Lecture Notes
in Business Information Processing

Series Editors

Wil van der Aalst
   *Eindhoven Technical University, The Netherlands*

John Mylopoulos
   *University of Trento, Italy*

Michael Rosemann
   *Queensland University of Technology, Brisbane, Qld, Australia*

Michael J. Shaw
   *University of Illinois, Urbana-Champaign, IL, USA*

Clemens Szyperski
   *Microsoft Research, Redmond, WA, USA*
Volume Editors

Lazaros Iliadis
Democritus University of Thrace
Department of Forestry and Management of the Environment
Orestiada, Greece
E-mail: liliadis@fmenr.duth.gr

Michael Papazoglou
University of Tilburg
Department of Computer Science
Tilburg, The Netherlands
E-mail: mikep@uvt.nl

Klaus Pohl
University of Duisburg-Essen
Department of Software Systems Engineering
Essen, Germany
E-mail: klaus.pohl@paluno.uni-due.de

ISSN 1865-1348 e-ISSN 1865-1356
ISBN 978-3-319-07868-7 e-ISBN 978-3-319-07869-4
DOI 10.1007/978-3-319-07869-4
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014940063

© Springer International Publishing Switzerland 2014
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of
the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation,
broadcasting, reproduction on microfilms or in any other physical way, and transmission or information
storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology
now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection
with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and
executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication
or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher’s location,
in ist current version, and permission for use must always be obtained from Springer. Permissions for use
may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution
under the respective Copyright Law.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication
does not imply, even in the absence of a specific statement, that such names are exempt from the relevant
protective laws and regulations and therefore free for general use.
While the advice and information in this book are believed to be true and accurate at the date of publication,
neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or
omissions that may be made. The publisher makes no warranty, express or implied, with respect to the
material contained herein.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)
A continuous challenge in modern information systems engineering (ISE) is to provide significant aid toward the improvement of the design, implementation, and fielding of advanced information systems. However, a timely daunting task is to employ ISE approaches to real-world, large-scale, adaptable systems that can have a potential impact in various diverse aspects of people’s life. All of these topics and potential roadmaps toward innovation that might lead to development and welfare were discussed in the workshops that took place under the framework of the 26th CAiSE held in Thessaloniki, Greece, June 16–20.

It is a long-standing tradition of the International Conference on Advanced Information Systems Engineering to be accompanied by an ensemble of high-quality workshops. Their aim is to serve as a discussion forum between stakeholders in this domain, to exchange innovative ideas on new approaches, techniques or tools, covering a wide range of specific thematic areas. This year, CAiSE had two associated working conferences (BPMDS and EMMSAD) and seven workshops. Several workshop proposals were received initially and those accepted were chosen after a careful consideration by the corresponding chairs, based on maturity and compliance with our usual quality and consistency criteria.

This volume contains the proceedings of the following five 2014 workshops (in alphabetical order):

- First International Workshop on Advanced Probability and Statistics in Information Systems (APSIS)
- First International Workshop on Advances in Services Design based on the Notion of Capability (ASDENCA)
- Second International Workshop on Cognitive Aspects of Information Systems Engineering (COGNISE)
- Third New Generation Enterprise and Business Innovation Systems (NGEBIS)
- 4th International Workshop on Information Systems Security Engineering (WISSE)

The CAiSE 2014 workshop 10th EOMAS decided to publish their proceedings in a separate LNBIP volume. The 7th iStar workshop decided to publish the proceedings in the CEUR Workshop Proceedings series. Each workshop complied with the CAiSE 2014 submission and acceptance rules. The paper acceptance ratio across all workshops was approximately 40%.

As workshop chairs of the 26th CAiSE 2014 we would like to express our gratitude to all organizers and to all corresponding scientific committees for their invaluable contribution. We hope that this volume will offer a comprehensive and
timely view on the evolution of advanced information systems engineering and that it will stimulate potential authors toward participation in future CAiSE events.

June 2014

Lazaros Iliadis
Mike Papazoglou
Klaus Pohl
First International Workshop on Advanced Probability and Statistics in Information Systems (APSIS 2014)

Preface

The rapid and continuous evolution of technology and especially the evolution of the Internet are changing the problems related to the development, the application, and the impact of information systems. Modern information systems are associated with the collection, management, processing, analysis, and production of massive amounts and different types of data. Although research in computer science has produced highly advanced methodologies for analyzing them, new complex research challenges appear.

Probability theory and statistics are considered well-defined and mature disciplines that have evolved through centuries and have become powerful based on the foundations of mathematics. Probabilities and statistics have offered innumerable theories, techniques, and tools to all aspects of data analysis with applications to all areas of information systems.

