

Lecture Notes
in Business Information Processing

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Advanced Information Systems Engineering Workshops

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Preface

These proceedings include the papers from workshops held in conjunction with the 25th Conference on Advanced Information Systems Engineering (CAiSE 2013) in Valencia, Spain. The CAiSE conference is a leading and prestigious event, where state-of-the-art results in the area of information systems engineering are presented and discussed. In addition to the main conference, the CAiSE series of conferences has a long tradition of hosting workshops.

The workshops complement the conference and provide forums for researchers and practitioners to exchange ideas and share initial results in an atmosphere that fosters interaction. Each workshop has a relatively narrow focus, facilitating lively discussions among participants.

The CAiSE 2013 workshops were selected based on quality, relevance, and reputation. Some of the workshops have a successful history with CAiSE, while others are held for the first time. All the workshops whose papers appear in this volume have undertaken upon themselves to maintain a high-quality and selective acceptance policy, resulting in acceptance rates of up to 50% for full research papers.

The workshops whose papers appear in these proceedings are:

- Approaches for Enterprise Engineering Research (AppEER)
- International Workshop on BUSiness/IT ALignment and Interoperability (BUSITAL)
- International Workshop on Cognitive Aspects of Information Systems Engineering (COGNISE)
- Workshop on Human-Centric Information Systems (HC-IS)
- Next Generation Enterprise and Business Innovation Systems (NGEBIS)
- International Workshop on Ontologies and Conceptual Modeling (OntoCom)
- International Workshop on Variability Support in Information Systems (VarIS)
- International Workshop on Information Systems Security Engineering (WISSE)

Other workshops that were held during CAiSE, whose papers are not contained in this volume, include International Workshop on Enterprise & Organizational Modeling And Simulation (EOMAS), and 6th International i* Workshop (iStar).

We would like to express our gratitude to the workshop organizers who initiated the workshops and took responsibility for the programs of their workshop.

They managed the process from issuing the call for papers, reviewing and selecting the papers, and preparing their part of the proceedings. We would also like to thank the members of the various Program Committees who devoted their time and helped us put together an exciting workshop program at CAiSE 2013. Finally, we are thankful to the CAiSE 2013 organizers for all their efforts to make this a successful, exciting, and enjoyable event.

June 2013

Xavier Franch
Pnina Soffer

Approaches for Enterprise Engineering Research Workshop AppEER

The AppEER Workshop (Approaches for Enterprise Engineering Research)¹ is set up as a one-day event in such a way that it attracts researchers (academics and practitioners). AppEER 2013 was focused on advancing information systems research and was co-located with the 25th International Conference on Advanced Information Systems Engineering (CAiSE 2013) in Valencia, Spain.

Information systems are used in enterprises to support human actors in their activities. Essentially, information systems amplify human information processing capabilities. When engineering such information systems, one must therefore do so in full alignment with their human/organizational contexts. This involves the coherent *engineering* of a socio technical system. Studying the engineering of such socio technical systems has resulted in a wide range of disciplines, including business process management, enterprise architecture, enterprise modeling, enterprise transformation, business engineering, organizational engineering, etc. As the overarching term we will use “enterprise engineering” (EE).

The research field of EE takes an engineering perspective on the design and establishment of enterprises and their supportive (information) technologies. This requires insights into a broad range of aspects, such as human, cultural, organizational, and political aspects of enterprises and the processes involved in establishing them. This broad range of aspects touches on various existing research fields, including organizational science, management science, and information science, that form the “source” fields on EE.

The multidisciplinary nature of the EE field also implies the need to consider it from differing (potentially contrasting) points of view. As a result, various research approaches, research methodologies are needed to expand and deepen the EE research field in terms of theories, models, methods, and other instruments for the analysis, design, implementation, evolution, and governance of enterprises.

In practice, researchers (academics or practitioners) face many challenges in selecting/synthesizing the most appropriate approach for doing EE research. Even more, being an emerging multidisciplinary field involves the challenge of establishing an open and multifaceted research tradition, drawing upon the strengths of the research fields it touches on. This multifaceted research tradition has not been established enough yet. This is especially needed, since the research approaches used in the different source fields have differing points of views on how to conduct research, potentially leading to clashes between these traditions.

