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Preface

This volume presents the proceedings of the workshops that were held in conjunction with the 13th International Conference on Service-Oriented Computing, which took place in Goa, India, November 16–19, 2015.

The workshops provide venues for specialist groups to meet, to generate focused discussions on specific subareas within service-oriented computing, and to engage in community-building activities. These events helped significantly enrich the main conference by both expanding the scope of research topics and attracting participants from a wider community.

The ICSOC 2015 workshop track consisted of seven workshops on a wide range of topics that fall into the general area of service computing:

- WESOA 2015: The 11th International Workshop on Engineering Service-Oriented Applications
- RMSOC 2015: The Second Workshop on Resource Management in Service-Oriented Computing
- ISC 2015: The Second Workshop on Intelligent Service Clouds
- DISCO 2015: The First International Workshop on Dependability Issues in Services Computing
- WESE 2015: Workshop on Engineering for Service-Oriented Enterprises
- BSCI 2015: The First International Workshop on Big Data Services and Computational Intelligence (joined with ISC 2015)
- FOR-MOVES 2015: The Second International Workshop on Formal Modeling and Verification of Service-based systems

The workshops were held on November 16, 2015. Each workshop had its own chairs and Program Committee who were responsible for the selection of papers. The overall organization for the workshop program, including the selection of the workshop proposals, was carried out by Alex Norta, Walid Gaaloul, and G.R. Gangadharan.

We would like to thank the workshop authors, as well as keynote speakers and workshop Organizing Committees, who together contributed to this important aspect of the conference.

We hope that these proceedings will serve as a valuable reference for researchers and practitioners working in the service-oriented computing domain and its emerging applications.

March 2016

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Walid Gaaloul
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Engineering Service-Oriented Applications (WESOA 2015)

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Resource Management in Service-Oriented Computing (RMSOC 2015)

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Intelligent Service Clouds (ISC 2015)

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Dependability Issues in Services Computing (DISCO 2015)

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Workshop on Engineering for Service-Oriented Enterprises (WESE 2015)

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Big Data Services and Computational Intelligence (BSCI 2015)

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Patrick Hung  University of Ontario Institute of Technology, Canada
Suzanne McIntosh  Cloudera Inc. and New York University, USA
Vaskar Raychoudhury  Indian Institute of Technology Roorkee, India

Formal Modeling and Verification of Service-Based Systems (FOR-MOVES 2014)

Hanifa Boucheneb  Montreal Polytechnic, Montréal, Canada
Kais Klai  LIPN, University of Paris 13, France
Workshop Introductions
Introduction to the 11th International Workshop on Engineering Service-Oriented Applications (WESOA’15)

George Feuerlicht\textsuperscript{1,2,3}, Winfried Lamersdorf\textsuperscript{4}, Guadalupe Ortiz\textsuperscript{5}, and Christian Zirpins\textsuperscript{6}

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The Workshop on Engineering Service Oriented Applications (WESOA) focuses on core service software engineering issues and at the same time keeps pace with new developments such as methods for engineering of cloud services. Our aim has been to facilitate evolution of new concepts in service engineering research across multiple disciplines and to encourage participation of researchers from academia and industry, providing a common platform for exchange of ideas between these groups. Over the past eleven years WESOA has been able to attract high-quality contributions across a range of service engineering topics. The 11th Workshop on Engineering Service Oriented Applications (WESOA’15) was held at the Goa University, in Goa, India on 16 November 2015. The ICSOC workshop day at the Goa University included keynotes by Richard Hull from IBM Research, Aditya Ghose from University of Wollongong and Guido Governatori from NICTA. The WESOA technical sessions included six research papers. Each paper submission was reviewed by at least three reviewers with the following papers accepted for presentation at the workshop and publication in the ICSOC’2015 Workshop Proceedings: All the Services Large and Micro: Revisiting Industrial Practice in Services Computing by Gerald Schermann, Jurgen Cito, and Philipp Leitner, From Choreography Diagrams to RESTful Interactions by Adriatik Nikaj, Sankalita Mandal, Cesare Pautasso, and Mathias Weske, A Web Services Infrastructure for the Management of Mashup Interfaces by Jesús Vallecillos Ruiz, Javier Criado, Antonio Jesús Fernández-García, Nicolás Padilla, and Luis Iribarne, Establishing Distributed Governance Infrastructures for Enacting Cross-Organization Collaborations by Alex Norta, Distributed Service Co-evolution based on Domain Objects by Martina De Sanctis, Kurt Geihs, Antonio Bucchiarone, Giuseppe Valetto, Annapaola Marconi, Marco Pistore, and Fondazione Bruno Kessler, and Estimating the Complexity of Software Services using an Entropy based Metric by George Feuerlicht and David Hartman.
Workshop Organizers

