

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbruecken, Germany

Jolita Ralyté Xavier Franch
Sjaak Brinkkemper Stanisław Wrycza (Eds.)

Advanced Information Systems Engineering

24th International Conference, CAiSE 2012
Gdańsk, Poland, June 25-29, 2012
Proceedings

Volume Editors

Jolita Ralyté
University of Geneva
Institute of Services Science
Battelle - Bâtiment A, Route de Drize 7, 1227 Carouge, Switzerland
E-mail: jolita.ralyte@unige.ch

Xavier Franch
Technical University of Catalonia
Department ESSI, UPC-Campus Nord
c/Jordi Girona 1-3, 08034 Barcelona, Spain
E-mail: franch@essi.upc.edu

Sjaak Brinkkemper
Utrecht University
Department of Information and Computing Sciences
Princetonplein 5, De Uithof, 3584 CC Utrecht, The Netherlands
E-mail: s.brinkkemper@uu.nl

Stanisław Wrycza
University of Gdańsk
Faculty of Management
Department of Business Informatics
ul. Piaskowa 9, 81-864 Sopot, Poland
E-mail: swrycza@ug.edu.pl

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-31094-2 e-ISBN 978-3-642-31095-9
DOI 10.1007/978-3-642-31095-9
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012939395

CR Subject Classification (1998): H.4, D.2.2, D.2.1, D.2, J.1, I.2, H.2

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

© Springer-Verlag Berlin Heidelberg 2012

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, 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.

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)

Preface

We are pleased to welcome you to the proceedings of the 24th International Conference on Advanced Information Systems Engineering (CAiSE 2012). The CAiSE series of conferences started in 1989 aiming at providing a venue to researchers and practitioners in the field of information systems engineering. Twenty-three years later, CAiSE has established itself as a leading event in the information systems area for presenting and exchanging results of emerging methods and technologies that facilitate innovation and create business opportunities.

CAiSE 2012, held in Gdańsk during June 25–29, 2012, continued this tradition. The theme of CAiSE 2012 was “Information Services.” The notion of service plays a more and more extensive role in enterprise development. Indeed, most of the enterprise management and manufacture role is based on the exchange of services: services to the customers and/or citizens, services to support the inter-organizational collaboration, as well as services to accomplish intra-organizational activities. Many organizations and companies are sharing services with others, interfacing services from others, or outsourcing their ICT resources to various locations worldwide aided by the Internet. For all of them, the concept of service becomes a cornerstone of their processes of collaboration, innovation, and value creation. In this context, information systems engineering is moving toward the adoption of service-driven architectures where intra- and inter-organizational business activities are carried out with the help of information services. Information services are considered as a new means to deal with the complexity, modularity, and interoperability of the constantly growing information systems. Design and development of information services and information service-driven architectures become key to the success of organizations and their business. Consequently, the service-driven IS domain is becoming a new complex domain, which requires new interdisciplinary approaches and new transdisciplinary ways of thinking.

This year, CAiSE 2012 received 297 submissions. In a first round, each submission was reviewed by three Program Committee members. After examining the final reviews, 171 papers entered into the on-line discussion process, each paper moderated by one Program Board member. As a result, the papers were ranked and then discussed during the Program Committee/Program Board meeting held in Geneva during February 13–14, 2012. At the end of the meeting, 33 papers were definitively accepted as full research papers, and nine others went through a last quality-assurance phase in which a shepherd ensured that some reviewers’ comments were handled properly. As a result, the conference program included 42 full research papers that were organized into 14 themes, each of them scheduled as a session in the conference program.

The main conference program also included four mini-tutorials, the CAiSE Forum, an industrial track on Practice-Driven Research on Enterprise Transformation (PRET 2012), a panel and two keynote speeches: Michele Missikoff talked about “Looking at Future Research Challenges in Enterprise Information Systems,” while Krzysztof Kurowski delivered a talk on “Challenges for Future Platforms, Services and Networked Applications.” Before the conference, some other events were scheduled: ten workshops, a Doctoral Consortium and two working conferences: Business Process Modeling, Development, and Support (BPMDS 2012) and Exploring Modelling Methods for Systems Analysis and Design (EMMSAD 2012), this year arranged jointly with EuroSymposium 2012.

