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Management Summary

This deliverable reports on the breadth, coverage and outcomes of mobility initiatives from the S-Cube mobility programme from month 1 to month 48. It also outlines possible areas, objectives and implementation routes for future research collaboration between participating S-Cube organisations. It updates and extends previous S-Cube deliverables: CD-IA-2.1.3 “Initial assessment of results of a separate mobility program for researchers and students”; CD-IA-2.1.4 “Mobility program determined based on the S-Cube Convergence Knowledge Model”; PO-IA-2.1.6 “Intermediate Assessment of mobility program for researchers and students”.

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Members of the S-CUBE consortium:

University of Duisburg-Essen (Coordinator)	Germany
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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
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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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List of acronyms

A&M	Adaptation and Monitoring
ASN	Agile Service Network
BPEL	Business Process Execution Language
BPM	Business Process Management
CEP	Complex Event Processing
EAI	Enterprise Application Integration
GUI	Graphical User Interface
KPI	Key Performance Indicator
PPM	Process Performance Metric
QA	Quality Assurance
QoS	Quality of Service
SC	Service Composition
SI	Service Infrastructure
SLA	Service Level Agreement
SN	Service Network
SOA	Service Oriented Architecture

1 Introduction

The S-Cube mobility program aims to promote knowledge exchange and the alignment of research activities across S-Cube's research groups and domains; this is achieved among others through funding for the travel and upkeep of S-Cube members carrying out joint research activities during research visits.

Mobility visits carried out during the first 18, 30 and 36 months of the project were reported in previous deliverables, respectively: CD-IA-2.1.3 "Initial assessment of results of a separate mobility program for researchers and students"; CD-IA-2.1.4 "Mobility program determined based on the S-Cube Convergence Knowledge Model"; and PO-IA-2.1.6 "Intermediate assessment of mobility program for researchers and students". In this deliverable we update the previously available data to present an assessment of all mobility visits occurred until month 48, thus covering the entire lifespan of the NoE.

Overall, 90 mobility visits took place. For each stay, data was collected, summarised (see Appendix B) and analysed to assess the results of the mobility programme against its intended aims and success indicators. Consequently, we reviewed the coverage of S-Cube scientific topics and workpackages during the mobility visits, the participation of S-Cube institutions, and the research outcomes of such visits.

The structure of this deliverable is as follows. Section 2 assesses the coverage of the S-Cube scientific subjects defined for the mobility program. Section 3 assesses the coverage of S-Cube workpackages. Section 4 evaluates the coverage of the S-Cube integration framework. Section 5 provides performance indicators to evaluate general mobility in the project, and the mobility of each partner. Section 6 presents areas of possible future research agreements involving the mobility programme's participating institutions and their possible objectives and implementation routes. Finally, Appendix A, Appendix B, Appendix C, Appendix D and Appendix E respectively list: the mobility topics used for collecting and classifying the current data on mobility; the mobility stays performed so far; mappings of visits to scientific topics, partners' competences and S-Cube workpackages; research outcomes of the mobility stays; and partners' preferences for further research collaboration.

2 Scientific subject coverage and synergy of competencies

S-Cube scientific subjects for mobility were defined in deliverable CD-IA-2.1.2 and updated in Deliverable CD-IA-2.1.4 (see Appendix A). Based on the descriptions of the mobility stays provided by the visitors and summarized in Appendix B, we summarise the covered scientific subject(s) during mobility visits as presented in Table 1 below, and their corresponding workpackages as presented in Table 2.

Scientific subject and visit IDs	**Number of visits**
Business Processes and Protocols	37
Cloud and grid computing	8
Adaptation	24
Evolution	11
Quality of Service	18
Service Discovery	8
Service Composition	34
Negotiation and QoS Agreement	13
Monitoring and Prediction	17
Lifecycle	9
Requirement Engineering	9
Service Design and Modelling Methodologies	16
Quality Assurance	6

Table 1. Number of visits per scientific subject

	Workpackage number					
Scientific subject and visit IDs	**1.1**	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**
Business Processes and Protocols				37		
Cloud and grid computing						8
Adaptation		24				
Evolution	11					
Quality of Service			18			
Service Discovery						8
Service Composition					34	
Negotiation and QoS Agreement			13			
Monitoring and Prediction		17				
Lifecycle	9					
Requirement Engineering	9					
Service Design and Modelling Methodologies	16					
Quality Assurance			6			
Total	35	41	37	37	34	16

Table 2 Number of visits per subject per main Work package

In the final year of the projects the set of visits made with mobility covered, for the first time, all of the research subjects and workpackage subjects such as Cloud and grid computing, Quality assurance, Lifecycle were all addressed for the first time in the mobility visits.

Table 4 below synthetises partner participation patterns by considering for each research stay the sending and hosting institutions pairs, and indicates a synergy of research at different institutions. As the table shows, overall there is a good participation from S-Cube members with all institutions acting as visitors, and all except for TUDortmund acting as hosts. Table 11 in Appendix C presents in more detail the synergy of research between mobility partners by breaking down for sending and hosting partner the competencies tapped into for each individual mobility stay.

		HOSTING INSTITUTIONS																
VISITING INSTITUTIONS		UniDue	Tilburg	CITY	CNR	FBK	INRIA	Lero-UL	SZTAKI	POLIMI	TUW	UCBL	UoC	UPM	USTUTT	UniHH	VUA	UPC	TUDortmund
	UniDue			1	1	1				1					2			1	
	Tilburg							1		1		3		2	5				
	CITY					1				1			1						
	CNR						1				1								
	FBK									3					1				
	INRIA			1												1	2		
	Lero-UL		1	2	1					1		1					1		
	SZTAKI		1	2	1						1				3			2	
	POLIMI		1	1									3		1				
	TUW		1		1				1						1				
	UCBL		2		2		1												
	UoC		1		1					1		2		2	2				
	UPM										3								
	USTUTT	1	1			1					1		2						
	UniHH														1				
	VUA									3									
	UPC													1					
	TUDortmund									1									

Table 3. Breakdown of mobility visits per host/visiting institutions

3 Workpackage coverage

Based on the information provided by the visitors for each mobility stay, we identified the association between each visit and the corresponding relevant workpackages as presented in Table 12 in Appendix C. This exercise highlighted an increase in the number of stays being reported as cross-package by the visitors in the last year of the project, which testifies to the success of the collaboration and alignment effort performed throughout S-Cube. The association between research stays and workpackages is summarised below in Figure 1.

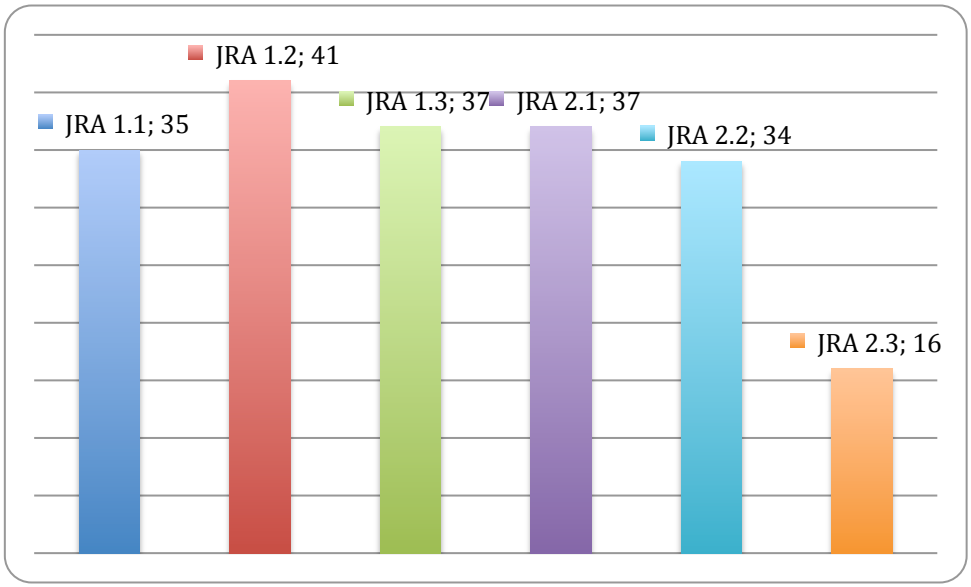

Figure 1. Number of research visits per workpackage

4 Integration research framework coverage

Based on the definition of the S-Cube Integration Framework Baseline in CD-IA-3.1.1 "Integration Framework Baseline," we analysed the coverage of S-Cube mobility stays with respect to 1) the Reference Lifecycle view and 2) the Runtime Architecture view of the integration framework. For each view, the analyses refer to each individual research visit using their unique IDs as defined in Table 9, Appendix B.

4.1 Coverage of the reference lifecycle view

The reference lifecycle view shown in Figure 2 below is described in detail in the deliverable CD-IA-3.1.1 "Integration Framework Baseline."

