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Management Summary

This deliverable reports recent co-authored S-Cube publications and lists planned co-authored publications for next period, for M23 of the S-Cube network. Each updated version of the deliverable will report how planned publications have progressed and, where appropriate, the publication output. A commentary is also provided to describe deviations from the publication plan, and how we deal with them through internal cooperation.

Members of the S-Cube consortium:

University of Duisburg-Essen (Coordinator)	Germany
Tilburg University	Netherlands
City University London	U.K.
Consiglio Nazionale delle Ricerche	Italy
Center for Scientific and Technological Research	Italy
The French National Institute for Research in Computer Science and Control	France
Lero - The Irish Software Engineering Research Centre	Ireland
Politecnico di Milano	Italy
MTA SZTAKI – Computer and Automation Research Institute	Hungary
Vienna University of Technology	Austria
Université Claude Bernard Lyon	France
University of Crete	Greece
Universidad Politécnica de Madrid	Spain
University of Stuttgart	Germany
University of Hamburg	Germany
Vrije Universiteit Amsterdam	Netherlands

Published S-Cube documents

All public S-Cube deliverables are available from the S-Cube Web Portal at the following URL:

http://www.s-cube-network.eu/results/deliverables/

The S-Cube Deliverable Series

Vision and Objectives of S-Cube

The Software Services and Systems Network (S-Cube) will establish a unified, multidisciplinary, vibrant research community which will enable Europe to lead the software-services revolution, helping shape the software-service based Internet which is the backbone of our future interactive society.

By integrating diverse research communities, S-Cube intends to achieve world-wide scientific excellence in a field that is critical for European competitiveness. S-Cube will accomplish its aims by meeting the following objectives:

- Re-aligning, re-shaping and integrating research agendas of key European players from diverse research areas and by synthesizing and integrating diversified knowledge, thereby establishing a long-lasting foundation for steering research and for achieving innovation at the highest level.
- Inaugurating a Europe-wide common program of education and training for researchers and industry thereby creating a common culture that will have a profound impact on the future of the field.
- Establishing a pro-active mobility plan to enable cross-fertilisation and thereby fostering the integration of research communities and the establishment of a common software services research culture.
- Establishing trust relationships with industry via European Technology Platforms (specifically NESSI) to achieve a catalytic effect in shaping European research, strengthening industrial competitiveness and addressing main societal challenges.
- Defining a broader research vision and perspective that will shape the software-service based Internet of the future and will accelerate economic growth and improve the living conditions of European citizens.

S-Cube will produce an integrated research community of international reputation and acclaim that will help define the future shape of the field of software services which is of critical for European competitiveness. S-Cube will provide service engineering methodologies which facilitate the development, deployment and adjustment of sophisticated hybrid service-based systems that cannot be addressed with today's limited software engineering approaches. S-Cube will further introduce an advanced training program for researchers and practitioners. Finally, S-Cube intends to bring strategic added value to European industry by using industry best-practice models and by implementing research results into pilot business cases and prototype systems.

S-Cube materials are available from URL: http://www.s-cube-network.eu/

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1   Introduction

The objective of S-Cube is to create an integrated European research community in the area of software and service engineering. Today, this community is fragmented and dispersed in across several European countries and it is another S-Cube objective to actively encourage joint research in order to foster the integration of this community. The Spread of Excellence (SoE) activity ensures a broad dissemination of research results as well as to enhance the public visibility of the research conducted within the network, which includes an awareness program that targets both European industry and academia.

1.1   Objectives of this Workpackage

The community outreach workpackage, WP-SoE-1.2, will focus on the spread of research outcomes, innovation and knowledge across the wider scientific community, special sections of industry and user communities, and consider opportunities to apply S-Cube's outputs to novel or emerging research fields.

The workpackage will also encourage the dissemination of S-Cube research through, together with other activities, the co-authoring of books and scientific papers for journals, conferences and workshops, as well as articles for technical magazines. Guidelines regarding where and how to disseminate information have been given in the S-Cube deliverable CD-SoE-1.2.3 "Definition of Strategy for Community Outreach". This deliverable provides a procedure for writing and registering a joint publication with the S-Cube SoE activity and also records the co-authored publications S-Cube partners plan to undertake in the next six months. The analysis of this information will be used to develop and refine the current procedure and guidelines for future collaborations and co-authored publications.

1.2   Co-Authorship Principles and Guidelines

The S-Cube consortium applies agreed guidelines and principles for co-authored publications that are produced by its members. The 4 underlying principles of co-authorship are:

1. Work undertaken within one or more work packages should be undertaken by more researchers at more than one S-Cube members;
2. All researchers who contribute to the work reported in a co-authored publication should appear as co-authors of the publication;
3. Only researchers who contribute to the work reported in a co-authored publication should appear as co-authors of the publication;
4. The authorship of all co-authored S-Cube publications should respect the ethical policies of the S-Cube member institutions for whom the co-authors of the publication work.