The organization and successful running of a large conference such as CAiSE would not be possible without the valuable help and time of a large number of people. As editors of this volume, we would like to express our gratitude to the Program Committee members, the Program Board members and additional reviewers for their valuable work in selecting the papers for the scientific program of the conference; to the authors of the papers for sending their work to CAiSE; and to the presenters of the papers and Session Chairs. We also thank the Chairs of the various CAiSE 2012 committees for their assistance in creating an exciting scientific program. We would also like to thank all members of the local Organizing Committee at the University of Gdańsk for their hospitality and the organization of the social events of the conference, and extend our gratitude to the sponsors who made the event financially feasible. Finally, we thank the participants both from academia and industry and we hope that their active participation in the CAiSE conference was inspiring for their research and a good support for industrial innovation.

June 2012

Jolita Ralyté
Xavier Franch
Sjaak Brinkkemper
Stanisław Wrycza

Organization

Steering Committee

Barbara Pernici	Politecnico di Milano, Italy
Oscar Pastor	Technical University of Valencia, Spain
John Krogstie	Norwegian University of Science and Technology, Norway

Advisory Committee

Arne Sølvsberg	Norwegian University of Science and Technology, Norway
Janis Bubenko Jr.	Royal Institute of Technology, Sweden
Colette Rolland	Université Paris 1 Panthéon Sorbonne, France

General Chair

Sjaak Brinkkemper	Utrecht University, The Netherlands
-------------------	-------------------------------------

Program Chairs

Jolita Ralyté	University of Geneva, Switzerland
Xavier Franch	Technical University of Catalonia, Spain

Organizing Chair

Stanisław Wrycza	University of Gdańsk, Poland
------------------	------------------------------

Workshop Chairs

Marko Bajec	University of Ljubljana, Slovenia
Johann Eder	Alpen Adria Universität Klagenfurt, Austria

Tutorial Chairs

Ana Moreira	Universidade Nova de Lisboa, Portugal
Raimundas Matulevičius	University of Tartu, Estonia

Forum Chairs

Marite Kirikova
Janis Stirna

Riga Technical University, Latvia
Stockholm University, Sweden

Industry Chair

Erik Proper

CRP Henri Tudor, Luxembourg

Doctoral Consortium Chairs

Isabelle Mirbel
Barbara Pernici

University of Nice, France
Politecnico di Milano, Italy

Publication Chair

Claudia P. Ayala

Technical University of Catalonia, Spain

Publicity Chairs

Rébecca Deneckère
Carina Alves

University of Paris 1, France
Universidade Federal de Pernambuco, Recife,
Brazil

Marta Indulska
Lin Liu
Keng Siau

University of Queensland, Australia
Tsinghua University, China
University of Nebraska-Lincoln, USA

Webmaster

Lukasz Malon

University of Gdańsk, Poland

Program Committee Board

Marko Bajec, Slovenia
Zohra Bellahsene, France
João Falcão e Cunha, Portugal
Giancarlo Guizzardi, Brazil
John Krogstie, Norway
Haris Mouratidis, UK
Oscar Pastor López, Spain

Barbara Pernici, Italy
Anne Persson, Sweden
Michael Petit, Belgium
Erik Proper, Luxembourg
Colette Rolland, France
Camille Salinesi, France
Pnina Soffer, Israel

