Information Systems Development
Information Systems Development

Asian Experiences

Foreword by William Wei Song and Shenghua Xu
Foreword

(Messages from Program Co-Chairs)

The 18th International Conference on Information Systems Development (ISD2009) is held in Nanchang, China, from September 16 to 19, 2009.

In keeping with the traditions of the conference, ISD2009, which is organized by Jiangxi University of Finance and Economics, aims to provide an international platform for the discussion and exchange of new research ideas on information system development and related among researchers, developers, and users from around the world. The theme of the conference is “Asian Experience”.

This year, we received 89 papers from more than 20 counties and regions. These papers have been rigorously reviewed by the Program Committee members, each paper being reviewed by least three reviewers. Finally, 54 papers have been accepted for presentation at the conference, setting an acceptance rate of 61%. The accepted papers are organized for presentation in 14 sessions spanning 9 tracks: “Enterprise Systems – A Challenge for Future Research and Improved Practice”, “Business Systems Analysis”, “IS/IT Project Management”, “Data and Information Systems Model”, “Human–Computer Interaction in ISD”, “Information Systems for Service Marketing”, “Development of Information Systems for Creativity and Innovation”, “Model-Driven Engineering in ISD”, “Legal and Administrative Aspects of Information Systems Development”, “Information Systems Engineering and Management”, and “Agile and High-Speed Systems Development”.

The conference is privileged to host five keynote speeches delivered by Guoqing Chen (Tsinghua University, China), Jian Ma (City University of Hong Kong, China), Zhi Jin (Peking University, China), Chengqi Zhang (University of Technology, Australia), and Deli Yang (Dalian University of Technology, China). The speeches provide an insight into a variety of research topics including e-Business, Internet-based software development, data mining, and electronic commerce and present challenges on related research issues.

The conference would not have been a success without the hard work of many individuals, including the general co-chairs Guoqin Chen and Qiao Wang, the organizing co-chairs Changxuan Wan, Guoqiong Liao, Bo Shen, Shumei Liao, and Yuansheng Zhong, and others in the organizing committees, thanks for putting
an exceptional programme. We are also grateful for all the PC members and the external reviewers for setting up a high standard for our conference. We would also like to thank the keynote speakers, the track chairs, the authors in particular who have contributed to the success of our conference. We would like to thank our sponsor NSFC. Last but not least, a big “thank you” to Jiangxi University of Finance and Economics for their great effort in organizing the event.

Durham, UK
Nanchang, China

William Wei Song
Shenghua Xu
Program Co-chairs
Preface

(Messages from the General Co-Chairs)

On behalf of the organizing committee, we would like to welcome you to the 18th International Conference on Information Systems Development (ISD2009). The purpose of this conference is to provide an international forum for technical discussion and exchange of ideas in information systems area among the researchers, developers, and users from academia, business, and industry.

This is the first time that this conference is held in China. We are most privileged to be hosting this conference. Nanchang is an ancient city full of historical and cultural heritages dating back more than 2,200 years. As the capital city of Jiangxi Province, it is an excellent location for a forum of academic and professional communications and exchange of research ideas, with a side helping of meaningful entertainment and cultural immersion.

In spite of the negative impact of the financial recession starting from 2008 and the prevalence of A/H1N1 Flu, the conference still received many papers from more than 20 counties and regions this year.

This year’s conference continues the ISD conferences tradition with an excellent program, consisting of 5 keynote speeches and 54 research paper presentations. The accepted papers have been peer reviewed strictly by three or more experts and selected carefully from 89 submissions across Australia, China (including Hong Kong), Croatia, Czech Republic, Denmark, Finland, Germany, Greece, Hong Kong, India, Ireland, Latvia, Lithuania, the Netherlands, Poland, Spain, Sweden, the UK, and the USA.

We wish to express our gratitude to the programme committee members, external reviewers, track chairs, and all the authors in particular for their excellent contributions of their work.

We would like to thank the International Advisory Committee, Gregory Wojtkowski, Wita Wojtkowski, and Henry Linger for their guidance. We also appreciate the work by the programme co-chairs, William Wei Song and Shenghua Xu; the organizing co-chairs, Changxuan Wan and Guoqiong Liao; the organizing vice-chairs, Bo Shen, Shumei Liao, and Yuansheng Zhong; the finance and registration chair, Jucheng Yang; the local arrangements chair, Shihua Luo; the publication
chair, Xiaofeng Du; and the publicity co-chairs, Joe Geldart and Juling Ding, who have done a great job putting together an excellent technical program.