The concrete guidelines implementing these 4 principles to govern co-authorship in the consortium are:

1. The authorship list of a co-authored S-Cube publication shall include authors from at least 2 institutions that are S-Cube members;
2. The affiliation list of a co-authored S-Cube publication shall include at least 2 institutions that are S-Cube members;
3. A co-author of a co-authored S-Cube publication shall have made an identifiable and substantial contribution to the work reported in the publication and/or the writing of the publication;
4. A co-authored publication shall report work from and be traceable to one or more identified S-Cube work packages;

5. If appropriate, a co-authored publication shall report work from and be traceable to one or more identified S-Cube mobility visits;
6. A co-authored publication shall be shown to adhere to the ethics policies of all institutions represented by the authors of the publication.

Furthermore, some S-Cube publications can be single-author publications that, therefore, cannot be co-authored according to the above guidelines. A single S-Cube publication can be a valid single-author S-Cube publication if the publication reports:

1. The outcome of a under-graduate or post-graduate dissertation work that, according to the regulations of the institution of the student, shall be individual work;
2. The outcome of a doctoral dissertation work that, according to the regulations of the institution of the student, shall be individual work.

Note that single-authored publications are not reported in this deliverable, but are reported in CD-SoE-1.2.4.

1.3 Structure of this Report

Section 2 reports successful co-authored publications produced from M13 to M23 of S-Cube. Section 3 reports planned co-authored publications for the next six months.

2   Successful Co-authored Publications

At the time of writing the members of S-Cube consortium produced and published 15 co-authored publications. These publications are reported below in the order in which they were produced.

Collaborators	Paper Description
CITY, POLIMI	Marco Comuzzi, Kyriakos Kritikos, and Pierluigi Plebani. A semantic based framework for supporting negotiation in service oriented architectures. In Proceeding of 11th IEEE Conference on Commerce and Enterprise Computing (CEC09). IEEE Computer Society Press, 20-23 July 2009.
CITY, USTUTT, UNIDUE, TILBURG, FBK, CNR	Elisabetta Di Nitto, Dimka Karastoyanova, Andreas Metzger, Michael Parkin, Marco Pistore, Klaus Pohl, Fabrizio Silvestri, and Willem-Jan Van den Heuvel. S-cube: Addressing multidisciplinary research challenges for the internet of services. In Towards the Future Internet: A European Research Perspective, Amsterdam, 2009. IOS Press.
TILBURG, USTUTT, VUA	Willem-Jan Van den Heuvel, Olaf Zimmermann, Frank Leymann, Patricia Lago, Ina Schieferdecker, Uwe Zdun, and Paris Avgeriou. Software service engineering: Tenets and challenges. In Proceed¬ings of ICSE 2009 Workshop -Principles of Engineering Service Oriented Systems (PESOS). IEEE Computer Society, May 2009.
USTUTT, TUW	Branimir Wetzstein, Philipp Leitner, Florian Rosenberg, Ivona Brandic, Frank Leymann, and Schahram Dustdar. Monitoring and analyzing influential factors of business process performance. In Proceedings of the 13th IEEE International Enterprise Distributed Object Computing Conference (EDOC'09), Auckland, New Zealand, 2009.
SZTAKI, TUW	Attila Kertesz, Gabor Kecskemeti, and Ivona Brandic. An sla-based resource virtualization approach for on-demand service provision. In VTDC '09: Proceedings of the 3rd international workshop on Virtualization technologies in distributed computing, pages 27–34, New York, NY, USA, 2009. ACM. ISBN 978-1-60558-580-2.
POLIMI, UOC	Kyriakos Kritikos and Dimitris Plexousakis. Mixed-integer programming for qos-based web service matchmaking. IEEE Transactions on Services Computing, 2(2):122–139, 2009. ISSN 1939-1374.
UNIDUE, USTUTT	Andreas Gehlert, Olha Danylevych, and Dimka Karastoyanova. From requirements to executable processes - a literature study. In Proceedings of the 5th International Workshop on Business Process Design (BPD 2009), Ulm, Germany, 7 September 2009.
VUA, POLIMI	Qing Gu, Patricia Lago, and Elisabetta Di Nitto. Guiding the service engineering process: the importance of service aspects. In 2nd IFIP WG5.8 Workshop on Enterprise Interoperability (IWEI 2009), Valencia, Spain, 2009. Springer.
CITY, UOC	Konstantinos Zachos, Christos Nikolaou, Pantelis Petridis, George Stratakis, Manolis Voskakis, and Eyaggelos Papathanasiou. Enhancing service network analysis and service selection using requirements-based service discovery. In 1st International Conferences on Advanced Service Com¬puting, Service Computation 2009, Athens, Greece, November 2009.
FBK, POLIMI	Luciano Baresi, Sam Guinea, Marco Pistore, and Michele Trainotti. Dynamo + astro: An integrated approach for bpel monitoring. In Proceedings of the IEEE 7th International Conference on Web Services(ICWS 2009), 2009.

