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Service-Oriented Computing

ICSOC/ServiceWave 2009 Workshops

International Workshops
ICSOC/ServiceWave 2009
Stockholm, Sweden, November 23-27, 2009
Revised Selected Papers

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Preface

This volume contains the proceedings of the scientific workshops that were held in conjunction with the 2009 International Conference on Service Oriented Computing/ServiceWave, held on November 24–25, 2009 in Stockholm, Sweden. Such satellite events traditionally play a key role in stimulating active exchange and interaction related to the conference topics.

This year, the scientific program was particularly rich and addressed various challenging research issues. The selected scientific workshops were organized around the following three main tracks:

Business Models and Architectures Track. The Business Models and Architectures Track Focused on the overall modern enterprise. The ability to react quickly to ongoing changes in the marketplace or customer requirements is one of the biggest challenges facing businesses. The three workshops in this track addressed different, yet complementing, facets of the problem. TEAR focused on aligning the enterprise architecture with its business models: adapting the IT infrastructure and changing applications so that they optimally support the new business needs. GLOBALIZATION (SG-PAW) looked at enacting the new business processes by encapsulating organizational work as services that can be combined in new ways, optimizing end-to-end operations across geographical, organizational, and cultural boundaries. Finally, SOC-LOG focused on addressing the challenges of a specific application domain, namely logistics, through developing SOC-based solutions and examining aspects of knowledge management, while bringing together researchers from different, though overlapping, areas (logistics/supply chain management and service-oriented computing/systems).

Service Quality and Service Level Agreements Track. Ensuring quality poses new challenges to service engineering, delivery, and evolution. This track included two workshops that approach this challenge from two complementary perspectives. The first workshop, NFPSLAM-SOC, focused on research problems around models, concepts, languages, and methodologies that enable the specifications of non-functional properties and service level agreements in the context of service-oriented computing, with a special focus on transparent, multi-level, and holistic NFP and SLA management of service-oriented systems. The workshop MONA+ concentrated on the problems related to the monitoring and adaptation mechanisms and strategies, with a special focus on the relations and interdependencies between the network layer and the service layer.

Service Engineering Track. With the wide adoption of SOA, there is an increasing need for comprehensive engineering principles, methodologies, and tools to support the entire software development lifecycle of service-oriented applications. This track included two workshops addressing this challenge.

WESOA 2010 focused on specific aspects of Software Service Engineering (SSE) and aimed at facilitating the exchange and evolution of ideas on SSE topics across multiple disciplines. The UGS 2009 workshop focused on user-centric approaches. It explored research and development approaches which empower end-users to participate in the generation, combination, and adaption of services to create functionality and solve problems in their work.

June 2010

Asit Dan
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Workshops Chairs
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Introduction to the 4th Workshop on Trends in Enterprise Architecture Research (TEAR 2009)

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Abstract. On Nov 23rd, 2009 the 4th Workshop on Trends in Enterprise Architecture Research (TEAR2009) is held in the "Business Models and Architecture" workshop track of the 7th International Conference on Service Oriented Computing (ICSOC 2009), which takes place Nov. 24–27, 2009.

1 Introduction

Although the field of enterprise architecture (EA) has gained more and more attention in the previous couple of years, it is still immature. The understanding of the term enterprise architecture is diverse in both practitioner and scientific communities. Regarding the term architecture, most agree on the ANSI/IEEE Standard 1471-2000, where architecture is defined as the "fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution." For enterprise architecture the focus is on the overall enterprise. In contrast to traditional architecture management approaches like IT architecture, software architecture, or IS architecture, EA explicitly incorporates "pure" business-related artifacts in addition to traditional IS/IT artifacts.

EA is important because organizations need to adapt increasingly quickly to changing customer requirements and business goals. This need influences the entire chain of activities of an enterprise, from business processes to IT support. Moreover, a change in a particular architecture may influence other architectures. For example, when a new product is introduced, business processes for production, sales, and after-sales need to be adapted. It might be necessary to change applications, or even adapt the IT infrastructure. Each of these fields will have its own architectures. To keep the enterprise architecture coherent and aligned with the business goals, the relations between these different architec-

tures must be explicit, and a change should be carried through methodically in all architectures.