¹ <http://appeer.ee-team.eu/>

The AppEER workshop intends to provide a common platform for the discussion and presentation of original work describing the usage of different approaches such as: design science, interpretivism, positivism, criticism, etc., for doing EE research. Moreover, the intended audience should involve people who have the ambition to bring “engineering rigour” to the design/development/creation of enterprises and their information systems. Basically, how organizations currently deal/grapple with the task of designing/evolving themselves and their ISs; how they currently use engineering approaches in this; and how the design of engineering methods/techniques/approaches is used to do/improve EE.

As a first event, this workshop succeeded in attracting different communities from research fields such as organizational science, management science and information science composing the “source” fields on EE. The workshop attracted nine submissions. The submitted papers came from both academics and practitioners who shared their original insights concerning research approaches in EE. Every paper received more than three reviews and was independently discussed with the advisory board. In the end, we decided to accept five papers and agreed on adding an “invited paper” that fits with the goals of this workshop. Paper presentations are opportunities for stimulating meaningful discussions between participants, with the goal of developing approaches for research methodologies in EE, thereby creating synergies and jointly identifying topics for further research in future AppEER events.

Organization

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8th International Workshop on BU**Si**ness/IT A**Li**gnment and Interoperability BUSITAL

Nowadays, information services are a core asset for organizations seeking sustainable business and competitive advantage. The continuous growth of information and communication technologies-enabled innovations provide organizations with new efficient mechanisms for communication, information sharing, resource management and planning, and help them to explore new market opportunities. The special theme of the 25th edition of CAiSE was “Information Services,” where the notion of service plays an increasingly extensive role in enterprise development. However, in the context of enterprise development the notion of services should not be limited to information services. Accordingly, we stress the Service Science Research Manifesto by Chesbrough and Spohrer, which calls for an integrated view, namely, integrating management science with computer science. It is interesting that in this context the notion of service refers to different definitions: in management science, a service is defined as a business economic activity, offered by one party to another to achieve a certain benefit, and generated by business processes; in information systems, a service is a complex (or simple) task executed (within) by an organization on behalf of a customer; and in computer science, a service is a programmable, self-describing, encapsulated, and loosely coupled function accessed and invoked over the Internet.

As a consequence, the governance of information services in this increasingly evolving scenario demands new models of alignment not only within the traditional organizational boundaries, but also with an outer context that challenges organizations to anticipate the constantly evolving business, technological, and social environment, where interoperability issues are key success factors. Information systems have to support these evolutionary challenges while preserving the alignment between business strategies, business processes, social context, and application portfolios. Furthermore, recent decades have witnessed yet another wave of ICT innovations: cloud, smart and mobile technologies are rapidly integrating with our daily life and opening new business opportunities for organizations. Following new trends while mastering the complexity and gaining the maximum value from IT is the major challenge for both business and IT leaders. Traditionally, methods, approaches, theories, and applications of business-IT alignment have been vividly discussed by practitioners and researchers in IT. This 8th edition of the BUSITAL workshop clearly demonstrates the increasing interest on business-IT alignment from the management community.

April 2013

Christian Huemer
Irina Rychkova
Gianluigi Viscusi
Jelena Zdravkovic

Organization

BUSITAL 2013 was organized in conjunction with the 25th International Conference on Advanced Information Systems Engineering (CAiSE13) in Valencia, Spain.

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First International Workshop on Cognitive Aspects of Information Systems Engineering COGNISE

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 at conferences, acknowledging that these aspects are as important as the technical ones, which have traditionally been at 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. Understanding the challenges and needs, providing educational programs, as well as developing supporting tools and notations may be enhanced for a better fit to our natural cognition, leading to better performance of engineers and higher system quality. The workshop aimed to bring together researchers from different communities, such as requirements engineering, software architecture, design and programming, who share an interest in cognitive aspects, for identifying the cognitive challenges in the diverse development-related activities.

The first edition of this workshop attracted six international submissions: two full papers and four position papers. Each paper was reviewed by several members of the Program Committee. From these submissions, one out of the two full papers was accepted and, in addition, all four submissions of position papers were accepted as short papers for presentation at the workshop.