FBK, POLIMI	Antonio Bucchiarone, Cinzia Cappiello, Elisabetta Di Nitto, Raman Kazhamiakin, Valentina Mazza, and Marco Pistore. Design for adaptation of service-based applications: Main issues and require¬ments. In Fifth International Workshop on Engineering Service-Oriented Applications: Supporting Software Service Development Lifecycles (WESOA), 2009.
TUW, USTUTT	Philipp Leitner, Branimir Wetzstein, Florian Rosenberg, Anton Michlmayr, Schahram Dustdar, and Frank Leymann. Runtime prediction of service level agreement violations for composite services. In 3rd Workshop on Non-Functional Properties and SLA Management in Service-Oriented Computing, co-located with ICSOC 2009, 2009
FBK, USTUTT	Raman Kazhamiakin, Branimir Wetzstein, Dimka Karastoyanova, Marco Pistore, and Frank Ley¬mann. Adaptation of service-based applications based on process quality factor analysis. In Pro¬ceedings of the 2nd Workshop on Monitoring, Adaptation and Beyond (MONA+), 2009.
UNIDUE, FBK, CITY	Barbara Pernici, Andreas Gehlert, Marco Pistore, Pierluigi Plebani, and George Spanoudakis, edi¬tors. Proceedings of the ICSOC-ServiceWave Workshop on Industrial Experiences for Service Ori¬ented Computing(IE4SOC), Technical report Politecnico di Milano, Dipartimento di Elettronica e Informazione, n. 2009/71, Stockholm, Sweden, 23 November 2009.
CNR, SZTAKI	Claudia Di Napoli, Maurizio Giordano, Zsolt N´emeth, and Nicola Tonellotto. A chemical metaphor to model service selection for composition of services. In Proceedings of the Second International Workshop on Parallel, Architectures and Bioinspired Algorithms (held in conjunction with PACT'09), pages 11–19, 2009. ISBN 978-84-692-3675-8.

This co-authored publication list is restricted to research publications that have actually been published externally. By definition, all other research outcomes yet to be published are reported in Section 4 – the list of planned co-authored publications.

3   Plan for Co-Authored Publications

The following is the two-step plan for the production and submission of an S-Cube co-authored publication. It was developed as part of the SoE activity to ensure publications follow a common format and qualify as an "S-Cube publication".

When producing a co-authored paper, the primary author(s) should:

1. Check the publication contains the correct S-Cube acknowledgement. The acknowledgement is: "The research leading to these results has received funding from the European Community's Seventh Framework Programme FP7/2007-2013 under grant agreement 215483 (S-Cube)."

2. Upon acceptance of your publication, the following information should be sent to publications@s-cube-network.eu:

    a) The camera-ready copy of the paper including S-Cube acknowledgement.
    b) The full reference.
    c) The list of S-Cube partners who are authors of the paper.

Following receipt of a publication the SoE activity will check the publication for the S-Cube acknowledgement, update the bibadmin database/website[1] accordingly and acknowledge the publication. To protect copyrights, the pdf files will only be made internally available to the project via the S-Cube portal.

Each quarter the management activity will compile a list of published papers from the bibadmin database to remove the duplicated reporting from each partner. The bibadmin database will also be used to produce the annual deliverable CD-SoE-1.2.4 "Report on the Dissemination of Network Results & Collaboration with ICT SSAI&E Projects".

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[1] http://bibadmin.s-cube-network.eu/

4   Planned Co-Authored Publications

The following are the planned research publications for months 25 to 30 of the S-Cube Network of Excellence. For each publication this section reports the S-Cube work package for which the research was undertaken, other work packages, tasks an deliverables that the work also relates to, and the institutions of the co-authors of the publication. The planned publications represent research outputs in a wide range of states of preparation, from ongoing research that will lead to a research output, through to a publication accepted to be published but not yet published. This diversity is reflected in the planned publications – some have clear titles and author lists, whilst others are simple descriptions of early collaborative research outcomes.

The collaborations undertaken to complete these publications have been and will continue to be carried out using different methods, ranging from student visits through the S-Cube mobility program, conference calls, S-Cube meetings, meetings at conferences and workshops, etc. and contribute to the integration of each partner's research agenda.

The remainder of this section reports the planned research publications by activity, and by work package with activity, starting with work package JRA1.1. The project is planning to co-author a total of **47** publications in the next 6-month period.

4.1   *JRA-1: Engineering & Adaptation Methodologies for Service-based Applications*

At the time of writing this deliverable, the consortium is planning **24** research publications in JRA-1.

4.1.1   WP-JRA-1.1: Engineering Principles, Techniques & Methodologies for Hybrid, Service-based Applications

WP-JRA-1.1 will integrate design and discipline knowledge from the related fields that impact on engineering of service-based applications. The workpackage has three individual tasks to coordinate design knowledge about software-based systems (T-JRA-1.1.1), codify human-computer interaction (HCI) discipline knowledge relevant to service-based application engineering (T-JRA-1.1.2) and to codify contextual discipline knowledge relevant to service-based application engineering (T-JRA-1.1.3).

The consortium is planning **10** research publications in JRA1.1. Furthermore USTUTT, UniDue, Lero@UL, and Tilburg have had preliminary discussions (Polimi is planned to participate in the future) with the intention to work on a unified life cycle of SBAs aligned with the existing life cycles on all functional levels in S-Cube. A paper with the results is planned that will contribute to both WP-JRA-1.1 and WP-JRA-2.2.