In previous years the emergence of service-oriented design paradigms (e.g., service-oriented architecture, SOA) contributed to the relevance of EA. The need to design services along business processes forced companies to pay more attention to business architectures. The growing complexity of existing application landscapes led to increased attention to application architectures at the same time. To better align business and IS architectures a number of major companies started to establish EA efforts after introducing SOAs.

Until recently, practitioners, consulting firms and tool vendors have been leading in the development of the EA discipline. Research on EA has been taking place in relatively isolated communities. The main objective of this workshop series is to bring these different communities of EA researchers together and to identify future directions for EA research, with special focus on service-oriented paradigms. An important question in that respect is what EA researchers should do, as opposed to EA practitioners.

2 Contributions

Building on its great success in previous years, the 4$^{\text{th}}$ Workshop on Trends in Enterprise Architecture Research (TEAR 2009) is held in the "Business Models and Architecture" workshop track of the 7$^{\text{th}}$ International Conference on Service Oriented Computing (ICSOC 2009) in Stockholm on November 23, 2009. The TEAR 2009 call for papers attracted 15 submissions. A total of 7 papers passed the review process successfully, resulting in a 46.6 % acceptance rate.

Accepted papers reflect the developments in the field of enterprise architecture as outlined in the introduction.

The papers of the first session highlight current discussions on future directions for EA as a research field. First, Sabine Buckl, Florian Matthes, and Christian Schweda give an overview on recent EA management approaches with their paper "Future Research Topics in Enterprise Architecture Management—A Knowledge Management Perspective." They take this perspective to identify gaps in current approaches and propose future research topics for the area of EA management. Dirk Stelzer takes a different approach in his review of current approaches and focuses on "Enterprise Architecture Principles: Literature Review and Research Directions." In his analysis he shows that business principles, IT principles, and EA principles are often mixed up and that research into generic design principles is still in its infancy. He concludes with conceptual foundations and guidance for further research in this field. Finally Sebastian Klöckner and Dominik Birkmeier employ a third perspective in their analysis "Something is Missing: Enterprise Architecture from a Systems Theory Perspective." In their paper they interpret enterprises as socio-technical systems and therefore choose a systems theory perspective. The authors analyze which features and aspects are necessary for a comprehensive model. They show that especially human actors, as the most flexible and agile elements of enterprises, are not adequately included

in current architectures, presenting the first ideas for integrating this aspect into EA. They also show the corresponding implications of such an inclusion, as well as several areas of further research.

The papers in the second session concentrate on current practices in EA in enterprises, especially in implementing EA. First, Joachim Schelp and Stephan Aier present "A Reassessment of Enterprise Architecture Implementation." After a summary of the current state of the art in research and practice, they ask why EA seems to be successful in some organizations while it is not in others that also have notations, models, methods, and even dedicated EA tools. In order to understand these differences, they analyze the development of EA in six companies over the last eight years and show that apart from formal structure and processes (1) training and education of architects and non-architects, (2) improving architects' communication skills, (3) intensifying EA representation in projects, and (4) tool support (not replacements with tools), can significantly contribute to long-term EA success. Then Marlies Van Steenbergen, Jurjen Schipper, Rik Bos, and Sjaak Brinkkemper present "The Dynamic Architecture Maturity Matrix: Instrument Analysis and Refinement" as an instrument to improve the effectiveness of EA teams. In the past this approach has been applied to many architecture practices to assess their architecture maturity level. They present an analysis of these assessments and give an overview of common strengths and weaknesses in current architecture practices. Finally, Steffen Kruse, Jan Stefan Addicks, Matthias Postina, and Ulrike Steffens focus on EA tool aspects with their paper "Decoupling Models and Visualisations for Practical EA Tooling." While customized modeling solutions provide scalability, adaptability, and flexibility, they are often in conflict with generic or reusable visualizations. The authors present an approach to augment customized modeling with the techniques of model transformations and higher-order transformations to provide flexible and adaptable visualizations with a minimum of requirements for the underlying enterprise models. They detail their approach with a proof-of-concept implementation, showing how a decoupling can ease EAM approaches and provide appropriate tooling in practice.

