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Innovations for Requirements Analysis

From Stakeholders' Needs to Formal Designs

14th Monterey Workshop 2007
Monterey, CA, USA, September 10-13, 2007
Revised Selected Papers

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Preface

We are pleased to present the proceedings of the 14th Monterey Workshop, which took place September 10–13, 2007 in Monterey, CA, USA. In this preface, we give the reader an overview of what took place at the workshop and introduce the contributions in this Lecture Notes in Computer Science volume. A complete introduction to the theme of the workshop, as well as to the history of the Monterey Workshop series, can be found in Luqi and Kordon’s “Advances in Requirements Engineering: Bridging the Gap between Stakeholders’ Needs and Formal Designs” in this volume. This paper also contains the case study that many participants used as a problem to frame their analyses, and a summary of the workshop’s results.

The workshop consisted of three keynote talks, three panels, presentations of peer-reviewed papers, as well as presentations of various position papers by the participants.

The keynote speakers at this year’s workshop were Daniel Berry, Aravind Joshi, and Lori Clarke. Each of their talks was used to set the tone for the presentations and discussions for that particular day. Daniel Berry presented an overview of the needs and challenges of natural language processing in requirements engineering, with a special focus on ambiguity in his talk “Ambiguity in Natural Language Requirements.” Aravind Joshi provided an overview of current natural language processing research in discourse analysis in the talk “Some Recent Developments in Natural Language Processing.” Finally, Lori Clarke showed how to combine formal requirements specification with natural language processing to cope with the complex domain of medical information processes in “Getting the Details Right.” We are grateful to each of them for their time and energy. For extended abstracts of the talks, please see “Part I: Abstracts” in this volume.

The panels examined a wide range of topics related to natural language processing and requirements engineering. The active discussions that took place at these panels stimulated many ideas for both the workshop and for the papers presented here. The titles and participants of the panels were:

1. *Advances in Requirements Engineering*

Chairs: Christine Choppy (University of Paris 13), Sol Shatz (University of Illinois at Chicago)

Panelists: Jeff Besser (SPAWAR), John Gibson (Naval Postgraduate School), Douglas Lange (SPAWAR), Julio Leite (PUC-Rio), and Steve Yau (Arizona State University).

Date: September 11, 2007

2. *State of the Art in Natural Language Processing and Requirements Engineering*

Chairs: Michel Lemoine (ONERA) and Kane Kim (University of California, Irvine)

Panelists: Swappan Bhattacharya (National Institute of Technology, Durgapur), Nabendu Chaiki (University of Calcutta), Alan Rieffer (DISA), Chen-Yu (Phillip) Sheu (University of California, Irvine), and Oleg Sokolsky (University of Pennsylvania).

Date: September 12, 2007

3. *Pro's and Con's of Proposed Approaches for Requirements Engineering*

Chairs: Doris Carver (Louisiana State University) and Daniel Cooke (Texas Tech University)

Panelists: Mikhail Auguston (Naval Postgraduate School), Valdis Berzins (Naval Postgraduate School), David Hislop (U.S. Army Research Office, Retired), Mohammad Ketabchi (Savvion), Peter Musial (VeroModo, Inc.), William Roof (IntelliDOT Corporation), Nelson Rushton (Texas Tech University), John Salasin (National Institute of Standards).

Date: September 13, 2007

Finally, of the papers presented at the workshop, the authors of 11 were invited to revise and expand their papers. These make up “Part II: Papers” in this volume. The papers fell into two broad categories:

1. Innovative requirements engineering techniques
2. Innovative applications of natural language processing techniques

1 Innovative Requirements Engineering Techniques

The six papers in this group present several challenges for requirements engineering and discuss innovative solution ideas.