Collaborators	Description	Also Relates or contributes to
TILBURG UCBL	Service evolution is the continuous process of service development through a series of consistent and unambiguous changes, and focuses on shallow changes, i.e. changes that do not affect their context and therefore do not require the adaptation of the interacting with the service parties. This publication will formalize aspects of service description and demonstrate how the principles and best practices of software evolution apply to them. A series of publications have already been produced and more have been planned for submission in the immediate future, starting with the ICSOC conference and the	WP-JRA-1.2

	IEEE TSE journal.	
LERO@UL VUA	The collaboration will focus on how to take software process quality into account when developing services. This work will investigate the gaps that currently exist between software process quality (focusing particularly on the maintenance of the software product) and the adaptability of services software (as shown in the S-Cube life-cycle left-hand side in deliverable CD-IA-3.1.1). A software process model will be devloped for the services maintenance cycle based on the gap analysis.	CD-JRA-1.1.4
FBK LERO@UL	Identification and presentation of the challenges in defining appropriate quality models for SBA engineering. Some preliminary work was already initiated during the work on the integrated research framework (IA-3.1). While various researchers have proposed services lifecycles for the development of adaptable service-based applications, none appear to incorporate key activities such as project management, requirements management or configuration management; they are thus not able to meet any of the state-of-art process quality models. Therefore it is crucial to meet those standards by implementing quality processes within the SBA development lifecycle.	IA-3.1
POLIMI UOC	KPI improvement in Agile Service Networks. This is work towards challenge number 5 in the vision paper and will result in a research thesis of a PhD student from POLIMI. This research is based on the idea of analyzing existing networks in the literature to derive patterns for KPI improvement that can then be applied to concrete situation. A research visit is planned to take place by December 2009 to finalize this activity.	None
POLIMI VUA	Analysis of the impact of service-specific aspects on the life cycle of SBAs and on identifying proper viewpoints for the design of adaptable service-based applications. Such viewpoints serve as guidelines to support designers in the development process.	None
POLIMI CITY	Service-based applications start to be preferred by organizations since they are able to offer complex functionalities by guaranteeing interoperability and flexibility. However, the design of such applications is not a trivial task since developers have to guarantee the alignment between the designed business process and the available services. In fact, these applications are executed by composing and invoking a number of available web services, which are often not under the control of systems developers. Services are simply exploited to obtain a specific functionality and they can be unavailable or change without notice. At the same time, any change in business processes will also cause a conflict between the business process and its supporting services. All the unforeseen changes might cause critical failures in the service discovery phase. In this paper, which will be submitted to the MONA'2009 workshop, we propose a framework that supports the alignment between the design of the process and the available knowledge about services in order to support the design of adaptive service-based applications and improve their dependability.	None
LERO@UL CITY	End-users often communicate their needs and wishes using natural language. These statements are then used as input to start requirements elicitation and negotiation supported by requirements analysts. Although this approach allows overcoming several issues regarding natural language requirements descriptions (e.g., ambiguity,	T-JRA-1.1.5

	incompletes) it does not allow to react immediately on end-user needs in terms of software provision. Furthermore this time and resource intense approach often does not allow tailoring software to particular needs of individual stakeholders. This paper presents initial ideas towards using codified context knowledge to help elicit more contextual requirements, with the goal of configuring a service-oriented software systems without the help of analysts and software engineers. Our approach tries to bridge software product lines and requirements engineering to come up with a better understanding of the users' needs.	
LERO@UL	Service-Oriented Development Processes: A Systematic Literature Review - The objective of this study is to systematically identify, review and evaluate existing service-oriented development processes and methods for building Service Based Applications (SBAs). This will provide a useful starting point for any further research in the area. In order to achieve this objective a Systematic Literature Review (SLR) of the existing software engineering literature is conducted.	JRA-1.1
Lero@UL CITY	Altio Case Study - This case study involved qualitative research, where key individuals within a service company were interviewed. The company involved were service providers and consumers as well as providers of other types of software systems. The case study was carried out jointly by the S-Cube partners listed. The aim of the case study was to interview individuals from varying roles through the company. In total there were three interviews with employees from the following roles: The Company's Chief Technology Officer (CTO), A Project Manager and a software Developer. We expect to enhance this case study work with a further case study and to publish our results.	JRA-1.1
CITY UNIDUE	Using Scenarios to Discover Requirements for Service-Based Applications, submitted to REFSQ'2010 Abstract. [Context and motivation] The deployment of service-based systems that can react to different usage contexts is increasing. Whilst the development of such systems has been the subject of considerable research, the challenges of discovering and specifying requirements on such systems have not been suffi-ciently addressed. [Question/problem] The paper reports an investigation of context-aware requirements discovery and specification. It explores whether ex-isting models of context-awareness can be applied to improve requirements specification. [Principal ideas/results] The paper reports an extension of the ART-SCENE scenario walkthrough environment with knowledge about ab-normal behaviours and states associated with service-centric and context-aware systems and their use. [Contribution] Results demonstrate how knowledge about context and service-centric systems can be codified in a requirements dis-covery tool, and the utility of this knowledge in the requirements process.	CD-JRA-1.1.4

4.1.2   WP-JRA-1.2: Adaptation & Monitoring Principles, Techniques & Methodologies for Service-based Applications

This workpackage will define principles and techniques for the cross-layer monitoring and adaption of service-based applications. It is split into three tasks that analyze existing adaptation and monitoring principles, techniques and methodologies, their integration and the emerging area of contextual monitoring. The consortium is planning **8** research publications in JRA1.2.