The aim of the First International Workshop on Advanced Probability and Statistics in Information Systems (APSIS), which was organized in conjunction with the 26th International Conference on Advanced Information Systems Engineering (CAISE 2014), was to bring together scientists from different branches of information systems who use or develop statistical or probabilistic methods in their research.

For this first year of the workshop, we received eight high-quality submissions from researchers in different fields of information systems, which were each peer-reviewed by at least two reviewers. Out of these submissions, three contributions were selected as full papers, while one short paper with promising research was also accepted.

The accepted papers are indicative of the wide applicability of probabilities and statistics in information systems research. Specifically, Yazdi et al. apply time series in order to describe and analyze the evolution of software systems at the abstraction level of models. Liparas and Pantraki propose a combination of the statistical Mahalanobis–Taguchi strategy with a Genetic Algorithm for Intrusion Detection Systems. Shoaran and Thomo use probabilistic methods for privacy mechanisms in social networks. Finally, Mavridis uses probabilistic notions to measure the quality evolution of open source software.

June 2014

Lefteris Angelis
Ioannis Stamelos
Apostolos N. Papadopoulos
APSIS 2014 Organization

Organizing Committee

Lefteris Angelis  
Aristotle University of Thessaloniki, Greece
Ioannis Stamelos  
Aristotle University of Thessaloniki, Greece
Apostolos N. Papadopoulos  
Aristotle University of Thessaloniki, Greece

Program Committee

Apostolos Ampatzoglou  
University of Groningen, The Netherlands
Andreas Andreou  
Cyprus University of Technology, Cyprus
Paris Avgeriou  
University of Groningen, The Netherlands
Stamatia Bibi  
Aristotle University, Greece
Pavlos Delias  
TEI of Kavala, Greece
Jesus M. Gonzalez-Barahona  
University Rey Juan Carlos, Spain
Anastasios Gounaris  
Aristotle University, Greece
Panagiotis Katsaros  
Aristotle University, Greece
Stefan Koch  
Bogazici University, Turkey
Stephen MacDonell  
Auckland University, New Zealand
Emilia Mendes  
Blekinge Institute of Technology, Sweden
Tim Menzies  
West Virginia University, USA
Nikolaos Mittas  
TEI of Kavala & Aristotle University, Greece
Maurizio Morisio  
Politecnico di Torino, Italy
Efi Papatheocharous  
Swedish Institute of Computer Science, Sweden
Evaggelia Pitoura  
University of Ioannina, Greece
Grigorios Tsoumakas  
Aristotle University, Greece
Athena Vakali  
Aristotle University, Greece
Claes Wohlin  
Blekinge Institute of Technology, Sweden
Michalis Xenos  
Hellenic Open University, Greece
Israel Herraiz  
Technical University of Madrid, Spain
Keynote by Magne Jorgensen*

Abstract. The keynote addresses a selection of questionable statistical practices commonly observed in empirical software engineering research. This includes a discussion of the topics: “p-values considered harmful”, “inflated effect sizes”, “publication bias in regression analysis”, “how much can we trust the outcome of statistical tests in software engineering studies?”, “regression-towards-the-mean in non-random samples”, “the fixed variables assumption is essential” and “Simpson’s paradox”. The topics will be illustrated with observations on how questionable statistical practices have produced misleading and incorrect results in software engineering research. We should never use a statistical method without understanding it thoroughly and never violate a statistical assumption without understanding the likely consequences of doing so. Several changes in statistical practice in software engineering research are suggested.

* Subject: Things you were never told, did not understand, forgot, or chose to ignore in statistics.
First International Workshop on Advances in Services Design Based on the Notion of Capability (ASDENCA 2014)

Preface

Lately the notion of capability is gaining much presence within the field of information systems engineering, due to a number of factors: the notion directs business investment focus, it can be used as a baseline for business planning, and it leads directly to service specification and design. Historically, it has been examined in economics, sociology, and management science. More recently, it has been considered in the context of business-IT alignment, in the specification and design of services using business planning as the baseline, in enterprise architecture, and in service-oriented architecture.

Capability is commonly seen as an ability or capacity for a company to deliver value, either to customers or shareholders, right beneath the business strategy. It consists of three major components: business processes, people, and physical assets. In recent academic proposals, such as of the Open Group Standard, capability is seen as originating from competence-based management and military frameworks, offering a complement to traditional enterprise modelling approaches by representing organizational knowledge from a result-based perspective. Thus it is an abstraction away from the specifics of how (process), who (agent), and why (goals), i.e., with a focus on results and benefits. At the same capability should allow fairly straightforward integrations with the aforementioned established bodies of knowledge and practices, such as goals (through “goal fulfillment”), processes (through “modelling”), and services (through “servicing”).