The final paper, which is placed in the joint session with the SIG-PAW workshop on service-oriented architectures, is presented by André Miede, Nedislav Nedyalkov, Dieter Schuller, Nicolas Repp, and Ralf Steinmetz. Their paper "Cross-organizational Security—The Service-Oriented Differences" focuses on questions of security architectures in cross-organizational collaboration scenarios. While there is an active research community for SOA security, common literature on the topic has not yet identified the influence of the SOA paradigm on security aspects in a structured manner, especially in an enterprise context. In their paper, they contribute to this goal by identifying the main elements of cross-organizational SOA in the form of a conceptual model and by discussing these elements regarding their impact on security issues. Based on this, they define and structure important research challenges for SOA security. All contributions reflect that EA as a research field is still in its infancy. However, it is evolving and the maturity of the individual research approaches is intriguing.

The contributions show that a single research approach to EA would not be sufficient, but that the diversity of research approaches is a key to investigate in the variety of aspects in this interdisciplinary topic—for the benefit of both research and practice.

3 Program Committee

The Program Committee members and reviewers each deserve credit for the excellent final program that resulted from the diligent review of the submissions. The organizing members of the program committee would like to thank all of them and especially all authors submitting contributions to the TEAR workshop series.

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Stephan Aier, Joachim Schelp, Marten Schönherr

First International Workshop on SOA, Globalization, People, and Work (SG-PAW): Current State of Affairs and Future Research Directions

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Introduction

On November 23, 2009, the First International Workshop on SOA, Globalization, People and Work (SG-PAW) was held as part of the 7th International Conference on Service Oriented Computing (ICSOC 2009) in Stockholm, Sweden. The workshop focused on the problem of enabling an enterprise to leverage internal and external global services and combine them in new ways that optimize its end-to-end operations. The premise is that the SOA methodology is well suited to address this problem by encapsulating organizational work as services that can cross geographical, organizational, and cultural boundaries. The goal was to combine academics and practitioners to identify together core issues, research challenges, learn from successful attempts or approaches, and propose new formalisms, models, architectures, frameworks, methodologies, or approaches.

This workshop was the second of three half-day workshops in the Business Models and Architecture track. It was preceded by the 4th International Workshop on Trends in Enterprise Architecture Research (TEAR 2009) and followed by the First International Workshop on Service Oriented Computing in Logistics (SOC-LOG 2009). The organizers and many participants of both TEAR and SOC-LOG also attended this workshop, creating a valuable atmosphere for discussion with a broad context. Five papers were presented. This workshop ended in a collaborative discussion that included the organizers and participants from all three workshops. This discussion was facilitated by Richard Hull, and its output is presented in the workshop manifesto below.

Workshop Manifesto

The following list summarizes the key findings and recommendations made by this group.