Collaborators	Description	Also Relates or contributes to
FBK POLIMI	A comparison of different approaches to monitoring and adaptation from a holistic point of view, aiming at their integration in a coherent whole.	None
FBK POLIMI	This work will develop new design principles to target the design of applications capable of adaptation and which can be monitored. This work will investigate the approaches and methodologies for defining, specifying and realizing built-in adaptation. This includes the description in appropriate notations of foreseen and prescribed adaptation at design time, which at deployment-time the underlying framework transforms these adaptation specifications in executable code that already includes the necessary facilities for detecting problems and reacting to them. The consolidation of contributions will enable an SBA-specific view on the problem of monitoring and adaptation within the design principles of traditional software systems.	T-JRA-1.2.1 T-JRA-1.2.3
INRIA UNIDUE	The objective of this work is to investigate how live-model evolution (using INRIA's models@runtime) can be useful for incremental runtime testing. The idea is to trace the SBS evolution with models@runtime and detect the runtime tests that must be replayed. This line of work will help to validate SBS after or – in the context of pro-active adaptation – even before an adaptation is triggered.	None
FBK CNR	This work is motivated by the strong expertise of the CNR in Data Mining & Information Retrieval and will focus on process monitoring to extract information useful for adaptation and monitoring principles and methodologies. FBK and CNR envision the application of classification techniques to highlight any deviation from the "normal" operating path. This technique has the potential to highlight emergency situations as soon as possible, meaning a shorter time to problem resolution. The results of this investigation will be published in major data mining conferences and journals, such as VLDB or IEEE Transactions on Knowledge & Data Engineering.	None
TILBURG TUW	These partners will work on evaluating the impact of the evolution of services in the context of service networks. More specifically, the issue of monitoring the performance of various service versions from the provider's portfolio in a service network, measured by its popularity and use, will be investigated as the driver for deciding whether to adapt, replace or decommission a service version or even the service itself. This publication was a workshop submission to the Joint ICSOC-ServiceWave 2009 conference.	CD-JRA-1.2.4
FBK UNIDUE	Monitoring techniques will be augmented with formal verification techniques. The approach explicitly encodes assumptions that the constituent services of an SBA will perform as expected (context assumption). Based on those assumptions, formal verification is used to assess whether the SBA requirements are satisfied and whether a violation of those assumptions during run-time leads to a violation of the SBA requirements.	None
FBK POLIMI	This work is to design of the novel principles for the realization of architectures supporting an integrated monitoring framework. First steps have already been made: an integrated monitoring framework for BPEL monitoring was defined and presented in two ServiceWave'08 and ICWS'09 papers. However, the framework	None

	requires new design principles and new monitoring architectures, in particular for targeting advanced challenges such as cross-layer monitoring and distributed monitoring. This publication will describe these new principles.	
UNIDUE, FBK	The publication will be based on previous work concerning context assumptions and formal verification. Both are used to assess whether the SBA requirements are satisfied and whether a violation of those assumptions during run-time leads to a violation of the SBA requirements. This work will set out to understand how to formalize context assumptions and (adaptation) requirements such that they can serve as input to verification engines. The aim of this publication is also to demonstrate the feasibility of the approach using a prototypical implementation using existing technology.	JRA-1.1 JRA-1.3

4.1.3   WP-JRA-1.3: End-to-End Quality Provision & SLA Conformance

This workpackage aims to define the principles, techniques and methodologies for specifying, negotiating and assuring end-to-end quality provision and SLA conformance. It will do this through defining the interfaces and interrelationships between the functional layers (i.e., between service infrastructure, service composition and co-ordination and business process management). This work is split into three tasks: T-JRA-1.3.1 will produce a quality reference model for service-based applications whilst tasks T-JRA-1.3.2 and 1.3.3 devise and ensure the principles, techniques and methodologies for specifying and negotiating end-to-end quality requirements and quality aspects of SLAs. The consortium is planning **6** research publications in JRA1.3.

Collaborators	Description	Also Relates or contributes to
USTUTT POLIMI	These partners are collaborating with the objective of investigating methods of analyzing key performance indicators (KPI) under uncertainty or incomplete data. The planned work will contribute to topics relevant across the tasks of this workpackage.	WP-JRA-2.2
TUW USTUTT	In this collaboration means for predicting SLA violations at runtime (i.e., before the violations have actually happened) are investigated. This is done by analyzing patterns in historical data using Machine Learning techniques such as Neural Networks. In the middle term the goal is to actively use these predictions to automatically or semi-automatically prevent violations by adapting the composition for compromised instances.	JRA-1.3 JRA-2.2 JRA-2.3
UCBL POLIMI	This work has the objective of aligning semantic service descriptions and descriptions of their quality of service. The aim is to use these descriptions to enhance matchmaking algorithms so that semantic and quality requirements can be simultaneously taken into account and fulfilled as much as possible.	WP-JRA-1.3 WP-JRA-2.2
TILBURG CITY UCBL	This collaboration will investigate pre-emptive SLA negotiation. Pre-emptive SLA negotiation has the objective of assuring SLAs are met through the cancellation or re-negotiation of an SLA when it becomes clear the existing SLA will not be met. This research will exploit the strengths of each institution to integrating monitoring techniques, negotiation protocols and negotiation strategies: City are developing monitoring software that can predict with certain probability that a negotiation is needed because a set of events have been received that indicate the current SLA will not be met, UCBL	None