Program Committee

Wil van der Aalst, The Netherlands
 Daniel Amyot, Canada
 Paris Avgeriou, The Netherlands
 Luciano Baresi, Italy
 Boalem Benatallah, Australia
 Giuseppe Berio, France
 Nacer Boudjlida, France
 Marco Brambilla, Italy
 Jordi Cabot, France
 Albertas Čaplinskas, Lithuania
 Silvana Castano, Italy
 Jaelson Castro, Brazil
 Corine Cauvet, France
 Isabelle Comyn-Wattiau, France
 Panos Constantopoulos, Greece
 Alfredo Cuzzocrea, Italy
 Fabiano Dalpiaz, Italy
 Valeria De Antonellis, Italy
 Rébecca Deneckère, France
 Eric Dubois, Luxembourg
 Johann Eder, Austria
 Mariagrazia Fugini, Italy
 Guido Geerts, USA
 Paolo Giorgini, Italy
 Cristina Gómez, Spain
 Stefanos Gritzalis, Greece
 Michael Grossniklaus, USA
 Irit Hadar, Israel
 Terry Halpin, Australia and Malaysia
 Markus Helfert, Ireland
 Brian Henderson-Sellers, Australia
 Willem-Jan van den Heuvel,
 The Netherlands
 Marta Indulska, Australia
 Matthias Jarke, Germany
 Manfred Jeusfeld, The Netherlands
 Paul Johannesson, Sweden
 Ivan Jureta, Belgium
 Haruhiko Kaiya, Japan
 Dimitris Karagiannis, Austria
 Panagiotis Karras, USA
 Evangelia Kavakli, Greece
 Marite Kirikova, Latvia

Christian Kop, Austria
 Régine Laleau, France
 Alexei Lapouchnian, Canada
 Wilfried Lemahieu, Belgium
 Michel Léonard, Switzerland
 Kecheng Liu, UK
 Lin Liu, China
 Peri Loucopoulos, UK
 Kalle Lyytinen, USA
 Lech Madeyski, Poland
 Raimundas Matulevičius, Estonia
 Jan Mendling, Austria
 Isabelle Mirbel, France
 Jerzy Nawrocki, Poland
 Moira Norrie, Switzerland
 Selmin Nurcan, France
 Andreas Oberweis, Germany
 Antoni Olivé, Spain
 Andreas Opdahl, Norway
 Michael Pantazoglou, Greece
 Mike Papazoglou, The Netherlands
 Gilles Perrouin, Belgium
 Dimitris Plexousakis, Greece
 Geert Poels, Belgium
 Klaus Pohl, Germany
 Jaroslav Pokorný, Czech Republic
 Naveen Prakash, India
 Sudha Ram, USA
 Ruth Raventós, Spain
 Manfred Reichert, Germany
 Iris Reinhartz-Berger, Israel
 Dominique Rieu, France
 Bill Robinson, USA
 Michael Rosemann, Australia
 Gustavo Rossi, Argentina
 Matti Rossi, Finland
 Antonio Ruiz Cortés, Spain
 Motoshi Saeki, Japan
 Ana Šaša, Slovenia
 Keng Siau, USA
 Guttorm Sindre, Norway
 Monique Snoeck, Belgium
 Janis Stirna, Sweden

Arnon Sturm, Israel
David Taniar, Australia
Ernest Teniente, Spain
Bernhard Thalheim, Germany
Juan-Carlos Trujillo Mondéjar, Spain
Irene Vanderfeesten, The Netherlands
Olegas Vasilecas, Lithuania
Yannis Vassiliou, Greece
Yair Wand, Canada
Barbara Weber, Austria

Jan Weglarz, Poland
Hans Weigand, The Netherlands
Mathias Weske, Germany
Jon Whittle, UK
Roel Wieringa, The Netherlands
Eric Yu, Canada
Jelena Zdravkovic, Sweden
Didar Zowghi, Australia
Meiyun Zuo, China