Finally, but none the less, thanks to NSF China, Jiangxi Computer Society, and Jiangxi University of Finance and Economics for their sponsorship and support.

We hope that all of you will find the technical programme of ISD2009 to be interesting and beneficial to your research. We also hope that you enjoy your stay in Nanchang, with time to visit the plethora of historic and scenic locations, such as Tengwang Pavilion, Lushan Mountain, Shanqing Mountain, and leave with a memorable experience of China.

Beijing, China

Nanchang, China

Guoqing Chen

Qiao Wang
## Contents

### Part I  Enterprise Systems – A Challenge for Future Research and Improved Practice

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CbSSDF and OWL-S: A Scenario-Based Solution Analysis and Comparison</td>
<td>3</td>
</tr>
<tr>
<td>Xiaofeng Du, William Wei Song, and Malcom Munro</td>
<td></td>
</tr>
<tr>
<td>Enterprise Systems in a Service Science Context</td>
<td>15</td>
</tr>
<tr>
<td>Anders G. Nilsson</td>
<td></td>
</tr>
<tr>
<td>A Petri Net-Based Software Process Model for Developing Process-Oriented Information Systems</td>
<td>27</td>
</tr>
<tr>
<td>Yu Li and Andreas Oberweis</td>
<td></td>
</tr>
<tr>
<td>Modern Enterprise Systems as Enablers of Agile Development</td>
<td>41</td>
</tr>
<tr>
<td>Odd Fredriksson and Lennart Ljung</td>
<td></td>
</tr>
<tr>
<td>Patterns-Based IS Change Management in SMEs</td>
<td>55</td>
</tr>
<tr>
<td>Janis Makna and Marite Kirikova</td>
<td></td>
</tr>
<tr>
<td>Applying Use Cases to Describe the Role of Standards in e-Health Information Systems</td>
<td>67</td>
</tr>
<tr>
<td>Emma Chávez, Gavin Finnie, and Padmanabhan Krishnan</td>
<td></td>
</tr>
<tr>
<td>Discussion on Development Trend of Chinese Enterprises Information System</td>
<td>77</td>
</tr>
<tr>
<td>Xiao-hong Gan</td>
<td></td>
</tr>
<tr>
<td>Asymmetrical Effects of Using Positive and Negative Examples on Object Modeling</td>
<td>85</td>
</tr>
<tr>
<td>Narasimha Bolloju, Christoph Schneider, and Doug Vogel</td>
<td></td>
</tr>
</tbody>
</table>

### Part II  IS/IT Project Management

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Case of Project-Based Learning Environment</td>
<td></td>
</tr>
<tr>
<td>Tero Vartiainen</td>
<td></td>
</tr>
</tbody>
</table>
Replacement of the Project Manager Reflected Through Activity Theory and Work-System Theory
Tero Vartiainen, Heli Aramo-Immonen, Jari Jussila, Maritta Pirhonen, and Kirsi Liikamaa

Integrating Environmental and Information Systems Management: An Enterprise Architecture Approach
Ovidiu Noran

Effective Monitoring and Control of Outsourced Software Development Projects
Laura Ponisio and Peter Vruggink

Classification of Software Projects’ Complexity
P. Fitsilis, A. Kameas, and L. Anthopoulos

Application of Project Portfolio Management
Malgorzata Pankowska

Part III  Human-Computer Interaction and Knowledge Management
Towards a Cost-Effective Evaluation Approach for Web Portal Interfaces
Andrina Granić, Ivica Mitrović, and Nikola Marangunić

IT Knowledge Requirements Identification in Organizational Networks: Cooperation Between Industrial Organizations and Universities
Peteris Rudzajs and Marite Kirikova

A Knowledge Tree Model and Its Application for Continuous Management Improvement
Yun Lu, Zhen-Qiang Bao, Yu-Qin Zhao, Yan Wang, and Gui-Jun Wang

On the Development of a User-Defined Quality Measurement Tool for XML Documents
Eric Pardede and Tejasvi Gaur