Collaborators	Description	
	will provide algorithms that will steer the negotiation or re-negotiation protocol to an outcome that is beneficial to a party implementing the algorithm and Tilburg have developed negotiation and re-negotiation protocols. The results of this collaboration will be to integrate these three pieces of research and publish principles and methodologies, as well as experiences when providing pro-active SLA adaptation.	
UNIDUE, CNR POLIMI	Based on initial concepts for using online testing to predict the need for the adaptation of a SBS, this collaboration will set out to investigate the use of data mining techniques to ensure that pro-active adaptations will be performed with high confidence. The aim is to demonstrate the feasibility of the approach using an application scenario (workflow) from the eGov domain.	JRA-1.2
UNIDUE FBK, USTUTT	When building adaptive applications that address two or more adaptation goals (such as perfective or corrective adaptation), precautions must be taken to ensure that the interplay and the interactions between the different types of adaptations are considered. This collaboration has set out to define a framework to integrate and align perfective and corrective adaptations, while addressing the problems raised by the interactions between different kinds of adaptation. The applicability is illustrated by a scenario from the telecommunication domain.	JRA-1.1 JRA-1.2

4.2   *JRA-2: Realization Mechanisms for Service-based Systems*

At the time of writing this deliverable, the consortium is planning **22** research publications in JRA-2.

4.2.1   WP-JRA-2.1: Business Process Management (BPM)

The principle objective of WP-JRA-2.1 is to scrutinize and develop fundamental new concepts to drive service implementation from business models relating to software service providers and telecommunication service providers. The work is split into two tasks: developing requirements for services in Agile Service Networks (T-JRA-2.1.1) and producing a model on which to base business transactions (T-JRA-2.1.2). The consortium is planning **4** research publications in JRA2.1.

Collaborators	Description	Also Relates or contributes to
TILBURG UPM	These partners are collaborating in the research on conformance and replaceability analysis of business protocols and choreographies. Business protocols describe the messaging behavior of participants into conversations, i.e. multiple correlated message exchanges, related by sequencing and time constraints, which take place among multiple participants. Conversations can be specified using choreographies in which each participant plays a role. Replaceability analysis for business protocols evaluates to which extent the modification in messaging behavior of one participant will affect the interoperability with the others. Conformance analysis studies to which extent the business protocol exposed by a participant matches the role it plays in a choreography. The envisioned contribution is a theory for conformance and replaceability analysis that is general enough to apply to multi-party conversations that explicitly model time constraints (e.g. "this message exchange must happen within 4 hours since the last one") and to abstract from any particular specification language or notation for choreographies and business protocols. The intended target for publication is ICSOC 2009	CD-JRA-2.1.3

	(deadline mid June, publication in late November), possibly followed by a journal paper (the target journal has not been identified yet) by the end of 2009.	
LERO@UL TILBURG	This research sets out to address the significant gap in our ability to measure and monitor the Key Performance Indicators (KPIs) across virtual organisations. This research will demonstrate how social network analysis (SNA) can provide us with the methodology to monitor agile service networks (ASN) across virtual organisations. This is of increasing importance as more businesses outsource many business processes and tailor collaborative networking strategies, therefore creating virtual networks structures. As competitive pressures increase, many organisations must now be in a position to report the 'true value' of adopting these strategies. The research explores how it can monitor service interaction and the value of process relationships and their contribution to organisational strategies. Reporting on such strategies allows managers to identify the network strengths, weakness, opportunities, and threats across many dimensions such as structural, functional, and behavioural. This research is largely concerned with Business Process Management (BPM) within a virtual environment which explores methods to 'deploy, monitor, and continuously update cross-enterprise functions within a mixed environment of people, content, and systems'. The overall objective of this research is to develop a framework which borrows extensively from SNA theory to extend our ability to measure and monitor KPIs within IT-enabled business processes. It is anticipated that the results of such analysis will allow us to clearly prescribe strategic direction for management decision making activities and offer methods to exploit network structuring and prediction within ASN.	JRA-2.1
TILBURG UPM	This work has the objective of developing a framework and tools to accurately describe the causes of an incorrect implementation of high-level protocols. This work will produce a framework for the `black-box' testing of services based on a formal specification of the protocol the service supports by exploring the state space of the protocol and converting these sequences into testable, repeatable message exchanges. Initially the framework will be used to test services implementing protocols for the negotiation of SLAs, but the tools, methodologies and principles will be generalised to be applicable to other protocols. Additionally, and since the testing is performed on an actual implementation, the developed techniques can be used to ensure that fragmentation / splitting on existing (possibly verified) compositions are still compliant with their specifications.	CD-JRA-2.1.5
UCBL TILBURG	The monitoring and analysis of web service executions allows the verification of service properties. This work will specify monitoring expressions and extract the relevant information from these expressions to perform monitoring. This is not an easy task when the processes are specified in BPEL, however. In this work the partners will design a monitoring approach that makes use of business protocols as an abstraction of business processes specified by means of BPEL. High-level queries are expressed against this abstraction and then translated into SQL queries that are evaluated against a database that stores the execution traces of the services. A publication has already been produced and more have been planned for submission in the immediate future.	None

4.2.2   WP-JRA-2.2: Adaptable Coordinated Service Compositions

WP-JRA-2.2 has the objective of investigating various aspects of service composition and coordination to provide the mechanisms and technological underpinnings for adaptable, service-enabled business processes in multiple domains. This is performed in tasks that will create mechanisms for business process support in terms of coordinated service compositions and their technical realization (T-JRA-2.2.1) and identification of requirements towards the mechanisms and techniques enabling self-configuring, adaptable and dynamic service compositions as well as specification of foundations for technological support for such systems (T-JRA-2.2.2). The consortium is planning **13** research publications in JRA2.2.