The papers presented at the workshop provide a mix of novel research ideas, mainly presenting research in progress or research plans. The full research paper “Zooming In and Out in Requirements Engineering” by Manuel Imaz argues that user stories or use cases play an essential role in our cognition and are the basic-level categories in requirements engineering, which can be aggregated to more abstract components in a bottom-up manner, unlike traditional top-down approaches. The position paper “Cognitive Principles to Support Information Requirements Agility” by Jeffrey Parsons and Yair Wand proposes information systems design rules, based on classification theory to foster information requirements agility by decoupling a conceptual view of data from logical models. “Naomi Unkelo-Spigel and Irit Hadar” present in their paper “Using Distributed Cognition Theory for Analyzing the Deployment Architecture Process” an analysis of the deployment architecture process according to distributed cognition theory, where each element participating in the process is analyzed as an

individual cognitive unit, and they identify challenges and difficulties that may hinder the process and compromise the quality of its outcomes. “Barbara Weber, Jakob Pinggera, Victoria Torres and Manfred Reichert” present a research design in their paper “Change Patterns for Model Creation: Investigating the Role of Nesting Depth” toward examining the impact of nesting depth on the cognitive complexity of change pattern usage when creating process models. Finally, “Jan Claes, Frederik Gailly and Geert Poels” present a research design in the paper “Cognitive Aspects of Structured Process Modeling” to investigate how structured process modeling affects the quality of the process model created. The paper also surveys some related cognitive theories that may help explain the causal relations between these two variables.

In addition to the presentations, we invited some of the presenters as well as additional guests to participate in a panel on “Information Systems Development Technologies and the Human Mind: Correspondence and Collision.”

We hope that the reader will find this selection of papers useful and be 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 first edition this year.

June 2013

Irit Hadar
Barbara Weber

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Workshop on Human-Centric Process-Aware Information Systems HC-PAIS

Human-centric issues are important to our understanding and development of information systems. In continuing the successful series of the HC-PAIS workshop, we are pleased to present the papers of the Human-Centric Information Systems (HCIS) 2013 workshop held in conjunction with CAiSE 2013, the 25th International Conference on Advanced Information Systems Engineering. The HCIS workshop series is dedicated to focusing on human-centric perspectives in the analysis, design, and use of information systems. The objective of the workshop is to extend the spectrum of the conference by providing researchers and practitioners with a platform for discussing research on human involvement and human integration in different types of IS, such as process-aware information systems (PAIS), business process management suites (BPMS) and workflow systems (WfS). The 2013 edition of the workshop attracted papers from nine different countries including Australia, Austria, Czech Republic, France, Germany, India, Luxembourg, Norway, and Spain. We received nine submissions, from which the four best rated papers were selected, yielding an acceptance rate of 44.45%. The HCIS contributions presented here address the following themes:

In “Enabling Personalized Process Schedules with Time-aware Process Views” Andreas Lanz, Jens Kolb, and Manfred Reichert present an approach to provide personalized schedules based on time-aware process schemas. The approach offers to individual users a comprehensive time-based view on business processes by visualizing them as extended Gantt diagrams.

Kimon Batoulis, Rami-Habib Eid-Sabbagh, Henrik Leopold, Mathias Weske, and Jan Mendling present in their contribution “Automatic Business Process Model Translation with BPMT” an evaluated technique to automatically translate business process models into different languages. The Business Process Model Translator (BPMT) supports the re-use of process models and allows employees, who work in subsidiaries of their multi national company, to access process models in foreign languages.

In “A Theoretical Basis for Using Virtual Worlds as a Personalized Process Visualization Approach” Hanwen Guo, Ross Brown, and Rune Rasmussen propose a theoretical analysis framework for reducing communication problems between business analysts and other process stakeholders. They show how processes of single-process performers can be captured in the virtual world and used as assistance for communication between the process stakeholders.

Hamzah Ritchi and Jan Mendling propose in “A Research Program for Studying the Impact of Process Representation on Risk Analysis” a set of hypotheses and a program outline for addressing the question of whether a process model

can help users to better understand the underlying processes and consequently supports the analyst in performing risk assessments, particularly in the audit domain.

We thank the authors for their contributions, the Program Committee members for reviewing, and the CAiSE 2013 Workshop Co-chairs and the Organizing Committee for all their support.

April 2013

Sonja Kabicher-Fuchs
Jan Recker
Stefanie Rinderle-Ma

Organization

HCIS 2013 was a workshop collaboratively organized by the University of Vienna, Research Group Workflow Systems of Technology and the Queensland University of Technology, Information Systems School.

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Workshop on New Generation Enterprise and Business Innovation Systems NGEBIS

Innovation is one of the major drivers to enable European enterprises to compete in global markets, especially in a tough economic juncture. Yet innovation is an elusive term that is often used in an indefinite way. If we consider widely accepted definitions, we can see that they capture only part of the essence of innovation. 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, etc. Innovation is a creative activity confronted with “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 intends to address the area of information systems dedicated to business innovation that has been 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 dedicated to business innovation, with particular attention to networked enterprises.