Findings

1. **Process.** There is a fundamental tension between routine and free-form that stems from the desire for standardization, consistency and repeatability vs. the need to continuously evolve and adapt. Standardized processes can be executed routinely, yield predictable results, and lend themselves well to machine-automation. Examples of routine processes include using an ATM to withdraw money from a bank, or requesting a loan from a financial institution. But when unpredictable things happen, there can be a need for almost free-form agility to respond and adapt. This need to quickly modify how things are done occurs frequently in large projects, such as collaborative development of an airplane or a complex software system. Currently, adaptation is handled primarily through human creativity, expertise, and ability to improvise; the failure rate of such projects is very high. There is a need for a framework that would support both routine and free-form, not only during the process design, but especially during execution. The need for process flexibility during runtime also blurs the current separation between the activities of designing a process and performing a task, as both activities become an integral part of doing work.
2. **People.** The need for people as a requirement to ensure effective execution of enterprise processes is not sufficiently understood. Current process definitions address people by specifying roles that are required to execute a task. This approach considers people merely as resources that could, in theory, be replaced by automation. However, some types of processes must rely on people to execute effectively. Humans may be required for a variety of reasons, including to assess the complexity of the domain; to drive recovery when unexpected things happen; to resolve issues at runtime; or to negotiate and coordinate work across enterprise boundaries. Most business process management (BMP) frameworks do not address these different roles of people; nor do they adequately support teamwork around tasks or the creation and execution of dynamic service plans. There is no model of the human system that identifies the different types of actors, teams, or organizations, and that can be used to bring this together with current BPM practices.
3. **Globalization.** Globalization creates an ever-growing abundance of resources, innovation, and specialization. In order for businesses to harness those potential benefits, they require flexible frameworks into which they can plug-and-play relevant entities such as partners, suppliers, service providers, or resources.
4. **Models.** There is a need for capability-oriented models and languages that can address both the routine and the free-form in a uniform way. Beyond providing a well-defined starting point for enterprise-work, they will also provide a formalism that enables ongoing evolution and adaptation in response to new needs or unpredictable events, and do so in a way that can be supported by machines. Such models will have to address many elements of the problems, including business, process, data, IT, people, resources, and organization. Current disciplines tend to focus on a limited subset of these as-

pects; the challenge is to bring them together. BPM, for example, does not adequately support teamwork around tasks or the creation and execution of dynamic service plans. Enterprise architecture (EA) models use a layered approach to bridge the gap between the business and IT that does not adequately consider the role of people, process, or organization. Computer-supported collaborative work (CSCW) focuses on people, awareness, and distributed collaboration to enable cooperative work, but does not adequately connect this with process, data, or organization. Services-oriented computing (SOC) tends to focus on composable bite-size processes that can be executed by machines, but does not provide the flexibility required to scale and support complex cross-organizational work. BPEL4People and similar standards do not address the full scope of cross-enterprise work or the complex needs of humans in their various roles.

Recommended Research Areas

1. Exploring the new capabilities enabled by human flexibility, creativity, and communication patterns and integrating them systematically into BPM, SOA/SOC, EA, and CSCW.
2. A framework that allows us to understand the trade-offs between automated vs. free-form approaches, what should be done by machine and what by human, where flexibility and creativity is required vs. where not, and how to set up or re-engineer an enterprise with these tradeoffs in mind.
3. A model or theory of non-functional characteristics of people work, such as trust, reputation, or quality. What they are and how to measure them. This will be analogous to non-functional characteristics of SOA services or hardware components.
4. How to ease the understandability, use, and communication of knowledge-rich processes, operations, and services. This relates not only to pre-designed processes but also to dynamically created and/or customized business processes, and should enable non-IT people to take advantage of free-form processes.
5. Models of people, teams, and organizations. This will identify the different types of roles people play in cross-organizational work. It will also focus on issues specific to people, such as incentives, accountability, authority, trust, collaboration, productivity, or quality of output.
6. Relationship between process design and execution, especially when ongoing adaptation and transformation is required.
7. Models, methods, formalisms, and languages that focus on the role people play in the control and coordination of cross-enterprise collaboration in different domains.
8. Dynamic flow engines that can support such models and provide the flexibility required for runtime adaptation and evolution.
9. Adaptation, versioning, and evolution of processes, work, collaborating organizations and collaboration patterns.

10. Extending SOA formalisms and constructs to facilitate the definition, dispatch, and orchestration of work as services that can be carried out by and for organizations.
11. Context, data, and knowledge management as required for managing and coordinating work across organizations and their interrelationship with the domain data, tools, and processes.
12. IT, middleware, systems, tools, and frameworks that support cross-enterprise collaboration, and their relationship with current enterprise or domain-specific tools and IT.
13. Utilization of crowd sourcing and social computing paradigms for the coordination and/or execution of work and business processes that span across organizational boundaries.