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Acknowledgements

The organizers of the WESOA’15 workshop wish to thank all authors for their contributions to this workshop and members of the program committee whose expert input made this workshop possible. Finally, we acknowledge the support of the ICSOC’15 workshop chairs Walid Gaaloul, Alex Norta, and G.R. Gangadharan.
Introduction to the 2nd Workshop on Resource Management in Service-Oriented Computing (RMSOC) 2015

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1 Preface

The Second Workshop on Resource Management in Service-Oriented Computing (RMSOC) was held in conjunction with the 13th International Conference on Service-Oriented Computing (ICSOC’15) and as part of a joint session with the Intelligent Service Clouds (ISC) and the Big Data Services and Computational Intelligence (BSCI) workshops in Goa, India.

The goal of RMSOC was to devise a holistic vision of resource management in Service-Oriented Computing through the analysis of multiple perspectives from several research communities. These perspectives range from the management of human resources in intra-organizational processes in the context of Business Process Management (BPM) to the distribution of work in crowdsourcing scenarios to the management of networked components in the field of Cyber-Physical Systems (CPS). For this reason, the workshop solicited contributions focused on the management of human and non-human resources in both intra- and inter-organizational scenarios. This included topics such as resource assignment, planning, analysis, visualization or composition, amongst others.

After a thorough peer-review process conducted by the workshop’s Program Committee, three papers were selected as representative of the multi-perspective approach the workshop aimed at. Following is a brief overview of the contributions.

The full research paper “Extending Generic BPM with Computer Vision Capabilities” by Adrian Mos, Adrien Gaidon and Eleonora Vig presents an approach to enrich business process models with computer vision (CV) capabilities so that cameras are used as resources in the process and the information provided by them is transformed into actionable data for BPM. The approach involves a CV engine where

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1 https://ai.wu.ac.at/rmsoc2015/.
various CV patterns such as car detectors are individually described and composed on-the-fly for any business process.

The full research paper “S-PDH: A CPS Service Contract Framework for Composition” by Lie Ye, Kaiyu Qian and Liang Zhang presents a framework for the composition of Cyber-Physical Systems (CPS) based on three-level service contracts, namely, the physical property contract, the dynamic physical behaviour contract, and the hybrid system behaviour contract. This framework enables the compatibility checking of the different resources that compose the CPS.

The full research paper “Towards RAM-Based Variant Generation of Business Process Models” by Ahmed Tealeb, Ahmed Awad and Galal Galal-Edeen deals with the problem of generating variants of a business process that come from changes in their organizational perspective. In particular, the authors use Resource Assignment Matrices (RAMs) as the model in which changes are introduced and present several algorithms to generate consistent process model variants caused by adaptations in them.

We sincerely thank the Program Committee Members of the RMSOC 2015 workshop for their time and support throughout the reviewing process.

_Cristina Cabanillas, Alex Norta, and Manuel Resinas_  
_RMSOC 2015 Workshop Chairs_

## 2 Organization Details

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- **Antonio Ruiz-Cortés**  
  University of Seville, Spain
- **Anderson Santana**  
  SAP, France
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Stefan Schulte  Vienna University of Technology, Austria
Mark Strembeck  Vienna University of Economics and Business, Austria
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Introduction to the Proceedings of the Workshop on Engineering for Service-Oriented Enterprise (WESE) 2015

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1 Introduction

The Workshop on Engineering for Service-oriented Enterprise (WESE) is set up as a one-day event in such a way that it attracts academics and practitioners. WESE 2015 is co-located with the ICSOC 2015 conference in Goa, India.

Present day enterprises often become service-oriented enterprises, which are comprised of a dynamic network of organizations that collectively provide services. In this context, we define a service as a self-contained unit of functionality that establishes a meaningful value to enterprises such as service performance, service customer, service producer, service delivery, etc.

Moreover, service-oriented enterprises need to negotiate many challenges, such as changes in the economic climate, mergers, acquisitions, innovation, novel technologies, and regulations. This involves enterprise transformation addressing digital transformation issues which are related to stakeholders’ experience, technology in process integration and new digitally-modified business models.

Enterprise engineering is the general term for an engineering based approach to architect, transform or develop service-oriented enterprises. Enterprise engineering is based on rationales of how an enterprise wants to use its organizational socio-technical systems, such as business processes and information systems.