The Paradox of “Structured” Methods for Software Requirements Management: A Case Study of an e-Government Development Project
Kieran Conboy and Michael Lang

The Research for Knowledge Management System of Virtual Enterprise Based on Multi-agent
Yang Bo and Shenghua Xu
Part IV  Model-Driven Engineering in ISD

Problem-Solving Methods in Agent-Oriented Software Engineering  
Paul Bogg, Ghassan Beydoun, and Graham Low  
MORPHEUS: A Supporting Tool for MDD  
Elena Navarro, Abel Gómez, Patricio Letelier, and Isidro Ramos  
Towards a Model-Driven Approach to Information System Evolution  
Mohammed Aboulsamh and Jim Davies  
Open Design Architecture for Round Trip Engineering  
Miroslav Beličák, Jaroslav Pokorný, and Karel Richta  
Quality Issues on Model-Driven Web Engineering Methodologies  
F. J. Domínguez-Mayo, M.J. Escalona, and M. Mejías  
Measuring the Quality of Model-Driven Projects with NDT-Quality  
M.J. Escalona, J.J. Gutiérrez, M. Pérez-Pérez, A. Molina,  
E. Martínez-Force, and F.J. Domínguez-Mayo  
Aligning Business Motivations in a Services Computing Design  
T. Roach, G. Low, and J. D’Ambra  

Part V  Information Systems for Service Marketing and e-Businesses

CRank: A Credit Assessment Model in C2C e-Commerce  
Zhiqiang Zhang, Xiaoqin Xie, Haiwei Pan, and Qilong Han  
Towards Agent-Oriented Approach to a Call Management System  
Amir Nabil Ashamalla, Ghassan Beydoun, and Graham Low  
Design and Research on e-Business Platform Based on Agent  
L.Z. Li and L.X. Li  
Research of B2B e-Business Application and Development  
Technology Based on SOA  
Li Liang Xian  
Dynamic Inventory Management with Demand Information Updating  
Jian Liu and Chunlin Luo  
Analysis of Market Opportunities for Chinese Private Express  
Delivery Industry  
Changbing Jiang, Lijun Bai, and Xiaoqing Tong  

Part VI  Development of Information Systems for Creativity and Innovation

Explaining Change Paths of Systems and Software  
Development Practices  
Kari Smolander, Even Åby Larsen, and Tero Päivärinta
Designing a Study for Evaluating User Feedback on Predesign Models ........................................ 411
Jürgen Vöhringer, Peter Bellström, Doris Gälle, and Christian Kop

Study on the Method of the Technology Forecasting Based on Conjoint Analysis ........................................ 425
Jing-yi Miao, Cheng-yu Liu, and Zhen-hua Sun

Towards a New Concept for Supporting Needy Children in Developing Countries – ICT Centres Integrated with Social Rehabilitation ........................................ 437
Anders G. Nilsson and Thérèse H. Nilsson

An Investigation of Agility Issues in Scrum Teams Using Agility Indicators ........................................ 449
Minna Pikkarainen and Xiaofeng Wang

The Influence of Short Project Timeframes on Web Development Practices: A Field Study .......................... 461
Michael Lang

On Weights Determination in Ideal Point Multiattribute Decision-Making Model ........................................ 475
Xin-chang Wang and Xin-ying Xiao

Part VII Information Systems Engineering and Management

An Approach for Prioritizing Agile Practices for Adaptation ........................................ 485
Gytenis Mikulenas and Kestutis Kapocius

Effects of Early User-Testing on Software Quality – Experiences from a Case Study ........................................ 499
John Sören Pettersson and Jenny Nilsson

Development of Watch Schedule Using Rules Approach ........................................ 511
Darius Jurkevicius and Olegas Vasilecas

Priority-Based Constraint Management in Software Process Instantiation ........................................ 523
Peter Killisperger, Markus Stumptner, Georg Peters, and Thomas Stückl

Lise Tordrup Heeager and Gitte Tjørnehøj

A Framework for Decomposition and Analysis of Agile Methodologies During Their Adaptation ........................................ 547
Gytenis Mikulenas and Kestutis Kapocius
<table>
<thead>
<tr>
<th>The Methodology Evaluation System Can Support Software Process Innovation</th>
<th>561</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alena Buchalcevova</td>
<td></td>
</tr>
<tr>
<td>Index</td>
<td>573</td>
</tr>
</tbody>
</table>
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September 16–19, 2009