Collaborators	Description	Also Relates or contributes to
TILBURG USTUTT	These partners have collaborated to define initial business transaction concepts and mechanisms and mapping these into business processes, business process fragments and relevant QoS criteria as well as conditions stipulated in end-to-end SLAs. The partners plan to publish this material to a journal before the end of this year.	CD-JRA-2.2.3
TILBURG UPM	The work relies on automatically generating orchestrations out of choreographies via *projections* in such a way that both the time constraints and the observable behavior of the system are respected. These are useful to derive conformance conditions that can be used to decide whether a partner can be replaced by another, which is one of the necessary conditions for seamless out/insourcing.	None
UPM USTUTT	Partners will work on applying data-aware analysis for inferring KPI and QoS properties of service compositions.	CD-JRA-2.2.4
UPM POLIMI	This collaboration aims to align semantic service descriptions and descriptions of their quality of service. This is of interest to JRA-2.2 as semantic-based matchmaking will be enriched with QoS-based requirements.	None
USTUTT UNIDUE FBK	These partners will perform further collaboration to understand and exploit the dependencies between requirements engineering, quality assurance (i.e., testing and monitoring) and service compositions for adaptive service-based systems. Initial work has been published as a workshop paper at MONA+ 2008, and the refinement and improvement of the approach will be published as part of a forthcoming Springer book on "Service Engineering", edited by S. Dustdar as part of the SSAI&E activities.	None
UCBL UPM POLIMI	This work has the purpose of developing formal models for QoS/SLA-aware service compositions. The requirements for such models are twofold: they must be sufficiently expressive to describe a wide class of service compositions and QoS attributes, whilst being sufficiently constrained to ensure that standard reasoning tasks on such models are, at least in common cases, decidable and reasonably efficient. Moreover they target the use of soft constraints for QoS modeling. Soft constraints can be used for avoiding failures to discover good-enough solutions with minimal penalty when it is not guaranteed that solutions that satisfy all	None

	constraints.	
UCBL USTUTT	The fragmentation of a Web service composition partitions the composition model (into fragments) that can be manipulated by multiple execution engines. These partners are working together on dynamic fragmentation and developing algorithms and techniques for splitting and merging service compositions in a dynamic manner. For this, they plan to use existing techniques developed for workflow fragmentation, process mining and fragmented graphs.	CD-JRA-2.2.3
TUW UPM	TUW has ongoing joint work with UPM in the area of modeling and analyzing QoS-aware service-oriented systems, in particular with regards to service choreographies and orchestrations. The goal is to devise a general approach to provide "what if" simulations with respect to the global QoS of a system and, in particular also for local partner orchestrations. This simulation will allow determining what QoS is required from each partner and also what can happen if the QoS of a specific partner decreases or partners have to be replaced by other partner services etc. The simulation is performed using choreography models that are transformed into timed-automaton annotated with QoS and timing information. As a medium term goal, the collaborating parties also plan to analyze existing systems by using a bottom up approach that semi-automatically derives choreographies and automatically annotates them with real-time QoS information retrieved from historical monitoring information. The collaboration was established during a visit of UPM (Irena Trajkovska) at the TUW and will be fostered by another visit of Florian Rosenberg (TUW) at UPM as part of the mobility program. Currently, the joint work is performed through e-mail and telcos. A paper is in preparation for ICSOC 2009 (or a closely related venue) and a further paper after the summer/autumn.	CD-JRA-2.2.4 CD-JRA-2.2.5
USTUTT TUW	Collaboration between TUW and USTUTT on monitoring and dependency analysis of KPIs in service compositions is currently ongoing and a first paper has been published to the EDOC 2009 conference. They plan to extend that approach towards KPI-based adaptation of compositions based on prediction techniques.	CD-JRA-2.2.4
USTUTT FBK	This is a collaboration in the area of adaptation of QoS-aware service compositions. A first paper has been published at MONA+ 2009. The work will be continued.	
TUW POLIMI	TUW is working with Polimi on HPS (Human Provided Service) and Web service mashups. The goal of the collaboration is to create a lightweight mashup description with regard to QoS and context information and to integrate these it into executable BPEL processes. The collaboration has been established between the partners through S-Cube meetings at Amsterdam and Lyon and the consequent interaction through telcos and e-mails. A submission is planned to ICSOC 2009 and a follow up paper is planned for summer / autumn 2009.	CD-JRA-1.3.2 CD-JRA-2.2.2/4
USTUTT TUW	Title: Runtime Prediction of Service Level Agreement Violations for Composite Services SLAs are contractually binding agreements between service providers and consumers, mandating concrete numerical target values which the service needs to achieve. For service providers, it is essen- tial to prevent SLA violations as much as possible to enhance customer satisfaction and avoid penalty payments.	None