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 enterprise engineering. The workshop attracted in total 9 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. At the end, we decided to accept 4. Papers 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, hopefully, in the next WESE event.

Khaled Gaaloul
Imed Boughzala
Wided Guedria
Olfa Chourabi
WESE 2015 Workshop chairs
Introduction to the Proceedings of the Workshop on FORmal MOdeling and VErification of Service-Based Systems (FOR-MOVES) 2015

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1 Introduction

The Second workshop on Formal Modeling and Verification of Service-based systems (FOR-MOVES) 2015 was held in conjunction with the ICSOC’15 conference in Goa, India. During the few last years the use of formal approaches for the modeling and the verification of service-based processes is increasingly widespread. On the one hand, formal modeling allows one to define unambiguous semantics for the languages and protocols used for the specification of service oriented systems. On the other hand, formal verification approaches are popular means of checking the correctness properties of these applications, such as safety, liveness, QoS requirements and security. Thus, the aim of FOR-MOVES workshop was to provide a venue for the presentation and discussion of new ideas and work in progress in formal modeling and verification methods, in the field of Service Oriented Computing (SOC). This year, the Workshop Program Committee Members selected two full papers after a thorough peer-review (four reviewers per paper). Following is a brief overview of the contributions.

The full research paper with the title “Toward the formalization of BPEL”, by authors Laila Boumlik and Mohamed Mejri, deals with the formalisation using process algebra of a fragment of BPEL. BPEL is considered as an important standard language for web services orchestration. However, many of its features are complex and source of a large misunderstanding due to the absence of formalization. The formalisation of BPEL is a mandatory step for automatic modelling and verification of BPEL Web services.

The full research paper with the title “Expressive Equivalence and Succinctness of Parametrized Automata with respect to Finite Memory Automata”, by authors Tushant Jha, Walid Belkhir, Yannick Chavalier and Michael Rusinowitch, deals with the comparison of two formalisms parametrized automata, proposed by the authors, and a class of finite memory automata used to model services. It proves that both classes have the same expressive power, while parametrized automata can be exponentially succinct
for some languages and that simulation preorder over parametrized automata is EXPTIME-complete.

We sincerely thank the Program Committee Members of the FOR-MOVES 2015 workshop for their time and support throughout the reviewing period.
Introduction to the Proceedings
of the Workshop on Intelligent Service Clouds
(ISC) 2015

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1 Introduction

The Second Workshop on Intelligent Service Clouds (ISC) 2015 was held in conjunction with the ICSOC’15 conference in Goa, India. The workshop followed the increasing interest in big data, cloud, analytics services, cyberphysical systems and rich combinations with human driven services. The goal of the workshop was to provide a platform for exploring this exciting landscape and the new challenges in the context of intelligent service clouds. It aimed at bringing together researchers from various communities interested in the challenges. We solicited contributions that study fundamental as well as practical aspects. At the fundamental, solution side we sought approaches that study adequate service models addressing the above characteristics, mechanisms for specification, discovery, composition, delivery and scaling of intelligent cloud services, data, computational-, security- and privacy aspects of analytics services, and cloud environments for analytics services, and address specific technical intelligent service-oriented cloud solutions, e.g., analytics; mining, visualization; self-management; security; trust mechanisms; collaboration mechanisms. At the practical, problem side we were interested in case studies in which intelligent service-oriented cloud computing technologies are applied in socio-technical systems/processes like smart logistics, smart manufacturing, healthcare, commerce, public administration, etc. The ISC’15 workshop was a direct successor of the full day first Workshop on Intelligent Service Clouds ISC 2015 which we organized in conjunction with ICSOC 2014, and the full day first Workshop on Pervasive Analytical Service Clouds for the Enterprise and Beyond which we organized in conjunction with ICSOC 2013.

Two full ISC-workshop papers were selected after a thorough peer-review by the Workshop Program Committee Members. Following is a brief overview of the contributions.

The full research paper with the title ‘Context-Aware Personalization for Smart Mobile Cloud Services’ by authors Waldemar Hummer and Stefan Schulte focuses on
the ability of context-aware applications to offer personalized cloud services to support
context-aware applications. The proposed solution is based on a three-phase approach
with context change analysis, context state management, and context-triggered adap-
tation actions. The authors use an illustrative scenario from the connected car domain,
and they introduce a system model and an approach for context-based personalization
of mobile services.