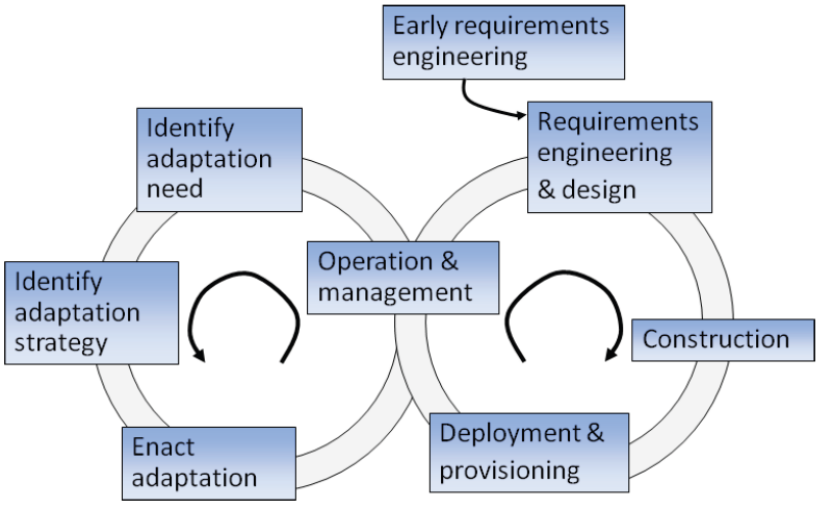

Figure 2. Reference Life Cycle view

Overall, all of the phases of the reference lifecycle were covered through various mobility visits as reported in Table 4. Much of the performed work addressed the Requirements Engineering & Design, and the Construction/Realization phases. Although improved since the last review of the life cycle coverage, research exchanges related to the phases of "Early Requirements Engineering" and "Enact Adaptation" were still markedly fewer than those dedicated to other phases. This however may be explained by the similarity of early requirements activities for SOA and other types of applications, and by the fact that the development of new enactment environments is not a focus of the S-Cube project.

Lifecycle phase	**Visit ID**
Early Requirements Engineering	18, 19, 70
Requirements Engineering & Design	1, 2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 34, 36, 37, 38, 41, 43, 44, 45, 48, 49, 50, 51, 52, 53, 55, 57, 58, 59, 62,68,67, 70, 71, 72, 73, 74, 80, 82, 83, 85, 88, 89
Construction/Realization	1, 2, 5, 8, 14, 15, 17, 19, 21, 23, 24, 27, 28, 36, 38, 42, 44, 45, 48, 49, 50, 51, 52, 54, 57, 58, 61, 62, 70, 71, 72, 73, 74, 80, 82, 85, 88, 89, 90
Deployment & Provisioning	2, 6, 7, 8, 17, 19, 20, 21, 33, 38, 43, 46, 48, 51, 70, 72, 73, 75, 76, 79, 81, 83, 87, 90
Operation & Management	2, 4, 10, 11, 12, 13, 17, 18, 19, 26, 32, 41, 48, 51, 55, 59, 67,

	70, 72, 75, 76, 78, 81, 82, 83, 85, 87, 89
Identify Adaptation Needs	2, 4, 6, 10, 11, 13, 16, 17, 18, 20, 29, 31, 32, 34, 35, 39, 40, 41, 43, 48, 51, 55, 64, 67, 72, 77, 80, 82, 83, 85, 86, 89
Identify Adaptation Strategy	16, 22, 29, 34, 35, 39, 40, 43, 64, 65, 72, 75, 77, 83, 84, 87
Enact Adaptation	7, 11, 12, 72, 77, 79, 83

Table 4 Mapping of visits to the lifecycle phase

4.2 Coverage of the runtime architecture view

The runtime architecture view, shown in Figure 3, is described in detail in [CD-IA-3.1.1 Integration Framework Baseline, 27 March 2009].

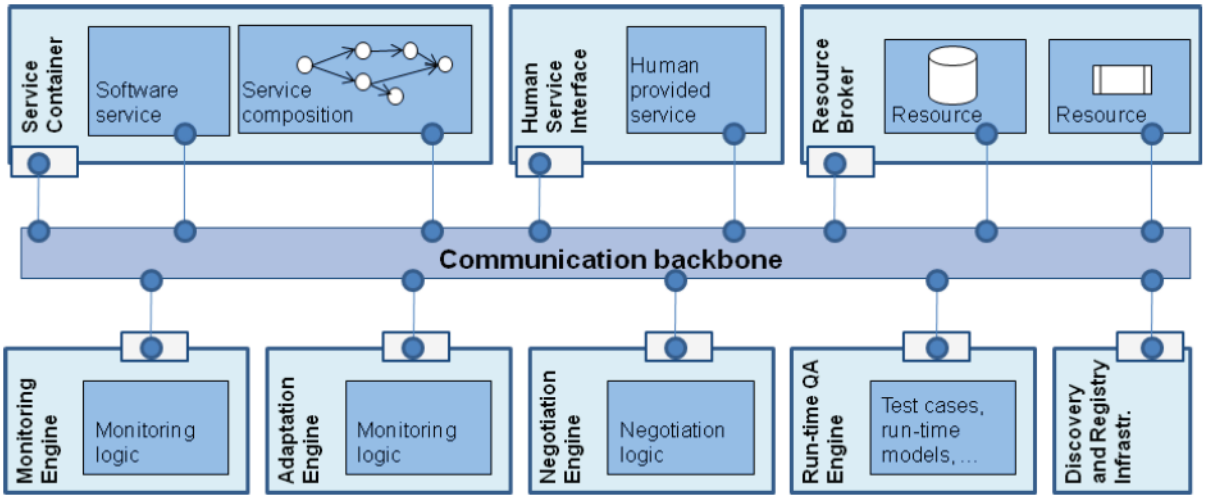

Figure 3. Runtime Architecture view

Overall, all elements of the runtime architecture were covered through various mobility visits as presented in Table 5 below. Again, we notice a slight disparity in the evenness of the coverage as some elements such as the Service Container and the Adaptation Engine received more coverage than others in keeping with the core focuses defined for the S-Cube project. There is however a general improvement as elements that received little to no coverage in previous years (e.g. Resource broker, Negotiation engine) were addressed over the course of several mobility stays.

Runtime Architecture elements	**Visit ID**
Service container	2, 4, 11, 20, 27, 28, 31, 32, 36, 38, 40, 42, 44, 57, 56, 62, 65, 67, 70, 72, 73, 74, 75, 80, 81, 82, 83, 85, 87, 88, 89, 90
Human service interface	28, 41, 49, 60, 70, 71, 72, 73, 81, 82, 85, 89
Resource broker	75, 76, 79, 82, 85, 87, 89
Monitoring engine	2, 17, 18, 28, 31, 34, 39, 56, 59, 57, 62, 64, 65, 70, 72, 73, 75, 78, 81, 83, 86, 87
Adaptation engine	11, 12, 16, 18, 22, 24, 29, 31, 32, 34, 39, 40, 43, 64, 65, 67, 77, 79, 80, 83, 83, 86, 90
Negotiation engine	7, 70, 79, 83
Runtime QA Engine	11, 18, 24, 30, 33, 40, 46, 47, 48, 63, 72, 84, 86
Discovery and registry infrastructure	6, 17, 20, 37, 67, 70, 72, 77, 83

Table 5. Mapping of visits to the Runtime Architecture elements

5 Key performance indicators (KPIs)

The project's Description of Work [Annex I – "Description of Work"] specifies one of S-Cube's key objectives as the "Bonding of Research Staff" (obj-4) to support the exchange of researchers in order to foster research alignment by achieving cross-fertilisation of knowledge. This objective is associated with key performance indicators, the fulfilment of which we examine in this section. Additional metrics such as average duration per visit are also examined.

As already presented in Section 2, all S-Cube partners participated to the mobility program. Table 6 and Figure 4 show an increase in the number of mobility stays and participants from the start of the project until M36, followed by a decrease in those metrics afterwards. The average duration of a visit on the other hand noticeably increases from M37 onwards. These results may be explained by the fact that, once the forming of bonds across institutions was established, many researchers carried on part of the collaboration online and reported using remote collaboration tools to communicate with each other in the course of their joint research activities. Overall, the mobility stays have resulted in 35 joint publications so far (see Appendix D) and many other research papers currently in progress.