Organizer
School of Information Technology
Jiangxi University of Finance & Economics
Tel: +86-791-3983891
Fax: +86-791-3983891
Email: isd2009.jxufe@gmail.com  isd2009@jxufe.edu.cn
Conference Organization
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Wrycza Stanislaw, University of Gdansk, Poland
Xavier Costa Heitor Augustus, University Federal de Lavras, Brazil
Zarri Gian Piero, University Paris 4/Sorbonne, France
Zurada Jozef, University of Louisville, USA
Contributors

Mohammed Aboulsamh Oxford University Computing Laboratory, Oxford, UK, mohammed.aboulsamh@comlab.ox.ac.uk

L. Anthopoulos Technological Education Institute of Larissa, 41110 Larissa, Greece, anthopoulos@teilar.gr

Heli Aramo-Immonen Department of Industrial Management and Engineering, Tampere University of Technology, Pori, Finland

Amir Nabil Ashamalla School of Information Systems and Technology, University of Wollongong, Wollongong, NSW, Australia, ana462@uow.edu.au

Lijun Bai College of Information Management, Zhejiang Gongshang University, Hangzhou, China, blj@mail.zjgsu.edu.cn

Zhen-qiang Bao Information Engineering College, Yangzhou University, Jiangsu 225009, China

Miroslav Beličák Department of Software Engineering, Faculty of Mathematics and Physics, Charles University in Prague, Prague, Czech Republic, miroslav.belicak@mff.cuni.cz

Peter Bellström Department of Information Systems, Karlstad University, Karlstad, Sweden, peter.bellstrom@kau.se

Ghassan Beydoun School of Information Systems and Technology, University of Wollongong, Wollongong, NSW, Australia, beydoun@uow.edu.au

Yang Bo School of Information Management, Jiangxi University of Finance & Economics, Nanchang, China, yb_lh@126.com

Paul Bogg University of New South Wales, Sydney, NSW, Australia, paulb@unsw.edu.au

Narasimha Bolloju Department of Information Systems, City University of Hong Kong, Hong Kong, China, narsi.bolloju@cityu.edu.hk
Alena Buchalcevova Department of Information Technologies, University of Economics, Prague, Prague, Czech Republic, buchalc@vse.cz

Emma Chávez School of Information Technology, Bond University, Robina, Gold Coast, QLD, Australia; Departamento de Ing. Informática, Universidad Católica de la Ssma, Concepción, emchavez@bond.edu.au; echavez@ucsc.cl

Kieran Conboy Business Information Systems Group, J.E. Cairnes School of Business & Economics, NUI Galway, Ireland Department of Accountancy & Finance, National University of Ireland, Galway, Ireland, kieran.conboy@nuigalway.ie

J. D’Ambra The University of New South Wales, Sydney, NSW, Australia, j.dambra@unsw.edu.au

Jim Davies Oxford University Computing Laboratory, Oxford, UK, jim.davies@comlab.ox.ac.uk

F.J. Domínguez-Mayo University of Seville, Seville, Spain, fjdominguez@us.es

Xiaofeng Du Computer Science Department, University of Durham, Durham, DH1 3LE, England, UK, xiaofeng.du@durham.ac.uk

M.J. Escalona University of Seville, Seville, Spain, mjescalona@us.es

Gavin Finnie School of Information Technology, Bond University, Robina, Gold Coast, QLD, Australia, gfinnie@bond.edu.au

P. Fitsilis Technological Education Institute of Larissa, 41110 Larissa, Greece, fitsilis@teilar.gr

Odd Fredriksson Department of Information Systems, Karlstad University, Karlstad, Sweden, odd.fredriksson@kau.se

Doris Gälle Institute for Applied Informatics, Research Group Application Engineering, University of Klagenfurt, Klagenfurt, Austria, doris@ifit.uni-klau.ac.at

Xiao-hong Gan Information College, Jiangxi University of Finance and Economics, Nanchang 330013, China, xhg1596@163.com

Tejasvi Gaur Department of Computer Science and Computer Engineering, La Trobe University, Melbourne, VIC 3086, Australia, tgaur@students.latrobe.edu.au