Additional Referees

Ebrahim Khalil Abbasi
David Ameller
Birger Andersson
Ofer Arazy
George Athanasopoulos
George Baryannis
David Bednarek
Saeed Ahmadi Behnam
Palash Bera
Maria Bergholtz
Alexander Bergmayr
Pierre Berlioux
Devis Bianchini
Bojana Bislimovska
Quentin Boucher
Renaud Bougueng
Hugo Bruneliere
Robert Buchmann
Fabian Büttner
Cristina Cabanillas
Javier Canovas
Samira Si-said Cherfi
Jan Claes
Anthony Cleve
Maya Daneva
Xavier Devroey
Thang Le Dinh
Prokopios Drogkaris
Daniel J. Dubois
Hubert Dubois
Pascal van Eck
Hanna Farah

Hassan Fatemi
Marie-Christine Fauvet
Pablo Fernández
Alfio Ferrara
Matthias Galster
Luciano Garcia-Banuelos
José María García
Guido Geerts
Frederic Gervais
Sepideh Ghanavati
David Gil
Sam Guinea
Uwe van Heesch
Martin Henkel
Pieter Hens
Nico Herzberg
André Heuer
Toma. Hovelja
Vedran Hrgovcic
Charlotte Hug
Slinger Jansen
Jakub Jurkiewicz
Jaap Kabbedijk
Christos Kalloniatis
Maria Karyda
Spyros Kokolakis
Haridimos Kondylakis
Sylwia Kopczynska
Yannis Kotidis
Kyriakos Kritikos
Sylvain Kubicki
Matthias Kunze

Alexander Lübbe
Andreas Lanz
Cyprian Laskowski
Algirdas Laukaitis
Stéphane Leblanc
Yang Lee
Henrik Leopold
Weizi Li
Zengyang Li
Hector Llorens
Mathias Lohrmann
Amel Mammari
Michał Mackowiak
Andreas Metzger
Andreas Meyer
Bartosz Michalik
Michele Melchiori
Geert Monsieur
Stefano Montanelli
Kafui Monu
Christoph Moser
Luca Mottola
Alain Mouttham
Miroslaw Ochodek
Karolyne Oliveira
Artur Opala
Dieter Pfoer
João Pimentel
Jakob Pinggera
Pierluigi Plebani
Richard Pohl
Artem Polyvyanyy
Viara Popova
Alireza Pourshahid
Nicolas Prat
Anna Queralt
Evangelos Rekleitis

Alain Renault
Manuel Resinas
Panagiotis Rizomiliotis
Oscar Romero
Anne Rousseau
Emanuel Santos
Brahmananda Sapkota
Farida Semmak
Azalia Shamsaei
Carla Silva
Patricio Silva
Aidas Smaizis
Sergey Smirnov
Jakub Starka
Vanessa Stricker
Yehia Taher
Virginie Thion
Robert Tairas
Giordano Tamburrelli
Chekfoung Tan
Jasmine Tehrani
Virginie Thion
Massimo Tisi
Dan Tofan
Pablo Trinidad
Justas Trinkunas
Wilfrid Utz
Carmen Vaca
Gaia Varese
Antonio Villegas
Niksa Visic
Changrui Yu
A. Zarghami
Chrysostomos Zeginis
Iyad Zikra
Srdjan Zivkovic
Stefan Zugul

Table of Contents

Keynotes

The Future of Enterprise Systems in a Fully Networked Society	1
<i>Michele Missikoff</i>	
Challenges for Future Platforms, Services and Networked Applications	19
<i>Krzysztof Kurowski</i>	

Business Process Model Analysis

Understanding Business Process Models: The Costs and Benefits of Structuredness	31
<i>Marlon Dumas, Marcello La Rosa, Jan Mendling, Raul Mäesalu, Hajo A. Reijers, and Nataliia Semenenko</i>	
Aggregating Individual Models of Decision-Making Processes	47
<i>Razvan Petrusel</i>	
Generating Natural Language Texts from Business Process Models	64
<i>Henrik Leopold, Jan Mendling, and Artem Polyvyanyy</i>	