Metric	**M1-M12**	**M13-M34**	**M25-M36**	**M37-M48**	**Overall**
Number of research visits (KPI)	16	19	34	21	90
Number of participating researchers (as visitors) (KPI)	13	16	29	12	70
Number of participating S-Cube beneficiaries as visitors (KPI)	7	12	15	10	18
Number of participating S-Cube beneficiaries as hosts	8	8	12	9	17
Average Duration per visit (in days)	10.5	8.12	7.72	14.15	10.12
Number of co-authored publications resulting from mobility (KPI)	8	10	9	8	35

Table 6. Performance Indicators

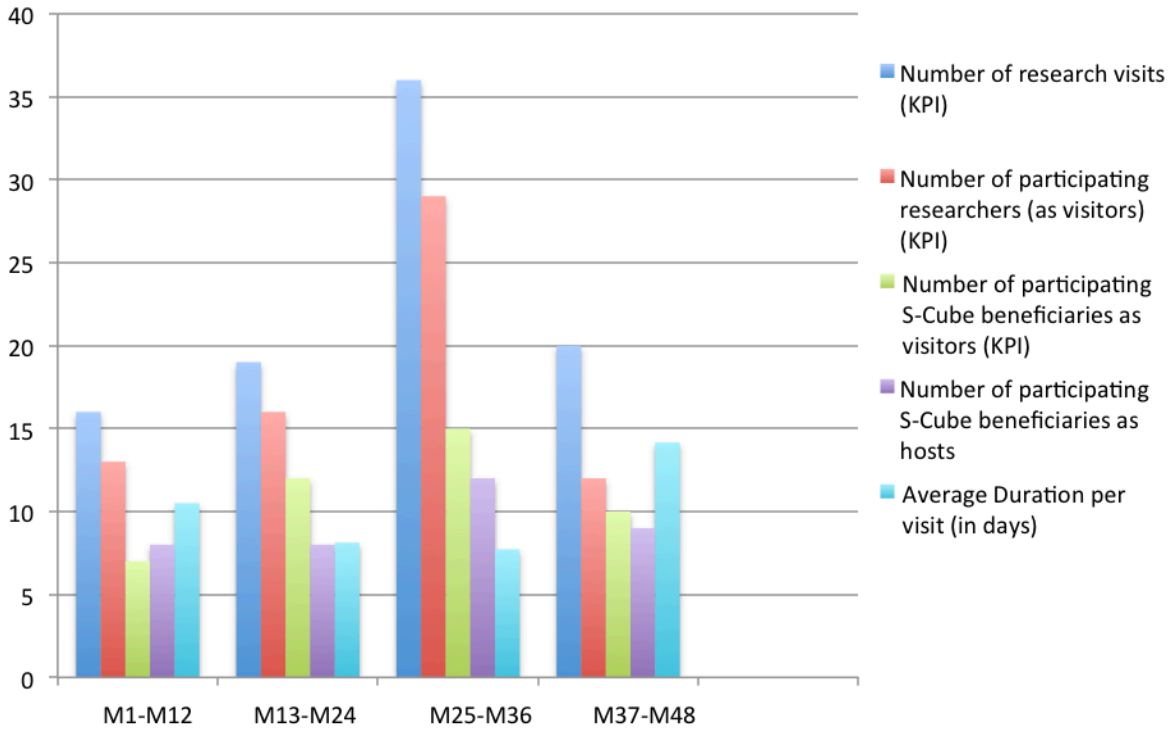

Figure 4. Variations of KPIs throughout the project

6 Future research agreements

In month 47, S-Cube member institutions were polled to determine their willingness to build upon the research links formed in the course of the project, and participate in future research agreements. Ten organisations replied to express their interest as summarised in Table 14 in Appendix E. This section reports on their specified preferences.

The polled partners listed over 30 SOC-related areas of interest for further collaboration, the full list of which can be seen in Table 14 (Appendix E). Most of these can be classified under the following overarching themes:

- Adaptation and monitoring (e.g. cross-layer service monitoring and adaptation; service middleware for adaptable services and service compositions);
- Business process and protocols;
- Cloud computing;
- Foundations of computing (e.g. foundations of SOC, GSD, Mobile and ubiquitous computing)
- Quality of service;
- Requirements engineering;
- Service composition;
- Service design and modelling methodologies (e.g. agile methods; formal models and languages for SOS).

Research areas pertaining to *Service Composition*, *Business Process Management* and *Cloud Computing* were the most recurrent out of all those mentioned by the partners. Other areas, namely *Internet of Things* and *Smart Energy Systems*, did not neatly fall into the themes above, as they reflect research trends emerged after the beginning of S-Cube, and were thus not integral to the taxonomy and terminology of the NoE.

The polled partners generally expressed an interest in collaborating further with other consortium members, with a few partners additionally listing external organisations and academics as potential research partners. The desired collaboration outcomes by and large involve the development and validation of approaches, models, techniques and/or tools depending on the area of focus, alongside with high-quality publications.

Suggested collaboration routes were varied in their mechanisms, and in their required length and level of commitment to a research partnership; they comprise:

- Training program;
- Fellowship program;
- Joint research center/lab;
- Joint seminar;
- Joint funding proposals;
- Joint research project;
- Short term researcher exchange (e.g. up to 2 months);
- Long term researcher exchange (e.g. up to 1 year);
- Research material, publications and knowledge exchange.

All respondents reported being willing to engage in joint funding proposals and joint research projects in the future; other well-received implementation routes included, in order of popularity: short research exchanges; research material, publications and knowledge exchange; and long research exchanges. Additional suggestions made by the partners included joint conference and/or workshop

organisation, and further Summer Schools and scientific tracks following positive returns on the S-Cube summer schools.

As interest in further research agreements has been recorded, a proposed next step is to initiate and facilitate the discussion on such agreements by circulating the collated information among partners and highlighting synergies of research areas, expected outcomes and competencies to start a "match-making" process.

7 Conclusions

This deliverable builds upon previous material (namely the S-Cube deliverablesCD-IA-2.1.3, CD-IA-2.1.4 and PO-IA-2.1.6) to report on mobility initiatives made possible through funding by the S-Cube project. Research exchange and collaboration was a cornerstone of S-Cube, which aimed to create a community of researchers committed to advancing software service architecture, infrastructures and engineering in Europe. As presented earlier in this document, all partners actively took part in joint research through mobility, with a good volume of research stays and outcomes. Overall, all workpackages and scientific subjects defined for S-Cube were covered in the course of mobility stays; a good synergy of competencies was demonstrated for the various collaborations taking place across institutions; and on the whole the S-Cube integration framework's core focuses were well covered although some phases and elements were less addressed than others due to the lesser focus of the project on them. Consequently, we consider that the S-Cube mobility program was overall successful as evidenced by its uptake in the duration of the project and the outcomes produced. Many participating institutions have indicated their interest and willingness in continuing research collaboration started during S-Cube, and a next step for action will initiate discussion around common topics, research objectives and preferred implementation routes indicated by the interested partners in order to match reported competencies and research expectations within concrete research agreements.

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Appendix A

Table 7 below lists the scientific subjects for mobility as described in CD-IA-2.1.4 (revision of the subjects defined in deliverable CD-IA-2.1.2); Table 8 maps S-Cube scientific topics to workpackages.

Scientific Subject ID	**Scientific Subjects Titles**	**Common and Complementary Competencies**
1	Business Processes and protocols	Business Process Management, Distributed Business Processes, Business Processes & Protocols, E-Business, Business Process Analysis, Monitoring & Auditing, Business Protocol Languages, Multi-Party Business Protocols, Adaptation in Business Protocols, Service Networks, Business Transactions
2	Cloud and grid computing	Grid Scheduling, Grid Workflow, Grid Brokering, Load Balancing & Scheduling, Knowledge Sharing Networks
3	Adaptation	Self-Adaptation, Dynamic Adaptation of Parallel Programs, Engineering Adaptive Component- Based Systems, Adaptive Web Services, Adaptation in Business Protocols, Adaptation of Service, Compositions, Engineering Adaptive Service-Based Systems, Self-Organising Systems, Self- Healing, Flexible & Self-Healing Web Services
4	Evolution	Service Evolution, Software Architecture Evolution, Dependable Evolvable Pervasive Service Engineering
5	Quality of Service	Quality Assurance, Quality of Service, Quality of Service in Component-Based Systems, Web Service Orchestration & QoS Optimisation, Monitoring QoS Metrics of Web Services , Data & Information Related Quality, Data- Related Quality
6	Service Discovery	Semantically-Enriched Service Discovery Mechanisms, Web Service Retrieval, Service Registries, Context-Aware Invocation of Web Services, Dynamic Binding & Invocation of Web Services, Discovery of Human-Based Services
7	Service Composition	Model-Driven Service Composition, Service Composition, Web Service Orchestration & QoS Optimisation, Service Choreography & Orchestration, Service Networks

8	Negotiation and QoS Agreement	Service Level Agreement (SLA) Negotiation, Quality Assurance Negotiation & QoS Agreement, Estimation of the Quality of Service Providers
9	Monitoring and Prediction	Monitoring, Service-Oriented Monitoring, Monitoring Design Principles & Monitoring Framework, Business Process Analysis, Monitoring & Auditing, Monitoring of QoS Metrics of Web Services, Monitoring of Key Performance Indicators, Prediction of KPIs
10	Lifecycle	Software Processes, Software Architecture, Software Engineering, Software Quality Assurance, Software Product-Line Engineering & Variability Management
11	Requirement Engineering	Requirements Engineering, Requirements & Model-Based Testing, User-Centred Requirements Engineering, User-Centred Requirements Engineering, User Centric Services
12	Service Design and Modelling Methodologies	Service-Centric Systems Engineering, Service Design & Modelling Methodologies, Model- Driven Service Composition, Model-Driven Engineering, Interaction Design & Research, Personalisation
13	Quality Assurance	Software Quality Assurance, Testing, Analysis, Monitoring, Prediction

Table 7: S-Cube scientific subjects

Workpackage number						
Scientific subject and visit IDs	**1.1**	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**
Business Processes and Protocols				x		
Cloud and grid computing						x
Adaptation	x	x				
Evolution	x					
Quality of Service			x	x	x	x
Service Discovery						x
Service Composition	x				x	
Negotiation and QoS Agreement			x	x	x	x
Monitoring and Prediction		x		x	x	x
Lifecycle	x					
Requirement Engineering	x					
Service Design and Modelling Methodologies	x					
Quality Assurance			x			

Table 8. Mapping between scientific topics and workpackages

Appendix B

Table 9 below extends previously collected data with the addition of mobility information from M37 onwards. It lists all reported mobility that occurred between M1 – M48.

