# 17<sup>th</sup> International Configuration Workshop

## Proceedings of the 17th International Configuration Workshop

Edited by

Juha Tiihonen, Andreas Falkner, and Tomas Axling

September 10-11, 2015 Vienna, Austria

Organized by





University of Helsinki Department of Computer Science Faculty of Science P.O. 68, FI-00014 UNIVERSITY OF HELSINKI FINLAND

ISSN 1613-0073

#### Chairs

Juha Tiihonen, Helsinki University, Finland Andreas Falkner, Siemens AG Österreich, Austria Tomas Axling, Tacton, Sweden

#### Program committee

Michel Aldanondo, Toulouse University, Mines Albi, France Claire Bagley, Oracle Corporation, USA Andreas Falkner, Siemens AG, Austria Alexander Felfernig, Graz University of Technology, Austria Gerhard Friedrich, University of Klagenfurt, Austria Cipriano Forza, University of Padova José A. Galindo, University of Seville, Spain Albert Haag, SAP, Germany Alois Haselböck, Siemens AG, Austria Mikko Heiskala, Aalto University, Finland Lothar Hotz, University of Hamburg, HiTeC, Germany Lars Hvam, Technical University of Denmark, Denmark Dietmar Jannach, University of Dortmund, Germany Thorsten Krebs, encoway GmbH, Germany Varvana Myllärniemi, Aalto University, Finland Tomi Männistö, Helsinki University, Finland Mikko Raatikainen, Aalto University, Finland Rick Rabiser, Johannes Kepler University, Austria Florian Reinfrank, Graz University of Technology, Austria Stefan Reiterer, Graz University of Technology, Austria Markus Stumptner, University of South Australia, Australia Juha Tiihonen, Helsinki University, Finland Elise Vareilles, Toulouse University, Mines Albi, France Franz Wotawa, Graz University of Technology, Austria Linda Zhang, IESEG Business School Paris, France Markus Zanker, University of Klagenfurt, Austria

#### Local arrangements

Andreas Falkner, Siemens AG, Austria

#### Preface

Configuration problems are among the most fruitful domains for applying and developing advanced artificial intelligence (AI) techniques. Powerful knowledge-representation formalisms are required to capture the great variety and complexity of configuration problems. Efficient reasoning is required to provide intelligent interactive behavior in contexts such as solution search, satisfaction of user preferences, personalization, optimization, and diagnosis.

The main goal of the workshop is to promote high-quality research in all technical areas related to configuration. The workshop is of interest both for researchers working in the various fields of Artificial Intelligence as well as for industry representatives interested in the relationship between configuration technology and the business problem behind configuration and mass customization. It provides a forum for presentation of original methods and the exchange of ideas, evaluations, and experiences especially related to the use of AI techniques in the configuration context.

This year's workshop is a standalone two day event that continues the series of 16 successful Configuration Workshops started at the AAAI'96 Fall Symposium and continued at IJCAI, AAAI, and ECAI conferences since 1999.

A total of 21 papers were selected for presentation on the Configuration workshop. The themes of the technical sessions are Strategy, Long-term management, Collaboration, Solving, Diagnosis, and Analytics.

The 17th International Configuration Workshop introduced the concept of Best Paper Award. The best paper was selected in a two-phase audience vote: three best papers (actually four due to an equal number of votes) of the first round entered the second round to select the best paper and a runner-up. The Best Paper Award winner was 'Column oriented compilation of variant tables' by Albert Haag. Two runner-ups (with an equal number of votes) were 'Impact on cost accuracy and profitability from implementing product configuration system – a case study' by Anna Myrodia, Katrin Kristjansdottir, and Lars Hvam; and 'Coupling two constraint-based systems into an on-line facade-layout configurator' by Andrés Felipe Barco Santa, Elise Vareilles, Paul Gaborit, Jean-Guillaume Fages, and Michel Aldanondo.

Juha Tiihonen, Andreas Falkner and Tomas Axling

### Contents

Strategy		
	Market-oriented variant management (position paper) Thorsten Krebs and Christoph Ranze	1
	An empirical study on product configurators' application: Implications, challenges, and opportunities  Linda L. Zhang and Petri T. Helo	Ę
	Impact on cost accuracy and profitability from implementing product configuration system – A case-study  Anna Myrodia, Katrin Kristjansdottir and Lars Hvam	11
Long-ter	m management	
Long ter	On breaking the curse of dimensionality in reverse engineering feature models (short paper)	19
	Jean-Marc Davril, Patrick Heymans, Guillaume Bécan and Mathieu Acher	
	Customer buying behaviour analysis in mass customization  Tilak Raj Singh and Narayan Rangaraj	23
	Intelligent supporting techniques for the maintenance of constraint-based configuration systems	31
	Florian Reinfrank, Gerald Ninaus, Franz Wotawa and Alexander Felfernig	
	Maintaining constraint-based systems: challenges ahead Florian Reinfrank, Gerald Ninaus, Franz Wotawa and Alexander Felfernig	39
Collabor	ation	
Collabol	Coupling two constraint-based systems into an on-line facade-layout configurator  Andrés F. Barco, Élise Vareilles, Paul Gaborit, Jean-Guillaume Fages and Michel  Aldanondo	47
	Solving combined configuration problems: a heuristic approach  Martin Gebser, Anna Ryabokon and Gottfried Schenner	55
	Towards a benchmark for configuration and planning optimization problems Luis Garcés Monge, Paul Pitiot, Michel Aldanondo and Elise Vareilles	61
Solving		
Joiving	Different solving strategies on PBO Problems from automotive industry Thore Kübart, Rouven Walter and Wolfgang Küchlin	67
	A heuristic, replay-based approach for reconfiguration  Alois Haselböck and Gottfried Schenner	73
	Arc consistency with negative variant tables  Albert Haag	81
	Column oriented compilation of variant tables  Albert Haag	89

$\overline{}$	iac			
$\boldsymbol{L}$	ıuv	41 1	v	טוע

	Inverse QuickXplain vs. MaxSAT — a comparison in theory and practice  Rouven Walter, Alexander Felfernig and Wolfgang Küchlin	97
	FlexDiag: anytime diagnosis for reconfiguration  Alexander Felfernig, Rouven Walter and Stefan Reiterer	105
	Learning games for configuration and diagnosis tasks (short paper) Alexander Felfernig, Michael Jeran, Thorsten Ruprechter, Alexander Ziller, Stefan Reiterer and Martin Stettinger	111
	Support for the social dimension of shopping through web based sales configurators Chiara Grosso, Cipriano Forza and Alessio Trentin	115
Analytic	cs ·	
-	A goal-question-metrics model for configuration knowledge bases Florian Reinfrank, Gerald Ninaus, Bernhard Peischl and Franz Wotawa	123
	Formal analysis of the Linux kernel configuration with SAT solving Martin Walch, Rouven Walter and Wolfgang Küchlin	131
	How to analyze and quantify similarities between configured engineer to order products by comparing the highlighted features utilizing the configuration system abilities Sara Shafiee, Lars Hvam and Katrin Kristjansdottir	139

Copyright © 2015 for the individual papers by the papers' authors. Copying permitted for private and academic purposes. This volume is published and copyrighted by its editors.