In “Could an Agile Requirements Analysis Be Automated?—Lessons Learned from the Successful Overhauling of an Industrial Automation System,” Thomas Aschauer, Gerd Dauenhauer, Patricia Derler, Wolfgang Pree, and Christoph Steindl describe a recent successful requirements analysis of a complex industrial automation system that combined a talented expert, who was willing to dig into the domain details, with a committed customer and a motivated team. Martin Feather, in “Defect Detection and Prevention,” presents the DDP process and tool which supports the exploration of and decision-making for complex requirements documents. His abstract (to be found in “Part I”) characterizes and summarizes the most important literature on this approach. In “Model-Driven Prototyping-Based Requirements Elicitation,” Jicheng Fu, Farokh Bastani, and I-Ling Yen present a requirements elicitation approach that is based on model-driven prototyping. They apply a “rapid program synthesis” approach to speed up prototype development. Michael Goedicke and Thomas Herrmann, in “A Case for ViewPoints and Documents,” consider how various stakeholders provide their requirements from different points of view, and how to deal with the

fact that these various points of view can often lead to vague and inconsistent requirements specifications. Allyson Hoss and Doris Carver, in “Towards Combining Ontologies and Model Weaving for the Evolution of Requirements Models,” address the challenges of software change that result from adding new requirements. They do this by combining ontologies and model weaving to assist in software evolution. Finally, in “Reducing Ambiguities in Requirements Specifications via Automatically Created Object-Oriented Models,” Daniel Popescu, Spencer Rugaber, Nenad Medvidovic, and Daniel Berry describe a three-step, semi-automatic method for identifying inconsistencies and ambiguities in requirement specifications. Their method automatically generates a diagram of the objects, classes and methods of the specified system for a human to review.

2 Innovative Applications of Natural-Language Processing Techniques

The five papers in this section all deal, in some way, with using natural language processing to help with the requirements engineering process.

Valdis Berzins, Craig Martell, Luqi, and Paige Adams, in “Innovations in Natural Language Document Processing for Requirements Engineering,” evaluate the potential contributions of natural language processing to requirements engineering and suggest some improvements to natural language processing systems that may be useful in this context. Nikhil Dinesh, Aravind Joshi, Insup Lee, and Oleg Sokolsky, in “Logic-Based Regulatory Conformance Checking,” describe an approach to formally assess whether an organization conforms to a body of regulation. This is done via a logic in which statements can formally refer to and reason about other statements. They present preliminary work on using natural language processing to assist in the translation of regulatory sentences into this logic. In “On the Identification of Goals in Stakeholders Dialogs,” Leonid Kof shows that the often unstated, and sometimes unknown, goals of stakeholders can lead to contradictory requirements, and that making these goals explicit as early in the process as possible facilitates the resolution of these contradictions. He describes how these goals can be derived by systematic analysis of stakeholders’ dialogs. Douglas Lange, in “Text Classification and Machine Learning Support for Requirements Analysis Using Blogs,” describes how text classification and machine learning technologies are being used to support management requirements in military command centers. He then explores how these technologies might be used in a requirements analysis environment. Finally, in “Profiling and Tracing Stakeholder Needs,” Pete Sawyer, Ricardo Gacitua, and Andrew Stone show how shallow natural language techniques can be used to assist in the analysis of stakeholder-elicited information and help with the synthesis of the user requirements. These same techniques can be used for subsequent management of requirements and in identifying unprovenanced requirements.

It has been a pleasure and an honor to serve as Program Committee Chairs for the 2007 Monterey Workshop. First of all, we would like to thank the Workshop

Chairs, Luqi and Fabrice Kordon, for their continuous support and advice during the workshop and the preparation of these proceedings. Secondly, we would like to thank the members of the Program Committee, who acted as anonymous reviewers and provided valuable feedback to the authors. We are also grateful to the authors for their active participation in the workshop and their timely responses during the preparation of the proceedings. Doris Keidel-Müller was a great help in reviewing the layout of the papers.

Finally, none of this would have worked as smoothly as it did without the continuous support of Willi Springer. Many thanks!

September 2008

Barbara Paech
Craig Martell

Organization

The Monterey 2007 Workshop was run by an Organizing Committee of two Workshop Chairs and a Technical Program Committee.

Workshop Chairs

Luqi	Naval Postgraduate School, Monterey, USA
Fabrice Kordon	Pierre & Marie Curie University, Paris, France

Technical Program Committee

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Bashar Nuseibeh	The Open University, UK
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