No	Researcher	Location	Destination	Start date	End date	Duration
1	Georgios Koutras	UOC	Tilburg	06.04.2008	19.04.2008	14
2	Branimir Wetzstein	USTUTT	TUW	07.05.2008	21.05.2008	15
3	Michele Mancioppi	Tilburg	UPM	09.05.2008	20.05.2008	12
4. a, b	Vasilios Andrikopoulos	Tilburg	UCBL	11.05.2008 11.06.2008	18.05.2008 25.06.2008	8 11
5. a, b	Olha Danylevych	USTUTT	UOC	14.05.2008 20.09.2008	28.05.2008 26.09.2008	15 7
6	F. M. Nardini & Gabriele Tolomei	CNR	TUW	09.06.2008	27.06.2008	19
7	Pierluigi Plebani	POLIMI	UOC	06.09.2008	20.09.2008	15
8	Ralph Mietzner	USTUTT	UniDue	29.09.2008	02.10.2008	4
9	Michele Mancioppi	Tilburg	UPM	06.10.2008	16.10.2008	11
10	Andreas Gehlert	UniDue	CITY	15.10.2008	17.10.2008	3
11	Andreas Gehlert & J. Hielscher	UniDue	USTUTT	13.11.2008	14.11.2008	2
12	Luca Cavallaro	POLIMI	USTUTT	07.12.2008	16.12.2008	10
13	Martin Treiber	TUW	Tilburg	16.01.2009	30.01.2009	15
14	Olha Danylevych	USTUTT	Tilburg	07.02.2009	13.02.2009	7
15	Andreas Gehlert	UniDue	USTUTT	02.03.2009	06.03.2009	5
16	Raman Kazhamiakin	FBK	USTUTT	26.05.2009	30.05.2009	5
17	Konstantinos Zachos	CITY	UOC	03.06.2009	16.06.2009	14
18	Andreas Gehlert	UniDue	FBK	07.06.2009	10.06.2009	4
19	Stephen Lane	Lero-UL	CITY	15.06.2009	28.06.2009	14
20	Vanessa Le Roy	INRIA	CITY	15.06.2009	04.09.2009	14
21	François Hantry	UCBL	INRIA	06.07.2009	07.07.2009	2
22	Cinzia Cappiello	POLIMI	CITY	20.07.2009	31.07.2009	12
23	Daniel Dubois	POLIMI	UOC	04.11.2009	14.11.2009	11
24	Voskakis Emmanouil	UOC	POLIMI	09.12.2009	13.12.2009	5
25	Vasilios Andrikopoulos	Tilburg	POLIMI	12.12.2009	18.12.2009	7
26	Deepak Dhungana	Lero-UL	CITY	10.01.2010	23.01.2010	14
27	Michele Mancioppi	Tilburg	USTUTT	15.02.2010	28.02.2010	14

No	Researcher	Location	Destination	Start date	End date	Duration
28	Dragan Ivanovic	UPM	TUW	20.02.2010	27.02.2010	8
29	Antonio Bucchiarone	FBK	POLIMI	23.02.2010	26.02.2010	4
30	Sandor Acs	SZTAKI	TUW	21.02.2010	26.02.2010	6
31	Branimir Wetzstein	USTUTT	FBK	21.02.2010	27.02.2010	7
32	Vasilios Andrikopoulos	Tilburg	USTUTT	24.02.2010	01.03.2010	6
33	Atilla Kertész	SZTAKI	CNR	01.03.2010	05.03.2010	5
34	Osama Sammodi	UniDue	CNR	01.03.2010	11.03.2010	11
35	George Baryannis	UOC	CNR	02.03.2010	05.03.2010	4
36	François Hantry	UCBL	Tilburg	14.03.2010	18.03.2010	5
37	Kreshnik Musaraj	UCBL	CNR	18.03.2010	29.03.2010	12
38	Stephen Lane	Lero-UL	CNR	02.03.2009	05.03.2009	4
39	Erwan Daubert	INRIA	UniHH	07.03.2010	19.03.2010	13
40	Philipp Leitner	TUW	USTUTT	08.03.2010	19.03.2010	12
41	Philipp Leitner	TUW	CNR	02.03.2010	05.03.2010	4
42	Kristof Hamann	UniHH	USTUTT	14.03.2010	19.03.2010	6
43	Maurizio Giordano	CNR	INRIA	10.05.2010	15.05.2010	6
44	Martin Treiber	TUW	UPM	16.05.2010	29.05.2010	14
45	Mariana Karmazi	UOC	USTUTT	23.05.2010	28.05.2010	6
46	Andras Micsik	SZTAKI	USTUTT	24.05.2010	27.05.2010	4
47	Laszlo Kovacs	SZTAKI	USTUTT	24.05.2010	27.05.2010	4
48	Attila Kertesz	SZTAKI	USTUTT	24.05.2010	27.05.2010	4
49	Noel Carroll	Lero-UL	Tilburg	31.05.2010	11.06.2010	12
50	Noel Carroll	Lero-UL	UCBL	08.06.2010	11.06.2010	4
51	Manolis Voskakis	UOC	UCBL	08.06.2010	13.06.2010	6
52	Mariana Karmazi	UOC	UCBL	08.06.2010	13.06.2010	6
53	A.K.M. Rafiqul Haque	Tilburg	Lero-UL	19.06.2010	10.07.2010	22
54	Olha Danylevych	USTUTT	UOC	21.06.2010	05.07.2010	15
55	Vasilios Andrikopoulos	Tilburg	UCBL	28.06.2010	09.07.2010	12
56	Marc Oriol Hilari	UPC	POLIMI	04.07.2010	09.07.2010	6
57	Dragan Ivanovic	UPM	TUW	20.07.2010	23.07.2010	4
58	Michele Mancioppi	Tilburg	USTUTT	03.08.2010	24.08.2010	22
59	François Hantry	UCBL	CNR	16.09.2010	19.09.2010	4
60	Voskakis Emmanouil	UOC	UCBL	08.06.2010	13.06.2010	6
61	Mariana Karmazi	UOC	USTUTT	10.07.2010	18.07.2010	9

No	Researcher	Location	Destination	Start date	End date	Duration
62	Dragan Ivanovic	UPM	TUW	02.10.2010	11.10.2010	9
63	Thomas Röblitz	TU Dortmund	POLIMI	13.10.2010	15.10.2010	3
64	Eric Schmieders	UniDue	POLIMI	14.10.2010	15.10.2010	2
65	Andras Micsik	SZTAKI	CITY	02.11.2010	05.11.2010	4
66	Attila Kertesz	SZTAKI	CITY	02.11.2010	09.11.2010	8
67	Pierluigi Plebani	POLIMI	Tilburg	14.11.2010	17.11.2010	4
68	Salima Benbernou	UCBL	Tilburg	07.10.2010	08.10.2010	2
69	Ali Imran Jehangiri	TU Dortmund	POLIMI	13.10.2010	15.10.2010	3
70	Ricardo Contreras	CITY	POLIMI	13.10.2010	15.10.2010	3
71	Michele Mancioppi	TILBURG	USTUTT	06.12.2010	20.12.2010	15
72	Sajid Ibrahim Hashmi	Lero	VUA	27.01.2011	11.02.2011	15
73	Michele Mancioppi	TILBURG	USTUTT	10.02.2011	25.02.2011	15
74	George Baryannis	UoC	UPM	05.03.2011	16.03.2011	12
75	Attila Kertesz	SZTAKI	UPC	01.04.2011	07.04.2011	6
76	Attila Kertesz	SZTAKI	TILBURG	02.05.2011	11.05.2011	9
77	Heorhi Raik	FBK	POLIMI	08.05.2011	21.05.2011	14
78	Amal Elgammal	TILBURG	UCBL	13.06.2011	02.07.2011	15
79	Ivona Brandic	TUW	SZTAKI	25.06.2011	29.06.2011	5
80	Hector Fernandez	INRIA	VUA	14.10.2011	01.12.2011	15
81	Sajid Ibrahim Hashmi	Lero	POLIMI	16.10.2011	31.10.2011	15
82	Damian Andrew Tamburri	VUA	POLIMI	22.10.2011	04.11.2011	12
83	Ricardo Contreras	CITY	FBK	01.11.2011	31.01.2012	92
84	Asli Zengin	FBK	POLIMI	04.11.2011	04.11.2011	1
85	Damian Andrew Tamburri	VUA	POLIMI	15.11.2011	16.11.2011	2
86	Osama Sammodi	UniDue	UPC	20.11.2011	25.11.2011	6
87	Attila Kertesz	SZTAKI	UPC	20.11.2011	26.11.2011	7
88	George Baryannis	UoC	UPM	25.11.2011	10.12.2011	16
89	Damian Andrew Tamburri	VUA	POLIMI	14.12.2011	15.12.2011	2
90	Hector Fernandez	INRIA	VUA	03.02.2012	10.02.2012	6

Table 9. List of mobility stays

Appendix C

This section presents the subjects, workpackages and competencies involved in each research stay.