To this end, beyond the presentation session devoted to research papers, NGEBS 2013 provided also the following sessions: (1) Discussion-oriented session, with demos of new tools and systems, posters, and emerging ideas; (2) WOW - Window on Online Workshop Forum, for online discussion on a selected Social Network (LinkedIn), that started 2 months before the workshop to identify the three hottest issues to be selected for the Knowledge Café held on site; (3) Knowledge Café: composed of three rotating parallel panels that discussed the three most relevant topics emerged during the WOW Forum.

This edition of NGEBS received eight submissions, each of which was reviewed by at least two Program Committee members in order to supply the authors with helpful feedback. The committee decided to accept four contributions as regular papers and one as short paper. The workshop resulted in a multi disciplinary collection of contributions, addressing two main research lines. The first concerns organizational models for the governance and the knowledge management in innovation-oriented enterprises, represented by the papers: “Toward Innovative Model-Based Enterprise IT Outsourcing” and “Characteristics of Knowledge and Barriers Towards Innovation and Improvement in Collaborative Manufacturing Process Chains.” The second concerns technical and formal methods for information processing in innovation projects, represented by the papers: “A Logic-Based Formalization of KPIs for Virtual Enterprises,”

“Cross-Domain Crawling for Innovation,” and “Hybrid Modelling with ADOxx: Virtual Enterprise Interoperability Using Meta Models.”

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 2013 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 2013

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Gash Bhullar
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NGEBIS 2013 Organization

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Second International Workshop on Ontologies and Conceptual Modeling Onto.Com

This volume collects articles presented at the second edition of the International Workshop on Ontologies and Conceptual Modeling (Onto.Com 2013). This workshop was organized as an activity of the Special Interest Group on Ontologies and Conceptual Modeling of the International Association of Ontologies and Applications (IAOA). It was held in the context of the 25th International Conference on Advanced Information Systems Engineering (CAISE 2013), in Valencia, Spain. Moreover, the workshop was designed with the main goal of discussing the role played by formal ontology, philosophical logics, cognitive sciences and linguistics, as well as empirical studies in the development of theoretical foundations and engineering tools for conceptual modeling.

For this edition, we had 11 submissions with contributors from Canada, France, Italy, Spain, Tunisia, UK, Australia, Sweden, Czech Republic, Greece, and Brazil. These proposals were carefully reviewed by the members of our international Program Committee. After this process, six articles (five full papers and one short paper) were chosen for presentation at the workshop.

In the paper entitled “Re-engineering Data with 4D Ontologies and Graph Databases,” Sergio de Cesare, George Foy, and Chris Partridge propose an approach based on the BORO approach (a 4D foundational ontology and methodology) for interpreting raw data. Moreover, the article discusses how a model resulting from the interpretation and ontology-based transformation of these raw data can be mapped to a graph-based database architecture.

In “An Application of Philosophy in Software Modelling and Future Information Systems Development,” Brian Henderson-Sellers, Cesar Gonzalez-Perez, and Greg Walkerden discuss the influences of different philosophical stances on conceptual modeling and modeling language engineering. A fundamental goal of this enterprise is to contribute to make explicit the (sometimes tacit) philosophical assumptions taken by information systems researchers and developers.

In “Knowledge Organization and the Conceptual Basis for Building Classification Systems for Complex Documents: An Application on the Brazilian Popular Song Domain,” Rodrigo De Santis elaborates on the multidisciplinary and multidimensional nature of complex documents. In particular, the article discusses theoretical grounding and presents an ontology-based system for the classification of popular songs.

In “Non-monotonic Reasoning in Conceptual Modeling and Ontology Design: A Proposal,” Giovanni Casini and Alessandro Mosca present a formal proposal for introducing non-monotonic reasoning in ORM (Object-Role Modeling) schemas, enriching the language with a new set of syntactic constructs.

In “Supporting Customer Choice with Semantic Similarity Search and Explanation,” Anna Formica, Michele Missikoff, Elaheh Pourabbas, and Francesco Taglino present a semantic search method based on the information content approach for helping customers to make their choices. Moreover, the authors elaborate on how the method proposed could also be used to provide to the user an explanation for the ranked list of options returned from a semantic search. Finally, the paper investigates graphical representations for better representing these results.