Abel Gómez Department of Information Systems and Computation, Polytechnic University of Valencia, Valencia, Spain, agomez@dsc.upv.es

Andrina Granić Faculty of Science, University of Split, Split, Croatia, andrina.granic@pmfst.hr

J.J. Gutiérrez University of Seville, Seville, Spain

Qilong Han College of Computer Science & Technology, Harbin Engineering University, Harbin, China, hanqilong@hrbeu.edu.cn
Contributors

Lise Tordrup Heeager  Aalborg University, Aalborg, Denmark, liseh@cs.aau.dk

Changbing Jiang  College of Information Management, Zhejiang Gongshang University, Hangzhou, China, johncabin@mail.zjgsu.edu.cn

Darius Jurkevicius  Department of Information Systems, Faculty of Fundamental Sciences, Vilnius Gediminas Technical University, Vilnius, Lithuania, d.jurkevicius@isl.vgtu.lt

Jari Jussila  Department of Industrial Management and Engineering, Tampere University of Technology, Pori, Finland

A. Kameas  Hellenic Open University, 23 Sahtouri street, 26222 Patras, Greece, kameas@eap.gr

Kestutis Kapocius  Department of Information Systems, Kaunas University of Technology, Kaunas, Lithuania, kestutis.kapocius@ktu.lt

Peter Killisperger  Competence Center Information Systems, University of Applied Sciences, München, Germany; Advanced Computing Research Centre, University of South Australia, Adelaide, SA, Australia, peter.killisperger@siemens.com

Marite Kirikova  Department of Systems Theory and Design, Riga Technical University, Riga, Latvia, marite.kirikova@cs.rtu.lv

Christian Kop  Institute for Applied Informatics, Research Group Application Engineering, University of Klagenfurt, Klagenfurt, Austria, chris@ifit.uni-klu.ac.at

Padmanabhan Krishnan  School of Information Technology, Bond University, Robina, Gold Coast, QLD, Australia, pkrishna@bond.edu.au

Michael Lang  Business Information Systems Group, J.E. Cairnes School of Business & Economics, NUI Galway, Galway, Ireland Department of Accountancy & Finance, National University of Ireland, Galway, Ireland, michael.lang@nuigalway.ie

Even Åby Larsen  Department of Information Systems, University of Agder, Serviceboks 422, 4604 Kristiansand, Norway, even.larsen@uia.no

Patricio Letelier  Department of Information Systems and Computation, Polytechnic University of Valencia, Valencia, Spain, letelier@dsic.upv.es

Yu Li  Institute of Applied Informatics and Formal Description Methods (AIFB), Karlsruhe Institute of Technology (KIT), Universität Karlsruhe (TH), 76128 Karlsruhe, Germany, yu.li@aifb.uni-karlsruhe.de

L.Z. Li  Research Center of Cluster and Enterprise Development, Business School, Jiangxi University of Finance and Economic, Nanchang, China