Table 10 below provides mappings between mobility stays and covered scientific subjects; Table 11 presents the research subjects and partners' competencies for each mobility stay; and Table 12 presents the workpackages addressed for each mobility stay.

Visit ID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	x												
2	x				x		x		x				
3	x												
4a				x								x	
4b				x								x	
5a	x						x					x	
5b	x						x					x	
6	x					x	x					x	
7						x		x					
8										x	x	x	
9	x												
10			x						x	x			
11			x				x			x			
12			x				x						
13									x				
14	x						x						
15	x									x	x		
16	x		x		x		x		x			x	
17	x				x		x		x				
18											x	x	
19	x				x		x		x				
20	x		x			x	x						
21	x												
22	x					x							
23	x		x									x	
24	x		x									x	
25							x						
26				x	x								
27							x						

28							x		x				
29			x						x		x		
30									x				
31					x								x
32			x	x									
33			x	x									
34	x								x				
35			x										
36	x												
37	x												
38			x										
39	x		x						x				
40			x				x	x					
41	x												
42	x							x					
43			x										
44							x						
45	x						x						
46								x					
47							x						
48							x						
49	x						x						
50	x												
51	x						x						
52	x						x						
53	x						x						
54							x						
55				x									
56					x			x					
57					x		x	x					
58	x												
59	x												
60	x				x		x						
61							x						
62					x								
63								x					

64			x										
65			x		x								
66			x		x			x					
67				x		x					x		
68				x				x					
69								x					
70				x	x	x	x	x	x				
71	x						x						
72		x			x					x	x		x
73							x	x	x				
74							x					x	
75		x	x						x				
76		x											
77	x		x	x	x	x	x					x	
78	x				x								x
79		x	x					x					
80	x	x											
81		x								x			x
82										x	x	x	
83			x	x		x	x		x				
84			x		x								x
85										x	x	x	
86					x		x		x				x
87		x	x						x				
88							x					x	
89										x	x	x	
90	x	x											

Table 10. Research topics of Visits - Scientific subjects for mobility

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
1	Service Systems and Business Process Management	UoC	Service networks	Tilburg	Business processes, service composition
2	Monitoring and Analysis of Influential Factors of Business Process Performance	USTUTT	Performance indicators Monitoring Process analysis	TUW	KPI Monitoring
3	Business Protocol Soundness	Tilburg	Business Process Languages Process execution	UPM	Business protocols Compatibility
4 a, b	Controlled Evolution of Services	Tilburg	Service choreography Service evolution	UCBL	Business protocol languages
5a, b	Service Networks on top of the BPM layering stack	USTUTT	Business processes Modeling Performance indicators	UoC	Level of services Service specification
6	Internet of Services (IoS): bring human inside the workflow of software services	CNR	Grid workflow	TUW	Service Discovery, Service Architectures
7	Semantic based negotiation	POLIMI	Service negotiation	UoC	Ontologies for services Semantics
8	Configuration and deployment of SaaS applications using techniques from software product lines	USTUTT	Enterprise application integration ESB	UniDue	SBA
9	Replaceability and conformance analysis for business protocols	Tilburg	Formal specification Service analysis	UPM	Business protocols Compatibility
10	Exploiting codified human interaction (HCI) and context knowledge for engineering, monitoring and adapting service-based applications	UniDue	Requirements analysis	CITY	Human computer interaction Requirement analysis engineering
11	Integrating requirements engineering, online testing and adaptation of workflows	UniDue	Requirements analysis/engineering Testing	USTUTT	Integration Adaptation mechanisms
12	Comparison between	POLIMI	Design for adaptation	USTUTT	Business

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
	SCENE and BPEL'n'Aspects				processes
13	Calculating Service Fitness in Service Networks	TUW	KPI monitoring	Tilburg	QoS monitoring
14	Service Networks and Service Compositions	USTUTT	Service choreography Modeling Performance indicators	Tilburg	Service choreography Service specification Evolution
15	The interface between requirements engineering and workflows	UniDue	Requirement engineering	USTUTT	Workflow
16	Adaptation of SBAs based on process quality factor analysis	FBK	(Self) Adaptation SBA analysis	USTUTT	KPI BP analysis
17	Enhancing Service Network Analysis and Service Selection using Requirements-based Service Discovery	CITY	Service discovery	UoC	Quality of service Service discovery
18	The role of assumptions in the engineering and adaptation processes of service-based applications.	UniDue	Adaptation requirements Adaptation strategies	FBK	Adaptation mechanisms Business process modeling
19	Primary Research on Software Process for SBA Development	LERO	"Industrial expertise"	CITY	User-centered requirements engineering
20	Replacement policies for dynamic Adaptation of SBAs	INRIA	Adaptation requirements Adaptation mechanisms	CITY	Service composition
21	Paradigm of model management, refinement, consistency, model checker	UCBL	Business Process Languages	INRIA	Verification
22	Designing Adaptive Service-based Applications using Service Granularity	POLIMI	Adaptation requirements Design for adaptation	CITY	User-centered requirement engineering Requirements analysis
23	Service Networks on top of BPM Layering stack	POLIMI	Business processes	UoC	Model-driven engineering

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
24	Service Networks on top of BPM Layering stack	UoC	Model-driven engineering	POLIMI	Business processes
25	QoS contract evolution	Tilburg	Contracts, evolution approaches	POLIMI	Formal specifications
26	Service engineering – reuse - contextual information	Lero-UL	Service engineering	CITY	Context-based information
27	Fragmentation and business Process transaction	Tilburg	Process transactions	USTUTT	fragmentation
28	Modeling dynamic behavior and provision of service composition	UPM	Modeling dynamic behavior and verification	TUW	Service composition
29	Context modeling of adaptable SBA – service engineering and design service adaptation and monitoring	FBKIRST	Monitoring – adaptation	POLIMI	Service engineering
30	SLA-based resource virtualization	SZTAKI	virtualization	TUW	Quality assurance
31	Adaptation of service based applications – KPIs	USTUTT	KPI	FBK	Adaptation
32	Evolution and adaptation of services	Tilburg	Evolution and adaptation	USTUTT	Evolution and adaptation
33	Deployment and management and self-* service execution	SZTAKI	Deployment of services	CNR	Service management
34	Quality prediction to support proactive adaptation	UniDue	Quality of service	CNR	Adaptation
35	Monitoring and adaptation	UoC	Monitoring and adaptation	CNR	Monitoring and adaptation
36	BPM transactions – business rules and SLA	UCBL	Formal specifications	Tilburg	Business rules
37	Mining business protocols	UCBL	Mining protocols	CNR	Mining techniques
38	Configuration management process for service-based applications – quality assurance	Lero-UL	Software process aspects	CNR	Service specific expertise
39	Adaptation and monitoring	INRIA	Generic adaptation framework	UniHH	Monitoring
40	Aspect-based adaptation	TUW	Predictions on SLA	USTUTT	Aspect-based adaptation of services

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
41	SLA Violation	TUW	Predictions on SLA	CNR	Process mining
42	Business transactions	UniHH	Business transactions	USTUTT	Business transaction models
43	Non-conventional computing models for service adaptation	CNR	Workflow formalization – based on chemical computation models	INRIA	Higher order programming languages Non-conventional programming languages
44	Dynamic service composition model	TUW	Dynamic system models	UPM	Behavior analysis
45	Service networks	UoC	QoS, Service discovery	USTUTT	Workflows
46	Deployment and management of service and self-* in service execution	SZTAKI	Deployment, service execution	USTUTT	Workflows
47	Deployment and management of service and self-* in service execution	SZTAKI	Deployment, service execution	USTUTT	Workflows
48	QoS monitoring	SZTAKI	QoS monitoring, ontological modeling	USTUTT	Monitoring, workflow
49	Service Networks and social networks analysis	LERO	Service-oriented business model	Tilburg	Business process management
50	Business Process Management	LERO	Service networks	UCBL (Paris)	Business transaction languages, performance analytics
51	Service networks – simulation, system dynamics, BP management and performance analysis	UoC	Business process management	UCBL (Paris)	Business process management
52	Service Networks metamodel	UoC	Simulation of SNs	UCBL (Paris)	Transactions, simulation
53	Business Transactional Process Fragments	Tilburg	Business processes and transactions	LERO	Service-oriented business model
54	Service Networks – meta models	USTUTT	Service networks	UoC	modeling
55	Service evolution while preserving interoperability	Tilburg	Service evolution	UCBL (Paris)	interoperability
56	Quality of Service for service composition	UPC	QoS monitoring	POLIMI	QoS monitoring