Introduction to the First International Workshop on Service-Oriented Computing in Logistics (SOC-LOG)

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Logistics is of paramount importance for many industries: it plans and realizes the flow of goods from sources to destinations by means of transformations in space, time, and quantity. While existing logistics IT systems provide solid support for static, self-contained logistics systems, research on managing the logistics in supply chains, which are dynamically changing, is less advanced. Service-oriented computing (SOC) is a promising paradigm, which automates inter-organizational processes by loosely coupled software-based services. With the set of design principles, architectural models, concepts, and — last but not least — with its existing and growing set of standards, SOC promotes the adaptiveness of logistics systems and supply chains, a flexible and re-configurable provisioning along multiple supply chains, and their efficiency. The purpose of the First International Workshop on Service-Oriented Computing in Logistics (SOC-LOG 2009) is to present and discuss recent significant developments at the intersection of SOC and logistics systems/supply chain management, and to promote cross-fertilization and an exchange of ideas and techniques between these fields. The relation to ICSOC 2009 is that, on one hand, the conference addresses the core concepts such as interacting business processes, service composition, service operations, and quality of services, and on the other hand, would receive feedback, experiences, and requirements from a highly relevant application domain to validate and advance its current approaches. The focus of this workshop is the study and exploration of SOCs potential to solve coordination problems in logistics systems and supply chains. Specifically, open issues are related to, e.g., service description languages; discovery, composition and coordination of logistics services; negotiation and management of service-level agreements for logistics-service delivery; measuring the efficiency and effectiveness of logistics services. All submissions received were single-blind peer reviewed by at least two members of the international program committee. In total, we received nine submissions from five countries. Based on the review reports, we accepted five papers, an acceptance rate of 55.6%. We would like to thank the program committee members and authors for all of their hard work and participation in the lively workshop. We hope that SOC-LOG will help with the exchanging new ideas and with the networking and sharing of ideas. More information on SOC-LOG 2009 is available at http://soclog09.wifa.uni-leipzig.de/.

Introduction to the Third Workshop on Non-functional Properties and Service Level Agreements Management in Service-Oriented Computing (NFPSLAM-SOC 2009)

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The Third Workshop on Non-functional Properties (NFPs) and Service Level Agreements Management (SLAM) in Service-Oriented Computing was held on November 23, 2007 in Stockholm, Sweden in conjunction with the International Conference on Service Oriented Computing. The first edition of the workshop was organized at the ICSOC 2007, followed by the second edition at ECOWS 2008. The workshops constituted a series of successful forums, each with more than 30 participants and 12 paper presentations. The workshop aimed to bring together researchers and industry practitioners to foster a greater understanding of how the management of NFP and SLAs can assist businesses utilizing service-oriented architectures (SOA) as well as to investigate the resulting research issues. These issues were felt to be highly relevant due to the increasing popularity of SOA and the fact that while the foundations of SOA functionality are now well understood, non-functional properties are not. The workshop keynote was given by Paolo Traverso, whose talk, "From Software Services to a Future Internet of Services" provided a context for much of the work presented in the workshop papers. The talk focused on the core role of real services," in the Future Internet and the paradigm shift required to model, monitor, adapt, and compose such services. The talk has generated interesting discussions on what services are and how their properties, especially non-functional ones, are crucial to support future scenarios with a next generation of technological platforms. High-quality papers were submitted to the workshop, allowing nine papers to be accepted. These were arranged into two broad themes: Service Level Agreements (SLAs) and NFPs in service-related tasks. In the first theme, six papers were presented.