The latter relation, specific to service-oriented engineering, has been described in service-oriented architecture, i.e., capability is seen as existing business functionality that enables a well-defined need, implemented through a service accessible through an interface. The business drive approach to service identification provides a solution for typical challenges of alignment between business and IT in this engineering context. Service design based on business capabilities is seen as an alternative to process-based service design, especially useful in cases of varying business contexts, where different capabilities address different contexts.

Traditionally, methods, approaches, theories, and applications of business–IT alignment have been vividly discussed by practitioners and researchers in IT. The idea for this first edition of the ASDENCA workshop came from the academic and industrial community gathered in the recently launched EU/FP7 project – CaaS.

Furthermore, the special theme of the 26th edition of CAiSE was “Information Systems Engineering in Times of Crisis.” Capability orientation in IS design
may play an important role in planning and reacting to crises of different kinds perceived as different contexts in which businesses may be found, and requiring efficient shifts to the services capable of sustaining these contexts.

ASDENCA 2014 attracted 21 submissions out of which the Program Committee selected nine high-quality papers for presentation at the workshop, which are included in this proceedings volume. The results of submitted proposals clearly demonstrate an increasing interest in the topic, and more specifically in service engineering emphasizing the use of capability notion. Divided into three sessions, the program of the workshop reflects different topics of capability-oriented service design, including modeling of capabilities, the practices of capability-based approaches, as well as variability and context modeling.

We owe special thanks to the Workshop Chairs of CAiSE 2014 for supporting the ASDENCA workshop, as well as for providing us with facilities to publicize it. We also thank the Program Committee for providing valuable and timely reviews for the submitted papers.

June 2014

Jelena Zdravkovic
Oscar Pastor
Peri Loucopoulos
## Organizing Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jelena Zdravkovic</td>
<td>Stockholm University, Sweden</td>
</tr>
<tr>
<td>Pericles Loucopoulos</td>
<td>University of Manchester, UK</td>
</tr>
<tr>
<td>Oscar Pastor</td>
<td>Universitat Politècnica de València, Spain</td>
</tr>
</tbody>
</table>

## Program Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Bravos</td>
<td>Greece</td>
</tr>
<tr>
<td>Jaelson Castro</td>
<td>Universidade Federal de Pernambuco, Brazil</td>
</tr>
<tr>
<td>Lawrence Chung</td>
<td>The University of Texas at Dallas, USA</td>
</tr>
<tr>
<td>Martin Glinz</td>
<td>University of Zurich, Switzerland</td>
</tr>
<tr>
<td>Sergio España</td>
<td>PROS Research Centre, Spain</td>
</tr>
<tr>
<td>Xavier Franch</td>
<td>Universitat Politècnica de Catalunya, Spain</td>
</tr>
<tr>
<td>Brian Fitzgerald</td>
<td>University of Limerick, Ireland</td>
</tr>
<tr>
<td>Janis Grabis</td>
<td>Riga Technical University, Latvia</td>
</tr>
<tr>
<td>Yousef Hassouneh</td>
<td>Birzeit University, Palestine</td>
</tr>
<tr>
<td>Zhi Jin</td>
<td>Key Peking University, China</td>
</tr>
<tr>
<td>Paul Johannesson</td>
<td>Royal Institute of Technology, Sweden</td>
</tr>
<tr>
<td>Dinitris Karagiannis</td>
<td>University of Vienna, Austria</td>
</tr>
<tr>
<td>Vagelio Kavakli</td>
<td>University of the Aegean, Greece</td>
</tr>
<tr>
<td>Kalle Lyytinen</td>
<td>Case Western Reserve University, USA</td>
</tr>
<tr>
<td>Julio Leite</td>
<td>PUC-Rio, Brazil</td>
</tr>
<tr>
<td>Nikolay Mehanjiev</td>
<td>Manchester Business School, UK</td>
</tr>
<tr>
<td>Haralambos Mouratidis</td>
<td>University of Brighton, UK</td>
</tr>
<tr>
<td>Antoni Olive</td>
<td>Universitat Politècnica de Catalunya, Spain</td>
</tr>
<tr>
<td>Andreas Opdahl</td>
<td>University of Bergen, Norway</td>
</tr>
<tr>
<td>Naveen Prakash</td>
<td>MRCE, India</td>
</tr>
<tr>
<td>Jolita Ralyte</td>
<td>University of Geneva, Switzerland</td>
</tr>
<tr>
<td>Gil Regev</td>
<td>Ecole Polytechnique Fédérale de Lausanne, Switzerland</td>
</tr>
<tr>
<td>Barbara Russo</td>
<td>Free University of Bolzano/Bozen, Italy</td>
</tr>
<tr>
<td>Kurt Sandkuhn</td>
<td>The University of Rostock, Germany</td>
</tr>
<tr>
<td>Jorge Sanz</td>
<td>IBM Research, USA</td>
</tr>
<tr>
<td>Isabel Seruca</td>
<td>Universidade Portucalense, Porto, Portugal</td>
</tr>
<tr>
<td>Keng Siau</td>
<td>Missouri University of Science and Technology, USA</td>
</tr>
<tr>
<td>Pnina Soffer</td>
<td>University of Haifa, Israel</td>
</tr>
<tr>
<td>Janis Stirna</td>
<td>Stockholm University, Sweden</td>
</tr>
<tr>
<td>Francisco Valverde Giromé</td>
<td>Universidad Politècnica de Valencia, Spain</td>
</tr>
</tbody>
</table>
Alain Wegmann  École Polytechnique Fédérale de Lausanne, Switzerland
Hans Weigand  Tilburg University, The Netherlands
Carson Woo  University of British Columbia, USA
Eric Yu  University of Toronto, Canada