Collaborators	Description	Also Relates or contributes to
	Therefore, it is desirable for providers to predict possible violations before they happen, while it is still possible to set counteractive measures. We propose an approach for predicting SLA violations at runtime, which uses measured and esti- mated facts (instance data of the composition or QoS of used services) as input for a prediction model. The prediction model is based on ma- chine learning regression techniques, and trained using historical process instances. We present the architecture of our approach and a prototype implementation, and validate our ideas based on an illustrative example.	
USTUTT FBK	Title: Adaptation of Service-Based Applications Based on Process Quality Factor Analysis When service-based applications implement business processes, it is important to monitor their performance in terms of Key Performance Indicators (KPIs). If monitoring results show that the KPIs do not reach target values, the influential factors have to be analyzed and corresponding adaptation actions have to be taken. In this paper we present a novel adaptation approach for service-based applications (SBAs) based on a process quality factor analysis. This approach uses decision trees for showing the dependencies of KPIs on process quality factors from different functional levels of an SBA. We extend the monitoring and analysis approach and show how the analysis results may be used to come up with an adaptation strategy leading to an SBA that satisfies KPI values. The approach includes creation of a model which associates adaptation actions to process quality metrics, extraction of adaptation requirements based on analysis results, and identification of an adaptation strategy which can consist of several adaptation actions on different functional levels of an SBA.	None

4.2.3   WP-JRA-2.3: Self-* Service Infrastructure and Service Discovery Support

WP-JRA-2.3 will define policies, monitoring and redeployment techniques, for adaptive and self-healing services, specify and develop registry support for service metadata, QoS attributes, service composition, and federation of service registries and provide service ranking information on the basis of historical usage information. Work is structured in two tasks, to develop infrastructure mechanisms for the run-time adaptation of services (T-JRA-2.3.1) and in service registration and search (T-JRA-2.3.2). The consortium is planning **5** research publications in JRA2.3.

Collaborators	Description	Also Relates or contributes to
CNR TUW	CNR will work with TUW on exploiting information about how users interact with the infrastructure and in particular how users implicitly define business processes through the infrastructure itself. Some preliminary work has been already carried out by CNR itself on logs coming not from service-based infrastructures but from search engines. The aim for is to publish papers in relevant IR and DM conferences and journals such as VLDB and ACM TWEB.	None
CNR TUW CNR	It is particularly important that for the infrastructure supports the self-* (i.e. self-organization, self-adaptiveness, self-management, self-monitoring, self-tuning, self-repair, self-configuration, etc.)	None

INRIA SZTAKI	execution of services and business processes. CNR has a strong expertise on this area and will work together with the other partners listed to definite novel self-* methodologies for service-based infrastructures. Work to develop autonomic computing techniques and bio-inspired algorithms for self-* will be performed.	
CNR SZTAKI	These partners will continue the work together to develop nature-inspired algorithms for self-adaptation. Self-adaptive systems change with requirements and environments, and provide dependability, robustness and availability with minimal human interaction. The aim of this joint effort is to devise algorithms that, through the use of paradigms inspired by nature, will enable the adaptation of services in different contexts. Current efforts are aimed at service selection based on non-functional properties in a chemical paradigm.	CD-JRA-2.3.6
SZTAKI TUW	This collaboration focuses on SLA based virtualized service provisioning with the aim of combining three different areas: negotiation, (meta)brokering and on-demand dynamic service deployment, so services with guaranteed performance can be deployed and invoked on the fly.	CD-JRA-2.3.6
SZTAKI INRIA	SZTAKI and INRIA will collaborate on nature inspired algorithms in self-* services. The aim of this work is to investigate how certain nature inspired models (e.g., "chemical computing") can be applied for some aspects of self-* service features. This activity is more focused on the chemical programming itself and its aspects (i.e. methodology) than its actual applications. In this sense it is a complementary to the CNR+SZTAKI cooperation.	CD-JRA-2.3.6

4.3   Other Co-authored Publications

Furthermore, some publications are difficult to report under one activity or work package because they report research undertaken globally within the consortium. One such paper is planned in the next 6-month period.

MOST S-CUBE MEMBERS	Description of the S-Cube research framework and of the longer term research challenges pursued in S-Cube.	Overall S-Cube Research Strategy

5   Conclusions and Future Co-Authored Publications

This deliverable reports a substantial increase in planned co-authored publications in the first half of year-3 of the project over the actual co-authored publications produced in year-2. Even allowing for some planned publications not to be accepted for publications, the analysis reveals a trend of increased co-authored publications consistent with the increased levels of research cooperation and visits that are taking place in the consortium. We anticipate these numbers to increase through year-3 of the project.

To improve the production of future versions of this deliverable, and to provide more effective reporting during deliverable periods, S-Cube will soon move to a centrally-managed document management solution based on bibliographic software for all of its planned and publication papers and other research outcomes. This solution will enable project members and external interested parties to track and trace all research outputs from their source and inception, to final publication. We look forward to reporting this and its results in the next version of this deliverable.