The paper "A Framework for Multi-level SLA Management" proposes a technical architecture for a multi-level SLA management framework. The core concepts of the framework include four different roles, three layers of business, software and infrastructure management, a service life-cycle model, and the conceptualization of basic data store and functional flows. The framework and architecture are evaluated on an open reference case supporting a retail chain scenario. The paper "Runtime Prediction of Service Level Agreement Violations for Composite Services" proposes an approach for predicting SLA violations at runtime, which uses measured and estimated facts (instance data of the composition or QoS of used services) as the input for a prediction model. The prediction model is based on machine learning regression techniques, and trained using historical process instances. The third contribution, "Using SLA Mapping to Increase Market Liquidity," discusses a solution that derives SLA templates from a large number of heterogeneous SLAs in the market, and, by using these templates instead of the original SLAs, facilitates SLA mapping (i.e., mapping of offers to requests). The approach is validated through simulation and comparison with alternative approaches in which SLAs are predefined. The paper "Translation of Service Level Agreements: A Generic Problem Definition" explores the dependencies between different SLAs, and formalizes the problem of converting an agreement for a composed service into individual agreements for the services from which it is composed. In "On the Design of Compliance Governance Dashboards for Effective Compliance and Audit Management," the authors advocate the use of compliance governance dashboards. The paper points out the major issues in this domain, identifies the concepts and models that underlie the problem, and addresses how IT can effectively support compliance analysis in SOAs. Finally, the paper "EC2 Performance Analysis for Resource Provisioning of Service-Oriented Applications" presents an interesting study on the performance of small instances in Amazon EC2. The authors show that the performance of virtual instances is relatively stable over time with fluctuations of mean response time. They also show that different, supposedly identical instances often have very different performance.

Issues on management of NFPs in service-related tasks have been discussed in three different papers. The first paper: "Transformation of Intermediate Nonfunctional Properties for Automatic Service Composition," proposes a transformation technique for automatic composition that identifies binding information in the selection stage from intermediate abstract NFPs. The classification of abstraction level in NFPs, a model to define abstract and concrete NFPs, and an algorithm for transformation from intermediate to concrete level are also presented. The paper "Dealing with Fixable and Non-fixable Properties in Service Matchmaking" presents a matchmaking approach under bounded uncertainty implemented using constraint programming. The matchmaking approach is transformed into a quantified constraint satisfaction problem. Finally, the paper "Ontology-Based Feature Aggregation for Multi-valued Ranking" focuses on the ranking of discovered Web services, proposing a novel approach based on non-functional properties of services: information that is available about services by analyzing their

description that is available on the Web, their hyperlink relations, monitoring information, etc. The approach is making use of semantic technologies, aggregating the various real-world service aspects as described above in a unified model and providing different rank values based on those aspects. The organizers would especially wish to thank the people who made NFPSLAM-SOC 2009 successful. First of all, Paolo Traverso who provided stimulating insights. Then the program committee members and the additional reviewers for their work that ensured the high-quality of accepted contributions. A special thanks to ICSOC Chairs that allowed and supported us for realizing the Third edition of NFPSLAM-SOC, and finally, all the authors and participants for providing the content of the workshop.

Introduction to the Second International Workshop on Service Monitoring, Adaptation and Beyond (MONA+)

Ranganai Chaparadza[1], Dimka Karastoyanova[2], Raman Kazhamiakin[3], Andreas Metzger[4], and Marco Pistore[5]