L.X. Li  Research Center of Cluster and Enterprise Development, Business School, Jiangxi University of Finance and Economic, Nanchang, China, llx@jxufe.edu.cn
Kirs Liikamaa  Turku School of Economics, Pori Unit, Turku, Finland
Cheng-yu Liu  School of Management Science and Engineering, Shanxi University of Finance and Economics, Shanxi, China
Jian Liu  School of Information Management, Jiangxi University of Finance & Economics, Nanchang 330013, China, liujian3816@263.net
Lennart Ljung  Department of Project Management, Karlstad University, Karlstad, Sweden, lennart.ljung@kau.se
Graham Low  School of Information Systems, Technology and Management, University of New South Wales, Sydney, NSW, Australia, g.low@unsw.edu.au
Yun Lu  Subei People’s Hospital, College of Clinical Medicine, Yangzhou University, Jiangsu 225001, China, yzbzq@163.com
Chunlin Luo  School of Information Management, Jiangxi University of Finance & Economics, Nanchang 330013, China, chunlinluo@126.com
Janis Makna  Institute of Applied Computer Systems, Riga Technical University, Riga, Latvia, promis@apollo.lv
Nikola Marangunić  Faculty of Science, University of Split, Split, Croatia, nikola.marangunic@pmfst.hr
E. Martínez-Force  Consejería de Cultura, Junta de Andalucía, Seville, Spain
M. Mejías  University of Seville, Seville, Spain, risoto@us.es
Jing-yi Miao  School of Management Science and Engineering, Shanxi University of Finance and Economics, Shanxi, China; School of Management, Tianjin University, Tianjin, country, jingyimiao@126.com
Gytenis Mikulenas  Department of Information Systems, Kaunas University of Technology, Kaunas, Lithuania, gytenis.mikulenas@ktu.lt
Ivica Mitrović  Arts Academy, University of Split, Split, Croatia, ivica.mitrovic@umas.hr
A. Molina  Consejería de Cultura, Junta de Andalucía, Seville, Spain
Malcom Munro  Computer Science Department, University of Durham, Durham, NC, USA, malcolm.munro@durham.ac.uk
Elena Navarro  Department of Computing Systems, University of Castilla-La Mancha, Spain, elena.navarro@uclm.es
Anders G. Nilsson  Department of Information Systems, Karlstad University, Karlstad, Sweden, anders-nilsson@kau.se
Jenny Nilsson  Department of Information Systems, Karlstad University, Karlstad, Sweden, jenny.nilsson@msb.se
Thérèse H. Nilsson Universal Child Welfare Foundation (UCWF), Karlstad, Sweden, ucwfoundation@hotmail.com

Ovidiu Noran School of ICT, Griffith University, Nathan, QLD, Australia, o.noran@griffith.edu.au

Andreas Oberweis Institute of Applied Informatics and Formal Description Methods (AIFB), Karlsruhe Institute of Technology (KIT), Universität Karlsruhe (TH), 76128 Karlsruhe, Germany, oberweis@aifb.uni-karlsruhe.de

Tero Päiväranta Department of Information Systems, University of Agder, Serviceboks 422, 4604 Kristiansand, Norway, tero.paivarinta@uia.no

Haiwei Pan College of Computer Science & Technology, Harbin Engineering University, Harbin, China, panhaiwei@hrbeu.edu.cn

Malgorzata Pankowska Information Systems Department, University of Economics, Katowice, Poland, malgorzata.pankowska@ae.katowice.pl

Eric Pardede Department of Computer Science and Computer Engineering, La Trobe University, Melbourne, VIC 3086, Australia, e.pardede@latrobe.edu.au

M. Pérez-Pérez University of Seville, Seville, Spain

Georg Peters Department of Computer Science and Mathematics, University of Applied Sciences, München, Germany

John Sören Pettersson Department of Information Systems, Karlstad University, Karlstad, Sweden, john_soren.pettersson@kau.se

Minna Pikkarainen VTT, Technical Research Centre of Finland, VTT, Finland, minna.pikkarainen@vtt.fi

Maritta Pirhonen Department of Computer Science and Information Systems, University of Jyväskylä, Jyväskylä, Finland

Jaroslav Pokorný Department of Software Engineering, Faculty of Mathematics and Physics, Charles University in Prague, Prague, Czech Republic, jaroslav.pokorny@mff.cuni.cz

Laura Ponisio University of Twente, Twente, The Netherlands, ml@ponisio.com

Isidro Ramos Department of Information Systems and Computation, Polytechnic University of Valencia, Valencia, Spain, iramos@dsic.upv.es

Karel Richta Department of Software Engineering, Faculty of Mathematics and Physics, Charles University in Prague, Prague, Czech Republic, karel.richta@mff.cuni.cz

T. Roach The University of New South Wales, Sydney, NSW, Australia, t.roach@student.unsw.edu.au
Peteris Rudzajs Department of Systems Theory and Design, Riga Technical University, Riga, Latvia, peteris.rudzajs@rtu.lv

Christoph Schneider Department of Information Systems, City University of Hong Kong, Hong Kong, China, christoph.schneider@cityu.edu.hk

Kari Smolander Department of Information Technology, Lappeenranta University of Technology, P.O. Box 20, 53851 Lappeenranta, Finland, kari.smolander@lut.fi

William Wei Song Computer Science Department, University of Durham, Durham, NC, USA, w.w.song@durham.ac.uk

Thomas Stückl System and Software Processes, Siemens Corporate Technology, München, Germany