Service and Component Composition

Towards Conflict-Free Composition of Non-functional Concerns	80
<i>Benjamin Schmeling, Anis Charfi, Marko Martin, and Mira Mezini</i>	
Fuzzy Verification of Service Value Networks	95
<i>Iván S. Razo-Zapata, Pieter De Leenheer, Jaap Gordijn, and Hans Akkermans</i>	
Cooperative Service Composition	111
<i>Nikolay Mehandjiev, Freddy Lécué, Martin Carpenter, and Fethi A. Rabhi</i>	

Language and Models

Abstracting Modelling Languages: A Reutilization Approach	127
<i>Juan de Lara, Esther Guerra, and Jesús Sánchez-Cuadrado</i>	
Logical Invalidations of Semantic Annotations	144
<i>Julius Köpke and Johann Eder</i>	

Uniform Access to Non-relational Database Systems: The SOS Platform	160
<i>Paolo Atzeni, Francesca Bugiotti, and Luca Rossi</i>	

System Variants and Configuration

Variability as a Service: Outsourcing Variability Management in Multi-tenant SaaS Applications	175
<i>Ali Ghaddar, Dalila Tamzalit, Ali Assaf, and Abdalla Bitar</i>	
Configurable Process Models for the Swedish Public Sector	190
<i>Carl-Mikael Lönn, Elin Uppström, Petia Wohed, and Gustaf Juell-Skielse</i>	
Aligning Software Configuration with Business and IT Context	206
<i>Fabiano Dalpiaz, Raian Ali, and Paolo Giorgini</i>	

Process Mining

Mining Inter-organizational Business Process Models from EDI Messages: A Case Study from the Automotive Sector	222
<i>Robert Engel, Wil M.P. van der Aalst, Marco Zapletal, Christian Pichler, and Hannes Werthner</i>	
Data Transformation and Semantic Log Purging for Process Mining	238
<i>Linh Thao Ly, Conrad Indiono, Jürgen Mangler, and Stefanie Rinderle-Ma</i>	
Improved Artificial Negative Event Generation to Enhance Process Event Logs	254
<i>Seppe K.L.M. vanden Broucke, Jochen De Weerd, Bart Baesens, and Jan Vanthienen</i>	
Efficient Discovery of Understandable Declarative Process Models from Event Logs	270
<i>Fabrizio M. Maggi, R.P. Jagadeesh Chandra Bose, and Wil M.P. van der Aalst</i>	

Ontologies

OtO Matching System: A Multi-strategy Approach to Instance Matching	286
<i>Evangelia Daskalaki and Dimitris Plexousakis</i>	
SCIMS: A Social Context Information Management System for Socially-Aware Applications	301
<i>Muhammad Ashad Kabir, Jun Han, Jian Yu, and Alan Colman</i>	

Ontological Meta-properties of Derived Object Types	318
<i>Giancarlo Guizzardi</i>	
An Automatic Approach for Mapping Product Taxonomies in E-Commerce Systems	334
<i>Lennart J. Nderstigt, Steven S. Aanen, Damir Vandić, and Flavius Fräsincar</i>	

Requirements and Goal Models

Requirements-Driven Root Cause Analysis Using Markov Logic Networks	350
<i>Hamzeh Zawawy, Kostas Kontogiannis, John Mylopoulos, and Serge Mankovskii</i>	
Validation of User Intentions in Process Models	366
<i>Gerd Gröner, Mohsen Asadi, Bardia Mohabbati, Dragan Gašević, Fernando Silva Parreiras, and Marko Bošković</i>	
Agile Requirements Evolution via Paraconsistent Reasoning	382
<i>Neil A. Ernst, Alexander Borgida, John Mylopoulos, and Ivan J. Jureta</i>	