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Advances in modern technology and the constantly evolving requirements implied by dynamic business and operational environments impose new challenges for engineering and provisioning service-based applications (SBAs). SBAs have to become drastically more flexible; they should be able to operate and evolve in highly dynamic environments and to adequately identify and react to various changes in these environments. In such a setting, adaptation becomes a key capability as it enables SBAs to continuously change themselves to satisfy new requirements and demands. The ability of the SBA to adapt relies on the presence of monitoring mechanisms to identify, detect, and even predict critical events and situations. A variety of approaches and techniques addressing different forms of monitoring and adaptation have been proposed to date. Still, for delivering robust, dependable, and highly adaptable SBAs, the definition of holistic approaches is crucial. This requires the integration of the efforts of researchers from various disciplines and research areas. More specifically, this requires the integration across the different layers of an SBA, including the business layer, the service composition and coordination layer, the infrastructure layer, and the network layer. In addition, different competences, such as requirements engineering, design, quality assurance, realization, and management need to be brought together to devise the required holistic approaches. The main objectives of MONA+ 2009 were to bring together researchers from the different communities working on SBA monitoring and adaptation, and to start identifying shared research challenges towards developing comprehensive holistic approaches for multi-layer monitoring and cooperative adaptation techniques across the layers involved while taking into account different types of triggers to adaptation, ranging from faults, changes in goals, policies and context of operation, etc. The special focus for this second edition of the workshop was on the relations and interdependencies between the network and the service layer. Specifically the workshop addressed how the monitoring and adaptation mechanisms provided at those two layers can better interoperate, and how to better support an integrated design and management of monitoring and adaptation across those two layers. The proceedings of the workshop provide a rich

collection of high-quality papers, thanks to the authors and to the over 50 participants of the workshop, who provided valuable feedback. The papers address a number of relevant research challenges, from which the community at large can benefit towards developing holistic approaches for multi-layer monitoring and cooperative adaptation techniques. Frameworks for designing and embedding autonomic principles of operation of services and network functions are also provided.

The MONA+ 2009 Organizers were: Ranganai Chaparadza (Fraunhofer FOKUS, Germany; acting as PC Chair), Dimka Karastoyanova (IAAS, University of Stuttgart, Germany), Raman Kazhamiakin (FBK-IRST, Trento, Italy), Andreas Metzger (Paluno, University of Duisburg-Essen, Germany; acting as PC Chair), Marco Pistore (FBK-IRST, Trento, Italy).

5th International Workshop on Engineering Service-Oriented Applications (WESOA 2009)

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Workshop Goals and Contents

The availability of comprehensive methodologies and tools based on sound software engineering principles is of critical importance to practitioners involved in developing service-oriented applications. Limitations of traditional software engineering approaches have led to the emergence of software service engineering (SSE) as a new research discipline, but this area is still immature with many remaining open issues. Service-oriented applications tend to be process-driven, loosely coupled, composed from autonomous services and influenced by diverse socio-economic contexts. Such applications need to provide multiple, flexible and sometimes situational interaction channels within and beyond organizational structures and processes. In many cases, service-oriented applications represent transactions of dynamic, process-driven business networks and drive interaction protocols between fluid configurations of autonomous service providers. In other cases, service-oriented applications are used in the context of social communities, where they are created by a large number of participants for very specific or even situational needs. In such domains it is not enough to focus on complex distributed software systems alone, but it is necessary to consider a broader socio-technical perspective. Engineering of such software systems requires continuous, collaborative and cross-disciplinary development processes, methodologies and tools that synchronize multiple software development lifecycles (SDLCs) of

various SOA artifacts. It is the challenge of service systems engineering to not only cope with these circumstances but to capitalize on them with radically new approaches. There is an urgent need for research community and industry practitioners to agree on comprehensive engineering principles, methodologies and tool support for the entire SDLC of service-oriented applications. The WESOA series of workshops provides an annual forum for SSE researchers and practitioners and facilitates exchange and evolution of ideas across multiple disciplines. The 5th WESOA event was held in Stockholm on November 23, 2009. The workshop started with a keynote presentation by Hugo Brand of Oracle on the convergence and unification of SOA, EDA and BPM concepts, giving an industry perspective on SOA standardization. The technical sessions consisted of eight high-quality papers representing a rich variety of topics revolving around principles, methods and application domains of SSE. A number of authors addressed various aspects of service variability including work on design for adaptation of service-based applications by Bucchiarone et al., a conceptual framework for legacy-to-SOA migration by Razavian et al., the MINERVA framework for continuous business processes improvement by Delgado et al., and work on service customization by variability modeling by Stollberg et al. Another focus was on runtime aspects of service-oriented applications. This included work on encapsulating Web forms as Web services by Vogel et al., adapter patterns for resolving mismatches in service discovery by Hyun Jung La et al. and work on runtime migration of WS-BPEL processes by Zaplata et al. The technical sessions concluded with work on quality models for choreography by Mancioppi et al. The workshop concluded with a discussion about the fundamental principles of SSE and the issues raised by individual presentations.