Keynote by Janis Stirna, Pericle Loucopoulos, Oscar Pastor and Jelena Zdravkovic subject: “Designing Business Capabilities: Challenges and Outlooks”.
Second International Workshop on Cognitive Aspects of Information Systems Engineering (COGNISE 2014)

Preface

Cognitive aspects of information systems engineering is an area that is gaining interest and importance in industry and research. In recent years, human aspects and specifically cognitive aspects in software engineering and information systems engineering have received increasing attention in the literature and conferences, acknowledging that these aspects are as important as the technical ones, which have traditionally been in the center of attention. This workshop was planned to be a stage for new research and vivid discussions involving both academics and practitioners.

The goal of this workshop is to provide a better understanding and more appropriate support of the cognitive processes and challenges practitioners experience when performing information systems development activities. By understanding the challenges and needs educational programs as well as development supporting tools and notations may be enhanced for a better fit to our natural cognition, leading to better performance of engineers and higher systems quality. The workshop aimed to bring together researchers from different communities such as requirements engineering, software architecture, and design and programming, who share an interest in cognitive aspects, for identifying the cognitive challenges in the diverse development-related activities.

The second edition of this workshop included four full research papers and three short position papers. The papers presented at the workshop provide a mix of novel research ideas, some presenting completed research and others research in progress or research plans.

The full research papers included the following papers. “Low-Cost Eye-Trackers: Useful for Information Systems Research?” by Stefan Zugal and Jakob Pinggera explores whether low-cost eye-trackers are of use for investigating cognitive aspects of information systems research and, specifically, examines the accuracy of the low-cost eye-tracker Gazepoint GP3 in an empirical study. Their results show that Gazepoint GP3 is well suited for respective research, given that experimental material acknowledges the limits of the eye-tracker. “Supporting BPMN Model Creation with Routing Patterns” by Idan Wolf and Pnina Soffer proposes routing patterns combined with a decision guidance tool to support BPMN model creation, in order to overcome cognitive difficulties that may be encountered when using BPMN, due to the large number of constructs and the lack of ontological clarity of this language. The proposed set of patterns builds on an existing set of routing behaviors and operationalizes these behaviors by providing their BPMN representations. Testing the impact of this support in a study showed a significantly positive effect on the quality of the produced
models, but longer modeling durations as compared with unsupported modeling. “Coupling Elements of a Framework for Cognitive Matchmaking with Enterprise Models” by Sietse Overbeek addresses the issue of the excessive cognitive load actors working in knowledge-intensive organizations need to cope with and its negative influence on the quality of knowledge-intensive task fulfillment. The paper discusses how elements from a cognitive matchmaking framework can be coupled with an example enterprise model to partly provide a solution for reducing cognitive load. This exercise enables one to achieve a better understanding of the cognitive fit of actor types and the knowledge-intensive task types they have to fulfill. “Investigating Differences Between Graphical and Textual Declarative Process Models” by Cornelia Haisjackl and Stefan Zugal reports on an investigation focusing on the question of whether a notation that does not contain graphical lookalikes, i.e., a textual notation, can help to avoid problems in understanding declarative process models, and particularly aspects that are present in both imperative and declarative process modeling languages at a graphical level, while having different semantics. The results indicate that even though a textual representation does not suffer from lookalikes, it performed worse in terms of error rate, duration, and mental effort.