Compliance

On Analyzing Process Compliance in Skin Cancer Treatment: An Experience Report from the Evidence-Based Medical Compliance Cluster (EBMC ²)	398
<i>Michael Binder, Wolfgang Dorda, Georg Duftschmid, Reinhold Dunkl, Karl Anton Fröschl, Walter Gall, Wilfried Grossmann, Kaan Harmankaya, Milan Hronsky, Stefanie Rinderle-Ma, Christoph Rinner, and Stefanie Weber</i>	
Compliance Evaluation Featuring Heat Maps (CE-HM): A Meta-Modeling-Based Approach	414
<i>Dimitris Karagiannis, Christoph Moser, and Arash Mostashari</i>	
A Compliance Management Ontology: Developing Shared Understanding through Models	429
<i>Norris Syed Abdullah, Shazia Sadiq, and Marta Indulska</i>	

Monitoring and Prediction

Patterns to Enable Mass-Customized Business Process Monitoring	445
<i>Marco Comuzzi, Samuil Angelov, and Jochem Vonk</i>	
Predicting QoS in Scheduled Crowdsourcing	460
<i>Roman Khazankin, Daniel Schall, and Shahram Dustdar</i>	

Services

Towards Proactive Web Service Adaptation	473
<i>Ahmed Moustafa and Minjie Zhang</i>	
Clouding Services for Linked Data Exploration	486
<i>Silvana Castano, Alfio Ferrara, and Stefano Montanelli</i>	

Case Studies

Business Intelligence Modeling in Action: A Hospital Case Study	502
<i>Daniele Barone, Thodoros Topaloglou, and John Mylopoulos</i>	
RadioMarché: Distributed Voice- and Web-Interfaced Market Information Systems under Rural Conditions	518
<i>Victor de Boer, Pieter De Leenheer, Anna Bon, Nana Baah Gyan, Chris van Aart, Christophe Guéret, Wendelien Tuyp, Stephane Boyera, Mary Allen, and Hans Akkermans</i>	
Publication of Geodetic Documentation Center Resources on Internet	533
<i>Marcin Luckner and Waldemar Izdebski</i>	

Business Process Design

Business Process Design from Virtual Organization Intentional Models	549
<i>Luz María Priego-Roche, Lucinéia Heloisa Thom, Agnès Front, Dominique Rieu, and Jan Mendling</i>	
A Novel Approach to Modeling Context-Aware and Social Collaboration Processes	565
<i>Vitaliy Liptchinsky, Roman Khazankin, Hong-Linh Truong, and Schahram Dustdar</i>	
Process Redesign for Liquidity Planning in Practice: An Empirical Assessment	581
<i>Jochen Martin, Tobias Conte, and Athanasios Mazarakis</i>	

Feature Models and Product Lines

Building Information System Variants with Tailored Database Schemas Using Features	597
<i>Martin Schäler, Thomas Leich, Marko Rosenmüller, and Gunter Saake</i>	

Evolutionary Search-Based Test Generation for Software Product Line Feature Models	613
<i>Faezeh Ensan, Ebrahim Bagheri, and Dragan Gašević</i>	
Feature Model Differences	629
<i>Mathieu Acher, Patrick Heymans, Philippe Collet, Clément Quinton, Philippe Lahire, and Philippe Merle</i>	
Human Factor	
Wiki Refactoring as Mind Map Reshaping	646
<i>Gorka Puente and Oscar Díaz</i>	
Purpose Driven Competency Planning for Enterprise Modeling Projects	662
<i>Janis Stirna and Anne Persson</i>	
Work Experience in PAIS – Concepts, Measurements and Potentials	678
<i>Sonja Kabicher-Fuchs and Stefanie Rinderle-Ma</i>	
Tutorials	
Ontological Foundations for Conceptual Modeling with Applications	695
<i>Giancarlo Guizzardi</i>	
Designing Technical Action Research and Generalizing from Real-World Cases	697
<i>Roel Wieringa</i>	
Improvisational Theater for Information Systems: An Agile, Experience-Based, Prototyping Technique	699
<i>Martin Mahaux and Patrick Heymans</i>	
Full Model-Driven Practice: From Requirements to Code Generation ...	701
<i>Óscar Pastor and Sergio España</i>	
Author Index	703