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
57	Quality of Service for service composition	UPM	Service Composition	TUW	QoS
58	Process fragments (syntactic structure)	Tilburg	BP management and transactions	USTUTT	Process fragments design and specification
59	Formal model for business aware transaction management	UCBL	Logic-based approach for transactions	CNR	SLA, business rules
60	Service Networks on top of the BPM layering stack (Performance analytics of service networks: A systems dynamics approach)	UoC	Simulation, performance measures	UCBLM (Paris)	Formal issues
61	Service networks	UoC	Service network's metamodel for constructing service network mo	USTUTT	Service networks metamodeling
62	Dynamic modeling of quality of service: testbeds	UPM	Modeling, service composition	TUW	QoS
63	SLA-based Resource Management of Virtual Plateforms	T.U. Dortmund	Monitoring, adaptation strategies, elearning	POLIMI	Discussions with several partners: INRIA, FBK, USTUTT, POLIMI, ..
64	Evaluation of existing model checkers in the context of proactive adaptation	UniDue	Proactive adaptation capabilities	POLIMI	Model checking
65	Quality prediction and quality based adaptation	SZTAKI	Contexts with web services and HCI aspects of web services access	CITY	Conxt-based information, HCI
66	Discussion about possible cross WP between JRA-1.2 and JRA-2.3	SZTAKI	Contexts with web services and HCI aspects of web services access	CITY	HCI approaches (CITY) + Discussion with other partners of S-Cube
67	Evolution, service discovery	POLIMI	Service retrieval	Tilburg	Service evolution
68	Service evolution and contract	UCBL (Paris)	Modeling of contracts	Tilburg	Evolution of services
69	SLA-based Resource Management of Virtual Platforms	T.U. Dortmund	Monitoring, adaptation strategies, elearning	POLIMI	Discussions with several partners: INRIA, FBK,

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
					USTUTT, POLIMI
70	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction	CITY	Context-based information Human computer interaction	POLIMI	Design for adaptation Adaptation requirements
71	Analysis of Service Choreographies	Tilburg	Service choreography Service evolution	USTUTT	Performance indicators Monitoring Process analysis
72	How to make use of SOA and cloud computing to meet the challenges posed by Global (or distributed) software development	Lero	Service engineering Service-oriented business model	VUA	Service oriented software engineering Software lifecycle
73	Monitoring of Quality Characteristics of Service Orchestrations and Service Choreographies	Tilburg	Service choreography Service evolution	USTUTT	Performance indicators Monitoring Process analysis
74	Automatic derivation of composite service specifications (part of the overall S-Cube challenge "Formal Models and Languages for QoS-aware service composition")	UoC	Service specification	UPM	Service Composition
75	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Multi-level and self-adaptation, Deployment and execution management	SZTAKI	Deployment of services Service execution QoS monitoring	UPC	QoS monitoring
76	Deployment and execution management	SZTAKI	Deployment of services Service execution	TILBURG	Business process execution
77	The integration of the	FBK	(Self) Adaptation	POLIMI	Adaptation

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
	adaptation engine CAptEvo with the dynamic BPEL engine to obtain an industry-ready solution for business process adaptation		Adaptation mechanisms		requirements Design for adaptation
78	Integrating design-time business process compliance management with runtime compliance monitoring for preventive lifetime compliance assurances	TILBURG	BP management and transactions	UCBL	Business process management
79	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Deployment and execution management	TUW	QoS Quality assurance Predictions on SLA	SZTAKI	Deployment of services Service execution QoS monitoring
80	Agile Service Networks in a Global Service Engineering	INRIA	Global software development	VUA	Service oriented software engineering Software lifecycle
81	Using the cloud to improve the technical processes involved in Global (or distributed) software development	Lero	"Industrial expertise" Service engineering Service-oriented business model	POLIMI	Software lifecycle model
82	Context modeling for global software development	VUA	Service oriented software engineering Software lifecycle	POLIMI	Context Software lifecycle model
83	Cross-layer, Pro-Active Monitoring and Adaptation; Human-Service Interaction	CITY	Human computer interaction Requirement analysis engineering	FBK	(Self) Adaptation Adaptation mechanisms
84	Using fuzzy logic to select the best cross-layer adaptation	FBK	(Self) Adaptation Adaptation mechanisms	POLIMI	Adaptation requirements Design for

ID	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
	strategy based on multi-criteria		SBA analysis		adaptation
85	Context modeling for global software development	VUA	Service oriented software engineering Software lifecycle	POLIMI	Context Software lifecycle model
86	Run-time Quality Assurance Techniques; Quality Prediction to Support Proactive Adaptation	UniDue	Proactive adaptation capabilities Quality of service	UPC	QoS monitoring
87	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Deployment and execution management	SZTAKI	Deployment of services Service execution QoS monitoring	UPC	QoS monitoring
88	Automatic derivation of composite service specifications (part of the overall S-Cube challenge "Formal Models and Languages for QoS-aware service composition")	UoC	Level of services Service specification	UPM	Service composition Formal specification Quality of service-aware service composition
89	Context modeling for global software development	VUA	Service oriented software engineering Software lifecycle	POLIMI	Context Software lifecycle model
90	Agile Service Networks in a Global Service Engineering	INRIA	Global software development	VUA	Software lifecycle

Table 11. Research subjects of the visits - competencies of the partners

ID	Research topic	JRA-1.1	JRA-1.2	JRA-1.3	JRA-2.1	JRA-2.2	JRA-2.3
1	Service Systems and Business Process Management				x		
2	Monitoring and Analysis of Influential Factors of Business Process Performance		x			x	
3	Business Protocol Soundness				x	x	
4 a, b	Controlled Evolution of Services	x	x				
5a, b	Service Networks on top of the BPM layering stack				x	x	
6	Internet of Services (IoS): bring human inside the workflow of software services				x	x	x
7	Semantic based negotiation			x			
8	Configuration and deployment of SaaS applications using techniques from software product lines	x					
9	Replaceability and conformance analysis for business protocols				x	x	
10	Exploiting codified human interaction (HCI) and context knowledge for engineering, monitoring and adapting service-based applications	x					
11	Integrating requirements engineering, online testing and adaptation of workflows	x		x		x	
12	Comparison between *SCENE* and BPEL‘n‘Aspects		x		x	x	
13	Calculating Service Fitness in Service Networks			x	x	x	
14	Service Networks and Service Compositions				x	x	
15	The interface between requirements engineering and workflows	x				x	
16	Adaptation of SBAs based on process quality factor analysis		x			x	
17	Enhancing Service Network Analysis and Service Selection using Requirementsbased Service Discovery		x	x			
18	The role of assumptions in the engineering and adaptation processes of service-based applications	x	x				
19	Primary Research on Software Process for SBA Development	x		x			

ID	Research topic	JRA-1.1	JRA-1.2	JRA-1.3	JRA-2.1	JRA-2.2	JRA-2.3
20	Replacement policies for dynamic Adaptation of SBAs	x	x				
21	Paradigm of model management, refinement, consistency, model checker			x	x	x	
22	Designing Adaptive Service-based Applications using Service Granularity	x					
23	Service Networks on top of BPM Layering stack				x		
24	Service Networks on top of BPM Layering stack				x		
25	QoS contract evolution			x			
26	Service engineering – reuse – contextual information	x					
27	Fragmentation and business Process transaction				x		
28	Modeling dynamic behavior and provision of service composition					x	
29	Context modeling of adaptable SBA – service engineering and design service adaptation and monitoring	x	x				
30	SLA-based resource virtualization			x			x
31	Adaptation of service based applications – KPIs		x				
32	Evolution and adaptation of services	x				x	
33	Deployment and management and self-* service execution						x
34	Quality prediction to support proactive adaptation			x			
35	Monitoring and adaptation		x			x	
36	BPM transactions – business rules and SLA			x	x	x	
37	Mining business protocols				x		
38	Configuration management process for service-based applications – quality assurance			x			
39	Adaptation and monitoring		x				x
40	Aspect-based adaptation		x				
41	SLA Violation			x			
42	Business transactions				x		
43	Non-conventional computing models for service adaptation						x

ID	Research topic	JRA-1.1	JRA-1.2	JRA-1.3	JRA-2.1	JRA-2.2	JRA-2.3
44	Dynamic service composition model						x
45	Service networks				x	x	x
46	Deployment and management of service and self-*in service execution		x	x			x
47	Deployment and management of service and self-* in service Execution		x	x			x
48	QoS monitoring		x			x	x
49	Service Networks and social networks analysis				x		
50	Business Process Management				x		
51	Service networks – simulation, system dynamics, BP management and performance analysis				x	x	
52	Service Networks metamodel				x		
53	Business Transactional Process Fragments				x		
54	Service Networks – meta models				x		
55	Service evolution while preserving interoperability	x	x				
56	Quality of Service for service composition			x		x	x
57	Quality of Service for service composition			x		x	x
58	Process fragments (syntactic structure)					x	
59	Formal model for business aware transaction management				x		
60	Service Networks on top of the BPM layering stack (Performance analytics of service networks: A systems dynamics approach)				x	x	
61	Service networks				x	x	
62	Dynamic modeling of quality of service: testbeds			x			
63	SLA-based Resource Management of Virtual Plateforms		x	x			
64	Evaluation of existing model checkers in the context of proactive adaptation		x				
65	Quality prediction and quality based adaptation		x	x			
66	Discussion about possible	x	x				x