Finally, in the paper entitled “Towards a Sociomaterial Ontology,” Maria Bergholtz, Owen Eriksson, and Paul Johannesson present an ontology of socio-material entities, discussing how organizational entities are grounded in physical ones and how they can be understood in their approach of deontic notions such as privileges, duties, and powers. Moreover, the authors discuss impacts of these ontological notions in the practice of conceptual modeling.

We would like to thank the authors who considered *Onto.Com* as a forum for presentation of their high-quality work. Moreover, we thank our Program Committee members for their invaluable contribution with timely and professional reviews. Additionally, we are grateful to the support received by the IAOA (International Association for Ontologies and Applications). Finally, we would like thank the CAISE 2013 Workshop Chairs and Organizing Committee for giving us the opportunity to organize the workshop in this fruitful scientific environment.

June 2013

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First International Workshop on Variability Support in Information Systems VarIS

Contemporary off-the-shelf enterprise information systems (IS) do not provide the flexibility required by agile enterprises whose businesses need to be rapidly adapted in response to market or environmental changes. Usually, standardized IS are deployed in different companies acting in different domains and distributed over various countries not taking their inherent differences into account. Despite these differences, certain IS functionality is shared among enterprises (e.g., the invoice checking and approval process or the customer entity). While major progress has been achieved by shifting from function- to process-centric system design, currently, the construction of IS dealing with all these particularities and commonalities is far from being realized. A feasible direction to improve this situation is to address IS variability as a first class aspect during IS development.

Variability management is prevalent in a multitude of research fields including, for example, requirements engineering, software product lines, business and software process modeling, and product data management. However, a comprehensive approach dealing with variability in the context of IS engineering and IS management is still missing; e.g., it is not well understood how the varying requirements contribute to variability of the different artifacts emerging in the IS lifecycle (e.g., architectural specifications, process models, test cases, handbooks).

The VarIS workshop fills this gap by bringing together researchers and practitioners from different fields (e.g., requirements engineering, software product line engineering, business process management, software engineering, product data management) who need to deal with variability issues in IS not from an isolated point of view, but as an integrated part of a development project. The overall goal of the workshop is to look at variability issues from a wider perspective, trying to understand not only the techniques and languages that allow capturing and representing IS variability, but also IS variability including, for example, its drivers and economic implications. VarIS discusses the current state of ongoing research, industry needs, future trends, and practical experiences.

The first edition of this workshop attracted 11 international submissions. Each paper was reviewed by at least two members of the Program Committee. From these submissions, the top five were accepted as full papers and, in addition, another interesting submission was accepted as short paper for presentation at the workshop.

The accepted papers provide a good example that variability is present in many different aspects of IS, and different approaches and techniques need to be used to address it properly. For example, the paper by Murguzur, Sagardui,

Intxausti, and Trujillo presents LateVa, an approach for managing BP variability along the modelling, execution, and evaluation phases of the BP lifecycle. Martinez-Ruiz, Ruiz, and Piattini deal with changes at the context level of software processes focusing on the project, and its characteristics, the organization, and the current laws. Ingles-Romero and Vicente-Chicote focus on the prototyping and verification of self-adaptive systems by means of a formal approach. Mori and Cleve present a research agenda to deal with data-intensive self-adaptive (DISA) systems where a classification framework for adaptation and key challenges for managing the complete lifecycle of DISA systems are discussed. Ponnalagu, Narendra, and Ghose propose a framework to deal with the development of reusable service-oriented applications. Finally, Ouali, Kraiem, Al-Khanjari, and Baghdadi propose a process that combines the use of maps and feature diagrams for the development of SPL.

In this first edition of the workshop, we hope that the reader will find this selection of papers useful to keep track of the latest advances and challenges in the area of variability in information systems, and we look forward to bringing new advances in future editions of the VarIS workshop.

June 2013

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Workshop on Information System Security Engineering WISSE

Modern information systems support significant areas of human society that require storage and processing of sensitive personal and organizational information. Therefore, developers of information systems are currently faced with important challenges related to the security of such systems. 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 the relevant industrial applications, recurring challenges, problems and industrial-led solutions in the area of secure information systems engineering.

This third edition of the workshop, held in Valencia (Spain) on June 18, 2013, was organized in conjunction with the 25th International Conference on Advanced Information Systems Engineering (CAiSE 2013). In order to ensure a high-quality workshop, each submitted paper went through an extensive review process. Five submissions were accepted as full papers and three as short papers. The accepted submissions address a large variety of issues related to secure information systems engineering.

We wish to thank all the contributors to WISSE 2013, 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 2013 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 2013

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