Markus Stumptner Advanced Computing Research Centre, University of South Australia, Adelaide, SA, Australia

Zhen-hua Sun School of Management Science and Engineering, Shanxi University of Finance and Economics, Shanxi, China

Gitte Tjørnehøj Aalborg University, Aalborg, Denmark, gtj@cs.aau.dk

Xiaoqing Tong Hangzhou University of Commerce, Zhejiang Gongshang University, Hangzhou, China, tongxiaoqing321@126.com

Tero Vartiainen Turku School of Economics, Pori Unit, Turku, Finland, tero.vartiainen@oulu.fi

Olegas Vasilecas Department of Information Systems, Faculty of Fundamental Sciences, Vilnius Gediminas Technical University, Vilnius, Lithuania, olegas@fm.vgtu.lt

Doug Vogel Department of Information Systems, City University of Hong Kong, Hong Kong, China, isdoug@cityu.edu.hk

Jürgen Vöhringer Institute for Applied Informatics, Research Group Application Engineering, University of Klagenfurt, Klagenfurt, Austria, juergen@ifit.uni-klu.ac.at

Peter Vruggink Logica, Amsterdam, The Netherlands, peter.vruggink@logica.com

Gui-jun Wang Information Engineering College, Yangzhou University, Jiangsu, 225009, China

Yan Wang Subei People’s Hospital, College of Clinical Medicine, Yangzhou University, Jiangsu, 225001, China

Xiaofeng Wang Lero, The Irish Software Engineering Research Centre, Limerick, Ireland, xiaofeng.wang@ul.ie
Xin-chang Wang Information School of Jiangxi University of Finance & Economics, Mathematics and Application Mathematics Department of Jinggangshan University, Jiangxi, China; Mathematics and Application Mathematics Department, Jinggangshan University, Jiangxi, China, wangxinchang11@163.com

Xin-ying Xiao Foreign Languages school, Jinggangshan University, Jiangxi, China, xxinying@163.com

Xiaoqin Xie College of Computer Science & Technology, Harbin Engineering University, Harbin, China, xiexiaoqin@hrbeu.edu.cn

Shenghua Xu School of Information Management, Jiangxi University of Finance & Economics, Nanchang, China, shenghua.xu@jxfe.edu.cn

Zhiqiang Zhang College of Computer Science & Technology, Harbin Engineering University, Harbin, China, zqzhang@hrbeu.edu.cn

Yu-qin Zhao Information Engineering College, Yangzhou University, Jiangsu 225009, China, lanyuzyq@163.com
Part I

Enterprise Systems – A Challenge for Future Research and Improved Practice
CbSSDF and OWL-S: A Scenario-Based Solution Analysis and Comparison

Xiaofeng Du, William Wei Song, and Malcom Munro

Abstract To tackle the semantic issues of web services, we proposed a comprehensive semantic service description framework – CbSSDF – and a two-step service discovery mechanism based on CbSSDF to help service users to easily locate their required services. In this chapter, we evaluate the framework by comparing it with OWL-S to examine how the proposed framework can improve the efficiency and effectiveness of service discovery and composition. The evaluation is done through analysing the different solutions proposed based on these two frameworks for achieving a series of tasks in a scenario.

Keywords Semantic web services · Concept graph · Service description · OWL-S · Semantic match

1 Introduction

In the last decade, enormous research effort of web services has been spent on service description, discovery [10, 11], and composition [1, 4]. In order to effectively and efficiently perform web service discovery and composition, a comprehensive service description framework is essential. There are several semantic service description frameworks that have been proposed to provide richer service descriptions, such as OWL-S [8], WSDL-S [2], and WSMF [7], to address the semantic issue of web services. The main idea behind the existing work is to build a semantic layer either on the top of WSDL or to be integrated into WSDL to semantically describe the capabilities of web services. By having the semantics, a software agent or other services can reason about what a web service’s capabilities are and how to interact with it. However, as we mentioned in [5], there are still some problems
that remain in the current semantic service description and search, such as insufficient usage context information, precisely specified requirements needed to locate services, and insufficient information about inter-service relationships.