ID	Research topic	JRA-1.1	JRA-1.2	JRA-1.3	JRA-2.1	JRA-2.2	JRA-2.3
	cross WP between JRA-1.2 and JRA-2.3						
67	Evolution, service discovery	x					x
68	Service evolution and contract	x	x	x	x		
69	SLA-based Resource Management of Virtual Plateforms		x	x			
70	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction		x	x			
71	Analysis of Service Choreographies				x	x	
72	How to make use of SOA and cloud computing to meet the challenges posed by Global (or distributed) software development	x					
73	Monitoring of Quality Characteristics of Service Orchestrations and Service Choreographies			x		x	
74	Automatic derivation of composite service specifications (part of the overall S-Cube challenge "Formal Models and Languages for QoS-aware service composition")					x	
75	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Multi-level and self-adaptation, Deployment and execution management		x				x
76	Deployment and execution management						x
77	The integration of the adaptation engine CAptEvo with the dynamic BPEL engine to obtain an industry-ready solution for business process adaptation		x				
78	Integrating design-time business process compliance management with runtime compliance monitoring for preventive lifetime compliance assurances				x		
79	Comprehensive and integrated		x	x			x

ID	Research topic	JRA-1.1	JRA-1.2	JRA-1.3	JRA-2.1	JRA-2.2	JRA-2.3
	adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Deployment and execution management						
80	Agile Service Networks in a Global Service Engineering	x	x	x	x	x	x
81	Using the cloud to improve the technical processes involved in Global (or distributed) software development	x					
82	Context modeling for global software development	x		x			
83	Cross-layer, Pro-Active Monitoring and Adaptation; Human-Service Interaction		x				
84	Using fuzzy logic to select the best cross-layer adaptation strategy based on multi-criteria		x	x			
85	Context modeling for global software development	x		x			
86	Run-time Quality Assurance Techniques; Quality Prediction to Support Proactive Adaptation			x			
87	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Deployment and execution management		x	x			
88	Automatic derivation of composite service specifications (part of the overall S-Cube challenge "Formal Models and Languages for QoS-aware service composition")					x	
89	Context modeling for global software development	x		x			
90	Agile Service Networks in a Global Service Engineering	x	x	x	x	x	x

Table 12. Research subject of visit - S-Cube Workpackages

Appendix D

Table 13 below presents the reported research stays and research outcomes categorized by research subject.

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
1	Adaptation	TUW→USTUTT	Aspect-based adaptation and monitoring	Publication: [1]
		SZTAKI→USTUTT	Chemical programming approaches for multi-level adaptation and cross-cutting issues of service infrastructure and service composition.	
		CNR(Naples) →INRIA	An approach to dynamic adaptation in order to accommodate the continuous evolution of SBA environments.	Implementation and experimentation of the chemical-based workflow instantiation process [7]
		FBK→USTUTT	Run-time adaptation in a proactive way to avoid KPIs violations.	Publication: [9] Others in progress
		FBK→POLIMI	Context-based adaptation	Publication: [10]
		UniDue→POLIMI	Evaluating exiting model checkers in the context of an adaptation approach	
		INRIA→UniHH	Comparison of various approaches on various part of the adaptation process.	Comparison of the monitoring phase using different frameworks. Comparison of complete adaptation systems
		UniDue→UniMunster	Design of techniques that can be utilized to adapt applications proactively	Investigation of strategies to cleanly integrate adaptation approaches
		SZTAKI→UPC	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Multi-level and self-adaptation, Deployment and execution	Research plan for an integrated service brokering approach using QoS monitoring of provisioned services in Clouds.

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
		TUW→SZTAKI	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Deployment and execution management	Publication: [28]
		FBK→POLIMI	Using fuzzy logic to select the best cross-layer adaptation strategy based on multi-criteria	
		SZTAKI→UPC	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Deployment and execution management	Published paper [29]
2	Business Processes	LERO→Tilburg	Service Design and Modelling Methodologies	Publication: [27]
		POLIMI→UoC	Identification of patterns in existing service networks and exploit them to reorganize the network by adding the capability to rapidly react to dynamic environment conditions and to changes in business requirements.	Publication: [6]
		UniHH→USTUTT	Design of a common meta model for Business Transactions	A paper dealing with the concept of business transaction which is planned to be integrated in the Deliverable CD- JRA-2.1.5. Publication under progress.
		FBK→POLIMI	The integration of the adaptation engine CAptEvo with the dynamic BPEL engine to obtain an industry-ready solution for business process adaptation	Investigation of integration of CAptEvo adaptation engine and DyBPEL execution engine for business processes (including technical issues) and step-by-step plan for such integration is created.
		UCBL→Tilburg	Formal underpinnings of a business aware transaction management language for design time , execution , runtime-monitoring, analysis and reuse time	Publication: [26]

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
		UPM→USTUTT	Static analysis (in principle, using dependency analysis) of business process implementations to help discard spurious / collateral events which are not related to the main effect under study.	Experiments in progress
		Trento→POLIMI	The integration of the adaptation engine CAptEvo with the dynamic BPEL engine to obtain an industry-ready solution for business process adaptation	Investigation of integration of CAptEvo adaptation engine and DyBPEL execution engine for business processes (including technical issues) and step-by-step plan for such integration is created.
		Tilburg→UCBL	Integrating design-time business process compliance management with runtime compliance monitoring for preventive lifetime compliance assurances	Publication: Elgammal A., Sebahi S., Turetken O., Papazoglou M., Hacid M.S., van den Heuvel W., " Business Process Compliance Management: An Integrated Proactive Approach", 24th International Conference on Advanced Information Systems Engineering (CAiSE'12), Poland (Under Review).
3	Business Protocols	Tilburg→UPM	Study formalisms for the definition of business protocols with time constraints, and analyze their soundness.	Publication: [11]
		Tilburg→USTUTT	The refinement of the classification of fragmentation of service compositions.	Submitted publication: [12]
4	Evolution	POLIMI→Tilburg	Combining service retrieval and service compatibility	[2] (submitted)
		Tilburg→UCBL	An approach to contract-based evolution in SBA	Publication: [18, 20, 21]
		Tilburg→POLIMI	Design of an approach to QoS contracts	Publication: [19]
5	Information Quality			
6	Interaction			
7	Grid Computing	SZTAKI→CNR	Formal Models for QoS-Aware Service Compositions, and Deployment and execution management	Discussion on how model checking can be applicable in models for service management in the future

	Scientific Subject for Mobility	**Visits devoted to the subjects**	**Addressed Challenge**	**Outcomes**
		POLIMI→IBM Haïfa	Impact of optimization approaches for dynamic placement of virtual servers in cloud environment	Theoretical and experimental frameworks built. Publications planned
		SZTAKI→USTUTT	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Multi-level and self-adaptation, Deployment and execution management	Publication: [30]
		Lero→VUA	How to make us of SOA and cloud computing to meet the challenges posed by Global (or distributed) software development	Publication: [31]
		SZTAKI→Tilburg	Deployment and execution management	Submitted paper: [Sz. Varadi, A. Kertesz and M. Parkin, The Necessity of Legally Compliant Data Management in European Cloud Architectures, Submitted to Computer Law and Security Review, 2011.]
		TUW→SZTAKI	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Deployment and execution management	Publication: [28]

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
		Lero→POLIMI	Using the cloud to improve the technical processes involved in Global (or distributed) software development	Publication in progress
		SZTAKI→UPC	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Deployment and execution management	Publication [29]
8	Model-Driven Engineering	SZTAKI→CNR	Deployment and execution management	Investigation of the convertibility and mutual expressiveness of manager components in Service-oriented Architectures with Abstract State Machines, UML State Machines and Temporal Logic of Actions, and discussed how model checking may be applicable in models for service management.
9	Monitoring	SZTAKI→CITY	Methodologies of monitoring and adaptation approaches in distributed systems such as Grids and Clouds	Preparation of Deliverables JRA- 1.2 and JRA-2.3
		UPC→POLIMI	Monitoring for quality of service	Initial model for QoS monitoring
		USTUTT→TUW	Implemented an integrated KPI monitoring and analysis approach	Publications: [22, 23]
		CITY→POLIMI	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction	Publication: [32]
		SZTAKI→UPC	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Multi-level and self-adaptation, Deployment and execution management	A research plan has been developed for an integrated service brokering approach using QoS monitoring of provisioned services in Clouds.
		City→UoC	The develop a process model for KPI-driven service discovery to enhance SN analysis and service selection.	Publication: [24]

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
		CITY→FBK	Cross-layer, Pro-Active Monitoring and Adaptation; Human-Service Interaction	currently writing a joint paper integrating the FBK approach (runtime adaptation triggered by context) with CITY approach (monitor rules verifying the correct execution of a system based on the user context)
		UniDue→UPC	Run-time Quality Assurance Techniques; Quality Prediction to Support Proactive Adaptation	paper will be submitted to ICWS'12
10	Negotiation & QoS Agreement	SZTAKI→TUW	SLA-based Resource Virtualization architecture extended with autonomic operation and enhanced SLA propagation and assurance	[3,5] (publications) [4] (research report)
		CITY→POLIMI	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction	Publication: [32]
		SZTAKI→USTUTT	Comprehensive and integrated adaptation and monitoring principles, techniques, and methodologies, Proactive SLA negotiation and agreement, Multi-level and self-adaptation, Deployment and execution management	Publication: [30]
11	Quality Assurance	UniDue→CNR	Design of an approach to support proactive adaptation decisions by augmenting monitoring with online testing to predict failures with confidence	Publication: [25]