The short position papers included the following papers. “Reducing Technical Debt: Using Persuasive Technology for Encouraging Software Developers to Document Code” by Yulia Shmerlin, Doron Kliger, and Hayim Makabee discusses the phenomenon of developers’ reluctance to document code, which leads to increased costs of software systems maintenance. It searches for efficient ways of using persuasive technology to encourage programmers to document their code, thus assisting software practitioners and project managers to control and reduce documentation debt. “Conceptual Understanding of Conceptual Modeling Concepts: A Longitudinal Study Among Students Learning to Model” by Dirk van der Linden, Henderik Proper, and Stijn Hoppenbrouwers reports on a longitudinal study investigating the conceptual understanding that students have of common concepts used for conceptual modeling (e.g., actors, processes, goals), as well as if and how these understandings may change over time while a student progresses through the academic curriculum. The authors discuss the seeming lack of connection found between educational stimuli and such changes, and reflect on what this means for the training of people in conceptual modeling. Finally, “What Do Software Architects Think They (Should) Do?” by Sofia Sherman and Naomi Unkelos-Shpigel explores software architects and their perceptions regarding their role and responsibilities. Perception, being a part of and having an effect on cognitive processes and decision making, is explored in order to gain a deeper understanding of what tasks architects find to be included in their role and responsibility. The results highlight several differences between the role of the architect as defined in the existing literature, and the way architects perceive their role.
We hope that the reader will find this selection of papers useful to be informed and inspired by new ideas in the area of cognitive aspects of information systems engineering, and we look forward to future editions of the COGNISE workshop following the two editions we had so far.

June 2014

Irit Hadar
Barbara Weber
COGNISE 2014 Organization

Organizing Committee

Irit Hadar University of Haifa, Israel
Barbara Weber University of Innsbruck, Austria

Program Committee

Daniel M. Berry University of Waterloo, Canada
Xavier Franch Universidad Politecnica de Catalunya, Spain
Marcela Genero University of Castilla-La Mancha, Spain
Joel Lanir University of Haifa, Israel
Meira Levy Shenkar College of Engineering and Design, Israel
Jan Mendling WU Vienna, Austria
Jeffrey Parsons Memorial University, Canada
Hajo Reijers TU Eindhoven, The Netherlands
Pnina Soffer University of Haifa, Israel
Irene Vanderfeesten TU Eindhoven, The Netherlands
Stefan Zugal University of Innsbruck, Austria

Keynote by Stijn Hoppenbrouwers “Pragmatics, Cognition, and Conceptual Modelling; why Process Modelling and Process Mining may Converge”
Preface

Innovation is one of the major drivers for enabling European enterprises to compete in global markets, especially in a severe economic downturn. Yet innovation is an elusive term that is often used in an imprecise or generic way. If we consider widely accepted definitions, we can see that they capture only part of the essence of innovation. Furthermore, an innovation process is different from a “usual” business process we find in an enterprise that is (supposedly) well defined in its activities, committed resources, time plan, etc. Conversely, innovation is a creative activity that falls in the category of “wicked problems,” i.e., problems difficult to solve because of incomplete, contradictory, and changing requirements.

The New Generation Enterprise and Business Innovation Systems (NGEBIS) workshop, now in its third edition, intends to address the area of information systems dedicated to enterprise and business innovation, traditionally considered too fuzzy and ill-defined to be systematically tackled by using existing information systems and information engineering methods. We expect that the ideas discussed in the workshop will contribute to the development of methods to be used in the implementation of a new generation of information systems capable of supporting innovation, with particular attention to networked enterprises.

In this frame, NGEBIS 2014 included an interesting scientific program with the presentation of the research papers contained in this volume. This edition of NGEBIS received 12 submissions, each of which was reviewed by at least two Program Committee (PC) members in order to supply the authors with helpful feedback. The PC decided to accept four contributions as full papers and two as short papers. The workshop tackled the key issues in the field. The content of innovation and methods to support creation and management of content are addressed in “Leveraging User Inspiration with Microblogging-Driven Exploratory Search” and “Towards Semantic Collective Awareness Platforms for Business Innovation.” The paper “Data Mart Reconciliation in Virtual Innovation Factories” considers the problem of monitoring innovation that takes place in the context of networked enterprises, where also decision making is a strategic issue, as discussed in “Cooperative Decision Making in Virtual Enterprises.” Important architectural issues are illustrated in “System Architecture of the BIVEE Platform for Innovation and Production Improvement.” Finally, the point of view of the end user is addressed in “A Methodology for the Set-Up of a Virtual Innovation Factory Platform.” The scientific program of NGEBIS was completed by demo and poster papers, plus a final panel dedicated to the discussion of the
hot issues that emerged in the workshop and in the dedicated NGEBIS Forum on LinkedIn.

We would like to thank all authors for their contributions and the members of the Program Committee for their excellent work during the reviewing phase. We would also like to thank the organizers of the CAiSE 2014 conference for hosting the workshop and the BIVEE European Project that is the initiator of this venture that we expect to continue in the future.