The full research paper with the title ‘Information governance requirements for
architectural solutions supporting dynamic business networking’ by authors Moham-
mad R. Rasouli, Rik Eshuis, Jos J.M. Trienekens and Paul W.P.J. Grefen is a study of
architectural solutions for emerging information governance requirements in dynamic
business networks. While in the previous research several different architectural
solutions have been developed, in this paper the authors investigate the extent to which
the emerging information governance requirements in dynamic business networks are
covered by the developed architectural solutions. The main findings indicate that some
further developments are needed to enhance information governance requirements,
particularly in emerging customer centric business networking scenarios.

We sincerely thank the Program Committee Members of the ISC 2015 workshop
for their time and support throughout the reviewing period.

Roman Vaculin
Alex Norta
Rik Eshuis
ISC 2015 Workshop Chairs
Introduction to the Proceedings of the First International Workshop on Dependability Issues in Services Computing (DISCO) 2015

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1 Introduction

The First International Workshop on Dependability Issues in Services Computing (DISCO) was held on November 16, 2015, in conjunction with ICSOC 2015 conference in Goa, India. As the name suggests, the workshop was organized to create awareness and share research ideas about dependability issues within the service oriented computing research community. While service-oriented computing is becoming mature and new generation of services are spawning everyday, the need for dependability is becoming even more critical. Recent paradigms of mobile computing, cloud services and Internet of Things offer ubiquitous and large-scale computing services as a utility. The concomitant complexity of these new service-oriented computing environments makes them prone to unexpected failure. Mitigating the effects of such failures via proactive and reactive approaches falls under the purview of dependability. In general, dependability is an umbrella concept that encompasses attributes such as reliability, availability, performability, survivability, safety, integrity, and maintainability. Security related concepts such as confidentiality, availability and integrity can also be brought under the dependability framework. DISCO 2015 workshop was planned keeping in mind the researchers and practitioners whose expertise fall in the intersection of service oriented computing and dependability computing. However, the participation of the audience and their enthusiastic interactions during the day of the workshop proved that the appeal of the workshop reached out to broader services community. Presence of academic faculty members, industry researchers and PhD students from India, Europe and the US made the workshop event truly global. Four full papers were selected after a thorough peer-review by the workshop program committee members. We sincerely thank the program committee members of the DISCO 2015 workshop for their time and support throughout the reviewing period. We also thank all the authors for their contributions and summarize the papers here.
The paper titled ‘On Composition of Checkpoint and Recovery Protocols for Distributed Systems’ authored by Soumi Chattopadhyay, Ansuman Banerjee and Himadri Sekhar Pal focuses on checkpoint based rollback recovery protocols that are used to increase fault tolerance of critical distributed applications. The authors model the composition of protocol and check whether such composition is consistent with recovery. The specific protocols that are used for such protocols are: (1) coordinated checkpointing and recovery, (2) receiver-based pessimistic message log-based recovery, and (3) quasi-synchronous checkpointing protocol. The authors prove that that after rollback, the states of the processes are consistent with respect to each other.

The paper titled ‘Safe Configurations of Replica Voting Processes in Fault-resilient Data Collection Services’ authored by Kaliappa Ravidran and Arun Adiththan addresses the challenge of enforcing safe configurations of a replica voting system, when environmental factors change dynamically. Although the authors limit the scope of their paper for data collection by sensor devices, approaches proposed in the paper can be applied to broad variety of distributed settings. The authors present an analytical model to describe the performance of voting systems in presence of voter failures to deliver the data. Numerical results from model evaluation quantify the influence of the device redundancy on the Quality of Service achieved.

The paper titled ‘A Proactive Solution to Manage Web Service Unavailability in Service Oriented Software Systems’ authored by Navinderjit Kaur Kahlon, Salil Vishnu Kapur, Kuljit Kaur Chahal, Sukhleen Bindra Narang presents a framework to manage the availability of web services. Key components of the proposed framework are workflow manager, service manager, service listener and service repair module. Experimental results are show to demonstrate how the adaptation process of proactive framework get triggered when a web service becomes unavailable at the service provider side.

The paper titled ‘A Reusable Architecture for Dependability and Performance Benchmarking of Cloud Services’ authored by Amit Sangroya and Sara Bouchenak propose a generic software architecture for dependability and performance benchmarking for cloud computing services. While there are existing approaches to evaluate the performance and reliability of Cloud services, a benchmark essential standardizes the process of such evaluation. The authors present different phases for such benchmarking and evaluate the performance of the proposed tool for several use cases. The proposed tool can also be used during the design phase of the Cloud services to quantify the dependability and performance of a given architecture.

Rahul Ghosh
Javier Alonso Lopez
Jogesh K. Muppala
DISCO 2015 Workshop Chairs
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