To tackle the problems, in our previous work [5], we proposed a context-based semantic service description framework (CbSSDF) and a two-step service discovery mechanism to improve the flexibility of service discovery and the correctness of generated composite services. In our recent work [6, 12], we improved the CbSSDF to address more sufficient context information in service descriptions. The context information addressed in the framework is the information that can help to understand the usage of a service and the relationship between the service and other services, so-called service usage context (SUC). By considering the SUC information of services, service discovery can be much more flexible and the service composition process can be simplified.

The main purpose of the chapter is to evaluate the framework by comparing it with OWL-S to examine how the proposed framework can improve the efficiency and effectiveness of service discovery and composition. The evaluation is done through analysing the different solutions proposed based on these two frameworks for achieving a series of tasks in a scenario. The reason we choose OWL-S is that it is the most well known and mature semantic web service description framework and also has been submitted to the World Wide Web Consortium (W3C) for assessment to be a standard.

2 Summary of the Context-Based Semantic Service Description Framework

As discussed previously in [5, 6, 12], to fully describe a service, we must address how the service is related to other services and entities in a business domain and under which context the service should be used. The potential relationship between a service and the other services and entities in a business domain is called service usage context (SUC), which we consider as an important aspect of service description. At a conceptual level, SUC is the conceptual relationships between a service concept and other concepts in a business domain, including other service concepts. At an instance level, SUC is the potential interactions between an instance service and other instance services at runtime. The concept of SUC forms the core of CbSSDF.

There are two layers of components in CbSSDF. The first layer is called service conceptual graphs (S-CGs) that represents the conceptual level SUC. The key point to have S-CGs in a service description is that they bridge the gap between the technical details of services and the conceptual explanations of service users’ needs. Normally the users (except the domain experts) are much more familiar to conceptual descriptions than stipulated technical information, such as the information addressed in WSDL. Each S-CG in CbSSDF captures a scenario that the described service can participate in so that it can be matched with service users’
usage scenarios to locate most suitable services. The conceptual graph formalism [13] is used to represent S-CG because (1) conceptual graph provides both flexible visual diagrams for service description and rigour logic expressions and (2) there are well-developed graph matching algorithms for deriving various relations between concepts and relations, such as conceptual graph projection.

The second layer is called semantic service description model (SSDM) that provides enriched semantic service description. SSDM addresses four types of semantics [3] associated with a service, which are data semantics, functional semantics, non-functional semantics, and execution semantics. The data semantics in SSDM is addressed through semantically annotated inputs and outputs. The functional semantics is captured by a service ontology and a set of pre-conditions and effects. The non-functional semantics is addressed through a set of service metadata. The execution semantics is addressed by a description of the internal structure of a service, which also indicates whether a service is a constituent of another service or a service contains a sequence of services.

Another important feature of SSDM is that it embeds the instance level SUC into service description, which can considerably improve the efficiency of service discovery and composition. The key component that addresses the instance level SUC is a set of common usage patterns (CUPs) [6]. Each CUP is a structure that describes how an instance service can be composed with other instance services in terms of semantic compatibility and data compatibility in achieving a task. The whole set of CUPs collectively represents how the instance service can interact/compose with other instance services in its business domain. Therefore, when an instance service is located, the service composition system can easily know which services are compatible with the located service rather than assuming that the services in the entire service repository are compatible and checking them one by one.

In CbSSDF, Defeasible Logic [9] is adopted as the rule language to describe pre-conditions and effect of services and other service composition rules [6]. Defeasible Logic is an implementation of non-monotonic logic, which provides the agile reasoning mechanism for highly dynamic environment and frequently changing conditions, such as the condition reasoning during service composition. The rules in the CbSSDF are divided into two categories: the general rules and the domain-specific rules. The general rules are used to govern and validate the service composition process. The domain-specific rules are used to describe the pre-conditions and effects of services and the business rules and policies in a specific business domain.

We also proposed an improved service discovery mechanism based on CbSSDF: a two-step service discovery mechanism [5]. The S-CGs in CbSSDF support the service search engine to locate services by concepts and conceptual relations, so in the first step what a service user needs to do is to describe his requirements or usage scenarios in natural language without worrying about any technical details. The search engine will first convert the natural language query into a CG and match with the S-CGs in the service repository to locate the query’s relevant services. The located services may or may not be the exact required services. However, it guarantees that these services are relevant to the user’s query. The second step is to refine