June 2014

Michele Missikoff
Johann Eder
Paul Johannes
NGEBIS 2014 Organization

Organizing Committee

Michele Missikoff  
Università Politecnica delle Marche, Italy
Johann Eder  
Alpen Adria Universität, Austria
Paul Johanneson  
Royal Institute of Technology, Sweden

Program Committee

Arne Berre  
SINTEF, Norway
Gash Bhullar  
TANet, UK
Massimo Canducci  
Engineering, Italy
David Chen  
UB1, France
Martine Collard  
University of the French West Indies and Guiana, France
Claudia Diamantini  
Marche Polytechnic University, Italy
Asuman Dogac  
SDRC, Turkey
Anders Hjalmarsson  
Victoria Institute, Sweden
Nenad Ivezic  
NIST, USA
Bernhard Katzy  
LIACS, The Netherlands
Larry Kerschberg  
GMU, USA
Peter Lindgren  
University of Aalborg, Denmark
Leszek Maciaszek  
WUE, PL
Simon Schlosser  
University of St. Gallen, Switzerland
Erich Schwarz  
AAU, Austria
Fabrizio Smith  
CNR, Italy
Janis Stirna  
KTH, Sweden
Francesco Taglino  
CNR, Italy
Konstantinos Zachos  
City University London, UK
Martin Zelm  
CIMOSA, Germany
Preface

As modern information systems support significant areas of the human society, which require storage and processing of sensitive personal and organizational information, security problems of information systems are currently a widespread and growing concern. The scientific community has realized the importance of aligning information systems engineering and security engineering in order to develop more secure information systems.

The International Workshop on Information System Security Engineering (WISSE) aims to provide a forum for researchers and practitioners to present, discuss, and debate on one hand the latest research work on methods, models, practices, and tools for secure information systems engineering, and on the other hand relevant industrial applications, recurring challenges, problems, and industrial-led solutions in the area of secure information systems engineering.

This fourth edition of the workshop, held in Thessaloniki (Greece) on June 17, 2014, was organized in conjunction with the 26th International Conference on Advanced Information Systems Engineering (CAiSE 2014). In order to ensure a high-quality workshop, following an extensive review process, four submissions were accepted as full papers and two as short papers addressing a large variety of issues related to secure information systems engineering.

We wish to thank all the contributors to WISSE 2014, in particular the authors who submitted papers and the members of the Program Committee who carefully reviewed them. We express our gratitude to the CAiSE 2014 workshop chairs, for their helpful support in preparing the workshop. Finally, we thank our colleagues from the Steering Committee, Nora Cuppens, Jan Jürjens, Carlos Blanco, and Daniel Mellado, for initiating the workshop and contributing to its organization.

June 2014

Nadira Lammari
David G. Rosado
Haralambos Mouratidis
WISSE 2014 Organization

General Chair
Haralambos Mouratidis University of Brighton, UK

Program Chair
Nadira Lammari Conservatoire National des Arts et Métiers, France
David G. Rosado University of Castilla-La Mancha, Spain

Steering Committee
Nora Cuppens Telecom-Bretagne, France
Jan Jürjens Technical University of Dortmund, Germany
Nadira Lammari Conservatoire National des Arts et Métiers, France
Haralambos Mouratidis University of Brighton, UK
David G. Rosado University of Castilla-La Mancha, Spain
Carlos Blanco University of Cantabria, Spain
Daniel Mellado Spanish Tax Agency, Spain

Publicity Chairs
Shareeful Islam University of East London, UK
Luis Enrique Sánchez University of Castilla-La Mancha, Spain
Frédéric Gervais Université Paris-Est Créteil, France