Workshop Organization

WESOA 2009 was organized by an international group of researchers comprising the authors of this article. The event would not have been possible without the contribution of the program committee. Our thanks go to the following experts: Sudhir Agarwal (KIT Karlsruhe), Marco Aiello (Univ. of Groningen), Sami Bhiri (DERI Galway), Vincenzo D'andrea (Univ. of Trento), Florian Daniel (Univ. of Trento), Valeria de Castro (Univ. Rey Juan Carlos), Gregorio Diaz (Univ. of Castilla La Mancha), Schahram Dustdar (Technical Univ. Vienna), Keith Duddy (Queensland Univ. of Technology), Howard Foster (Imperial College London), Paul Greenfield (CSIRO), Peng Han (Fernuniv. Hagen), Birgit Hofreiter (Hochschule Lichtenstein), Dimka Karastoyanova (Univ. of Stuttgart), Rannia Khalaf (IBM Research), Axel Kieninger (KIT Karlsruhe), Agnes Koschmieder (KIT Karlsruhe), Heiko Ludwig (IBM Research), Leszek Maciaszek (Macquarie Univ.), Tiziana Margaria (Univ. of Potsdam), E. Michael Maximilien (IBM Research), Massimo Mecella (Univ. Roma LA SAPIENZA), Sooksathit Meesathit (Sakon Nakhon Rajabhat Univ.), Vojtech Merunka (Czech Univ. of Agriculture), Daniel Moldt (Univ. of Hamburg), Martin Molhanec (Czech Technical Univ. in Prague), Cesare Pautasso (Univ. of Lugano), Greg Pavlik (Oracle), Tomas

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Introduction to the First International Workshop on User-Generated Services (UGS 2009)

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Service-oriented architectures (SOA) have transformed the way software systems are being developed. However, the development of services is still service-centric rather than user-centric. The reuse and combination of such services requires the assistance of a skilled developer. To address this, UGS 2009 set out to explore research and development empowering end-users to participate in the generation, combination and adaptation of services to create functionality and solve problems in their work. This development in the service area mirrors that of *user-generated content* (UGC), which has become a major source of information on the World-Wide Web. Wikis, blogs, Web-based user forums and social networks have empowered end-users to collaboratively create content and share it. UGC is not only a phenomenon in the private domain, but has become a major source for technical solutions as well, as exemplified by the results of Web searches for technical problems: solutions are now increasingly found in sites providing UGC. Thus end-users have become a major source of knowledge, similarly leveraging the "resources at the edge of the network" as P2P systems have done on a technical level. The next logical step is that after supporting the creation and management of data, the same should be done at the level of services created and provided by end-users, i.e., *user-generated services* (UGS). UGS can cover a range of services, from ad-hoc, situational applications for personal use to more advanced enterprise mash-ups supporting a community of users. In order to facilitate UGS, tools and infrastructures to create, combine, reuse and execute possibly complex services in an easy manner are needed.

A range of issues have to be addressed in order to realize the vision of UGS. With the goal of tackling these issues and establishing a community around the topic of user-generated services, UGS 2009 brought together researchers and developers from both academia and industry, presenting and discussing a diversity of topics ranging from a user-study investigating the feasibility of UGS in general (Namoune et al.), front-ends for the visualization and composition of services (Gilles et al., Nestler et al., Silva et al.), over specific service domains such as personal information management (Grebner), the community-based

annotation of services (Loutas et al.) to problems of ontology mediation required in supporting end-users in combining services (Ambrus et al.). All papers presented here are based on the preliminary online proceedings made available at http://CEUR-WS.org/Vol-540/.

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