassing framework for fostering elastic collaboration processes, i.e., collaboration processes that are not statically predefined, but may be adapted to dynamic requirements and situational changes. Their approach is based on a semantic model that can be used to express information about process steps as well as the participants and their contexts, thus allowing for the implementation of dynamic applications.

*A Semantics-Based, End-User-Centered Information Visualization Process for Semantic Web Data* by Martin Voigt et al. introduces the *VizBoard* workbench, a system which allows end users without specific Semantic Web skills to create informative visualizations of Semantic Web data. By using semantic description of all visualization components, complex adaptive and interactive views can be generated.

*PASTREM: Proactive Ontology Based Recommendations for Information Workers* by Benedikt Schmidt et al. addresses the needs of information workers dealing with multiple diverse resources in various processes. The chapter discusses a recommender system that detects the user's current context and work process and

identifies relevant items in the user's system. The system was evaluated using data collected from different work stations at an IT company, and is shown to provide more meaningful recommendations than common recommendation algorithms.

*Visualizing Search Results of Linked Open Data* by Christian Stab et al. introduces an approach for making search on Linked Open Data more intuitive for end users. Their approach provides a means to translate natural language keyword searches to formal queries on Linked Data, and gives the users visual feedback on both the system's understanding of the user's query and the search results. The authors show that users searching for information with their system are both faster as well as more satisfied than with traditional approaches.

*A Context-Aware Shopping Portal Based on Semantic Models* by Tim Hussein et al. illustrates how semantic models can be used as backend data source for both exploration and adaption of interactive systems. They show how semantic models can be used to provide faceted browsing as well as user adaption and recommendation, using spreading activation on semantic data to make the system adapt to a user's preferences.

*Semantic Models for Interactive Systems: The Case of Tagging and Folksonomies* by Steffen Lohmann is concerned with a specific interaction technique that has become popular in the Web 2.0, i.e., tagging. User generated tags are used as a basis for finding and recommending content in large-scale platforms such as Flickr or YouTube. The chapter introduces a formal ontology for describing tagging interactions and the relations between individual tags, which can be used for novel graphical visualizations.

*User Interaction Templates for the Design of Lifelogging Systems* by Frank Hopfgartner et al. shows how semantics can help organizing and analyzing the abundance of data generated by lifelogging systems, i.e., systems that constantly track their users. They discuss use cases, interaction techniques, and information visualization approaches that are made possible by using semantic representations of the data collected by lifelogging systems.

## Acknowledgements

The editors would like to thank all the authors contributing chapters to this volume and participating in the peer reviewing process, as well as Beverley Ford and Ben Bishop at Springer for making this volume possible. Furthermore, we would like to thank the organizers of the ACM Intelligent User Interfaces conferences 2010–2012 for providing the frame for the SEMAIS workshop series, and all the participants at those workshops for their interesting submissions and stimulating discussions.

Duisburg, Mannheim, Delft, Grenoble  
March 2013

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Semantic Models for Adaptive Interactive Systems

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2013, XII, 204 p. 58 illus., Hardcover

ISBN: 978-1-4471-5300-9