Program Committee
Alban Gabillon Université de Polynésie Française, Polynésie Française
Antonio Maña University of Malaga, Spain
Brajendra Panda University of Arkansas, USA
Carlos Blanco University of Cantabria, Spain
Christophe Bidan Supélec, France
Christos Kalloniatis University of the Aegean, Greece
Daniel Mellado Spanish Tax Agency, Spain
David G. Rosado University of Castilla-La Mancha, Spain
Djamel Benslimane LIRIS, Claude Bernard Lyon I University, France
Eduardo Fernández-Medina University of Castilla-La Mancha, Spain
Eduardo B. Fernández Florida Atlantic University, USA
Eric Dubois CRP Henri Tudor, Luxembourg
Ernesto Damiani Università degli Studi di Milano, Italy
Esma Aïmeur Université de Montréal, Canada
Fabio Massacci Università degli Studi di Trento, Italy
Frédéric Cuppens Telecom Bretagne, France
Frédéric Gervais Université Paris-Est Créteil, France
Günther Pernul University of Regensburg, Germany
Haralambos Mouratidis University of Brighton, UK
Isabelle Comyn-Wattiau Cnam Paris, France
Jacky Akoka Cnam Paris, France
Jan Jürijens Technical University of Dortmund, Germany
Kamel Adi Université de Québec en Outaouais, Canada
Luis Enrique Sánchez University of Castilla-La Mancha, Spain
Mahmoud Barhamgi LIRIS, Claude Bernard Lyon I University, France
Marc Gondree Naval Postgraduate School, USA
Mohammad Zulkernine Queen’s University, Canada
Nadira Lammari Cnam Paris, France
Nineta Polemi University of Pireaus, Greece
Nora Cuppens LUSSI/SERES Telecom-Bretagne, France
Paolo Giorgini University of Trento, Italy
Régine Laleau LACL, Université Paris-Est Créteil, France
Sabrina De Capitani di Vimercati Università degli Studi di Milano, Italy
Sakurai Kouichi Kyushu University, Japan
Shareeful Islam University of East London, UK
Stefanos Gritzalis University of the Aegean, Greece
Steven Furnell Plymouth University, UK
Yves Ledru LIG, University of Grenoble, France

Auxiliary Reviewers

Ludwig Fuchs University of Regensburg, Germany
Manolis Maragkoudakis University of the Aegean, Greece

Keynote by Sokratis Katsikas, University of Piraeus.
Table of Contents

Analysis and Prediction of Design Model Evolution Using Time Series .......................................................... 1
   Hamed Shariat Yazdi, Mahnaz Mirbolouki, Pit Pietsch, Timo Kehrer, and Udo Kelter

An Evolutionary Improvement of the Mahalanobis – Taguchi Strategy and Its Application to Intrusion Detection ........................................ 16
   Dimitris Liparas and Evangelia Pantraki

Zero-Knowledge Private Computation of Node Bridgeness in Social Networks .......................................................... 31
   Maryam Shoaran and Alex Thomo

Valuation and Selection of OSS with Real Options .......................... 44
   Androklis Mavridis

State of the Art in Context Modelling – A Systematic Literature Review .......................................................... 53
   Hasan Koç, Erik Hennig, Stefan Jastram, and Christoph Starke

On the Applicability of Concepts from Variability Modelling in Capability Modelling: Experiences from a Case in Business Process Outsourcing ................................................ 65
   Kurt Sandkuhl and Hasan Koc

Capability Sourcing Modeling: A High-Level Conceptualization Based on Service-Dominant Logic ................................................ 77
   Laleh Rafati and Geert Poels

Capability-Based Business Model Transformation .......................... 88
   Martin Henkel, Ilia Bider, and Erik Perjons

Capability-Driven Development of a SOA Platform: A Case Study ................................................ 100
   Sergio España, Tania González, Jānis Grabis, Lauma Jokste, Raúl Juanes, and Francisco Valverde

Modeling Enterprise Capabilities with i*: Reasoning on Alternatives ................................................ 112
   Mohammad Hossein Danesh and Eric Yu

Service Functioning Mode in Variability Model .......................... 124
   Peteris Rudzajs and Marite Kirikova
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards a Computer-Aided Problem-Oriented Variability Requirements</td>
<td>136</td>
</tr>
<tr>
<td>Engineering Method</td>
<td></td>
</tr>
<tr>
<td>Azadeh Alebrahim, Stephan Faßbender, Martin Filipczyk,</td>
<td></td>
</tr>
<tr>
<td>Michael Goedicke, Maritta Heisel, and Marco Konersmann</td>
<td></td>
</tr>
<tr>
<td>An Outlook on Patterns as an Aid for Business and IT Alignment with</td>
<td>148</td>
</tr>
<tr>
<td>Capabilities</td>
<td></td>
</tr>
<tr>
<td>Janis Stirna and Kurt Sandkuhl</td>
<td></td>
</tr>
<tr>
<td>Low–Cost Eye–Trackers: Useful for Information Systems Research?</td>
<td>159</td>
</tr>
<tr>
<td>Stefan Zugal and Jakob Pinggera</td>
<td></td>
</tr>
<tr>
<td>Supporting BPMN Model Creation with Routing Patterns</td>
<td>171</td>
</tr>
<tr>
<td>Idan Wolf and Pnina Soffer</td>
<td></td>
</tr>
<tr>
<td>Coupling Elements of a Framework for Cognitive Matchmaking with</td>
<td>182</td>
</tr>
<tr>
<td>Enterprise Models</td>
<td></td>
</tr>
<tr>
<td>Sietse Overbeek</td>
<td></td>
</tr>
<tr>
<td>Investigating Differences between Graphical and Textual Declarative</td>
<td>194</td>
</tr>
<tr>
<td>Process Models</td>
<td></td>
</tr>
<tr>
<td>Cornelia Haisjakl and Stefan Zugal</td>
<td></td>
</tr>
<tr>
<td>Reducing Technical Debt: Using Persuasive Technology for Encouraging</td>
<td>207</td>
</tr>
<tr>
<td>Software Developers to Document Code (Position Paper)</td>
<td></td>
</tr>
<tr>
<td>Yulia Shmerlin, Doron Kliger, and Hayim Makabee</td>
<td></td>
</tr>
<tr>
<td>Conceptual Understanding of Conceptual Modeling Concepts:</td>
<td>213</td>
</tr>
<tr>
<td>A Longitudinal Study among Students Learning to Model</td>
<td></td>
</tr>
<tr>
<td>Dirk van der Linden, Henderik A. Proper, and</td>
<td></td>
</tr>
<tr>
<td>Stijn J.B.A. Hoppenbrouwers</td>
<td></td>
</tr>
<tr>
<td>What Do Software Architects Think They (Should) Do?</td>
<td>219</td>
</tr>
<tr>
<td>Sofia Sherman and Naomi Unkelos-Shpigel</td>
<td></td>
</tr>
<tr>
<td>Towards Semantic Collective Awareness Platforms for Business</td>
<td>226</td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
</tr>
<tr>
<td>Fabrizio Smith, Emanuele Storti, and Francesco Taglino</td>
<td></td>
</tr>
<tr>
<td>Leveraging User Inspiration with Microblogging-Driven Exploratory</td>
<td>238</td>
</tr>
<tr>
<td>Search</td>
<td></td>
</tr>
<tr>
<td>Maria Taramigkou, Fotis Paraskevopoulos, Efthimios Bothos,</td>
<td></td>
</tr>
<tr>
<td>Dimitris Apostolou, and Gregoris Mentzas</td>
<td></td>
</tr>
<tr>
<td>System Architecture of the BIVEE Platform for Innovation and</td>
<td>250</td>
</tr>
<tr>
<td>Production Improvement</td>
<td></td>
</tr>
<tr>
<td>Mauro Isaja</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Cooperative Decision Making in Virtual Enterprises</td>
<td>256</td>
</tr>
<tr>
<td>Nesat Efendioglu, Vedran Hrgovic, Ronald Quirchmayr, and Robert Woitsch</td>
<td></td>
</tr>
<tr>
<td>A Methodology for the Set-Up of a Virtual Innovation Factory Platform</td>
<td>268</td>
</tr>
<tr>
<td>Cristina Cristalli and Daniela Isidori</td>
<td></td>
</tr>
<tr>
<td>Data Mart Reconciliation in Virtual Innovation Factories</td>
<td>274</td>
</tr>
<tr>
<td>Claudia Diamantini, Domenico Potena, and Emanuele Storti</td>
<td></td>
</tr>
<tr>
<td>Requirements Refinement and Exploration of Architecture for Security and Other NFRs</td>
<td>286</td>
</tr>
<tr>
<td>Takao Okubo, Nobukazu Yoshioka, and Haruhiko Kaiya</td>
<td></td>
</tr>
<tr>
<td>Cloud Forensics Solutions: A Review</td>
<td>299</td>
</tr>
<tr>
<td>Stavros Simou, Christos Kalloniatis, Evangelia Kavakli, and Stefanos Gritzalis</td>
<td></td>
</tr>
<tr>
<td>Resolving Policy Conflicts - Integrating Policies from Multiple Authors</td>
<td>310</td>
</tr>
<tr>
<td>Kaniz Fatema and David Chadwick</td>
<td></td>
</tr>
<tr>
<td>Evolving Computational Intelligence System for Malware Detection</td>
<td>322</td>
</tr>
<tr>
<td>Konstantinos Demertzis and Lazaros Iliadis</td>
<td></td>
</tr>
<tr>
<td>Lightweight Formal Verification in Real World, A Case Study</td>
<td>335</td>
</tr>
<tr>
<td>Andrea Atzeni, Tao Su, and Teodoro Montanaro</td>
<td></td>
</tr>
<tr>
<td>Security Requirements Analysis Using Knowledge in CAPEC</td>
<td>343</td>
</tr>
<tr>
<td>Haruhiko Kaiya, Sho Kono, Shinpei Ogata, Takao Okubo, Nobukazu Yoshioka, Hironori Washizaki, and Kenji Kaijiri</td>
<td></td>
</tr>
</tbody>
</table>

**Author Index**                                                                 | 349  |