	Scientific Subject for Mobility	**Visits devoted to the subjects**	**Addressed Challenge**	**Outcomes**
		TU_Dortmund→POLIMI	Investigating of a multi-layer eLearning system at TU Dortmund.	Monitoring data gathered
		UniDue→UPC	Run-time Quality Assurance Techniques; Quality Prediction to Support Proactive Adaptation	paper will be submitted to ICWS'12
12	Quality of Service	UPM→TUW	Prediction and analysis of QoS for service orchestration	Publication: [8] Journal publication: in progress
		CITY→POLIMI	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction	Publication: [32]
13	Requirements Engineering			
14	Service Architectures	Lero-UL→VUA	How to use Service Oriented Architecture (SOA) to address the challenges faced by Global Software Development (GSD).	Publications: in progress
		SZTAKI→CITY	Multi-level and self-adaptation, Deployment and execution management	Discussion on possible extensions of the SRV service virtualization architecture with pre-agreed proactive SLA negotiations using the SLA negotiation framework
15	Security			

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
16	Service Composition	UoC→CNR	Service compositions using a variety of composition models	A novel approach for the automatic creation of specifications of services and service compositions more suitable for verification.
		Tilburg→USTUTT	The investigation of fragments and change operators for service choreographies.	Technical report: [13]
		USTUTT→UoC	Design of mechanisms to transform Service Value Networks into executable runtime artifacts	Publications: [14,15,16]
		USTUTT→Tilburg	Classification of fragmentation approaches of service compositions	Submitted publication: [17]
		USTUTT→UoC	Comparison of the perspectives of the institutions on Service Networks. Refinement of the Service Network Modeling Notation	A paper will be submitted to EOMAS2011
		UOC→UPM	Automatic derivation of composite service specifications (part of the overall S-Cube challenge "Formal Models and Languages for QoS-aware service composition")	Submitted paper: [G. Baryannis, M. Carro and D. Plexousakis "Deriving Specifications for Composite Web Services"]
		Tilburg→USTUTT	Adapting a service composition to new requirements or changes to the composition context	Potential connections with service composition and the impact of change of the service composition to the service context were investigated.
17	Service Discovery	POLIMI→Tilburg	Combining service retrieval and service compatibility	Publication: [2] (submitted)
		CITY→POLIMI	Cross-layer Pro-Active Monitoring & Adaptation; End-to-End Quality Provision & SLA Conformance; Human-Service Interaction	Publication: [32]

	Scientific Subject for Mobility	Visits devoted to the subjects	Addressed Challenge	Outcomes
18	Service Design & Modelling Methodologies	VUA→POLIMI	Context modeling for global software development	Submitted publication ["On the nature of GSE organizational social structures: coordinating teams or managing skills?" D.A. Tamburri, P. Lago, H. Van Vliet, E. Di Nitto];
19	Service-Oriented Computing			
20	Service Oriented Software Engineering			
21	Software Engineering Life-Cycle	Lero-UL→VUA	To establish whether there is a value in researching the Global Software Process as a Service	Publication: in progress
22	User-Centred Requirements Engineering			

Table 13. Scientific subjects research outcomes

Appendix E

Table 14 below presents partners preferences for further research collaboration.

Organisation	**Areas of interest**	**Possible collaboration objectives**	**Possible collaboration routes**	**Potential research partners**
USTUTT	Service composition & Coordination, adaptable Service Compositions, Business Process Management, Cloud Computing, Scientific Workflow Management, Service Middleware for Adaptable Services and Service Compositions, Context-aware service-based applications, QoS-aware service compositions and choreographies, Distributed Service based applications and corresponding infrastructures, Software engineering methodologies for service based applications for different application domains (manufacturing processes, simulation and scientific experiments, e-Health, smart cities, smart factories)	Research in the specified areas Publish results of collaboration at high-impact conferences and journals Organize special issue on Adaptation and Context-awareness of Service Compositions Perform research in areas we are not experts in with partners from S-Cube, like the areas of Software Engineering, High-performance Computing, Formal Models for Service-based applications	• Joint seminars • Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Research material, publications and knowledge exchange • Joint Summer Schools or Scientific Tracks at Summer Schools	• DERI NUIG Galway, Prof. Manfred Hauswirth • Cluster of Excellence SimTech – Using Service-based Computing in the area of Scientific Experimenting: Prof. Bernhard Mitschang, Prof. Kurt Rothermel, Prof. Albrecht Schmidt • University of Kiel - Software Engineering Prof. Willi Hasselbring
University of Groningen	Service Composition, Internet of Things (especially domotics with health applications), Smart Energy Systems	AI Planning and Search Complex Systems and Networks	• Joint research center/lab • Joint seminar • Joint funding proposals • Joint research project • Short and Long term researcher exchange	Any one

Organisation	**Areas of interest**	**Possible collaboration objectives**	**Possible collaboration routes**	**Potential research partners**
TILBURG	Service-Based Applications, Service-Oriented Computing, Business Processes, Business Transactions, Cloud Computing,	Design and Management of Cloud Services, Business Transaction Management, Business Process Compliance, Process/Maturity Models for Cloud-based systems.	• Joint seminar • Joint funding proposals • Joint research project • Research material, publications and knowledge exchange	
TUW	Foundations of service-oriented computing, Autonomic, complex, and context-aware computing, Cloud computing, Mobile and ubiquitous computing	• research requirements engineering for cloud computing (workshops, talks planed) • research future trends in humans providing their skills as a service • studies of Internet of Things and saving energy (ongoing collaboration with industry)	• Training program (PhD School) • Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year) • Research material, publications and knowledge exchange	USTUTT, SZTAKI, UPM
UniHH	Business Process Management: e.g. flexibilization of distributed execution, monitoring and management of business transactions; Mobile Services; Self-* Service Infrastructure: e.g. non-conventional approaches (e.g. agent-based), self-organization	Research cooperation, new projects – in above mentioned areas	• Joint research center/lab • Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year) • Research material, publications and knowledge exchange	S-Cube and others

Organisation	Areas of interest	Possible collaboration objectives	Possible collaboration routes	Potential research partners
UoC	Service Specifications, Service Composition, Cross-layer Service Monitoring and Adaptation, Service networks, Business Process Management, Business Processes & Business Protocols	• Research automated service composition in the Semantic Web, based on semantic service specifications • Research on cross-layer service monitoring and adaptation methods and techniques • Research service networks over cloud computing including business contracts	• Training program • Fellowship program • Joint research center/lab • Joint seminar • Joint funding proposals • Joint research project • Joint scholarships • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year) • Research material, publications and knowledge exchange • Joint conference/workshop organisation	• Foundation for Research and Technology – Hellas (FORTH) • Karlsruhe Service Research Institute
UPM	Service composition analysis and synthesis, Prediction of QoS, assurance and negotiation, Proactive monitoring / predictive adaptation in service compositions, Formal models and languages for service oriented systems.	Developing and empirically validating efficient and effective QoS prediction and analysis techniques for service compositions. Modelling and simulation of SOA system QoS, esp. in a cloud environment. Developing tools for computational cost analysis of service compositions. Development of cloud-based high-performance, efficient, portable and interoperable service applications. Researching complex adaptive system techniques and approaches for SOA.	• Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year)	• Madrid Institute for Advanced Studies in Software Development Techniques (IMDEA) Spain • High Performance Computing Centre (HLRS) of the University of Stuttgart, Germany • Instituto de Telecomunicações (IT) Portugal • Indra Software Labs SLU, Spain • PT Comunicações SA, Portugal • Alcatel-Lucent Deutschland AG, Germany

Organisation	Areas of interest	Possible collaboration objectives	Possible collaboration routes	Potential research partners
VUA	Knowledge Management, (Global) Software Engineering, SOA Migration, Service Networks, Social Structures, Agile Methods	• Requirements for Domain-Specific Knowledge Management, • SOA Migration Case Studies / action research, • Agile Service Networks action research, • Requirements for Domain-Specific Social structures	• Training program • Fellowship program • Joint research center/lab • Joint seminar • Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year) • Research material, publications and knowledge exchange	
CNR	Adaptation support for Service Runtime Infrastructures	Research requirements of a nature-inspired framework for modelling SBAs as an autonomic and evolutionary ecosystem of services	• Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Research material, publications and knowledge exchange	Currently only S-Cube organisations: SZTAKI, INRIA
CITY	Requirements engineering for service-oriented computing	Requirement-driven service choreography challenges; user task modelling in service computing	• Training program • Fellowship program • Joint seminar • Joint funding proposals • Joint research project • Short term researcher exchange (e.g. up to 2 months) • Long term researcher exchange (e.g. up to 1 year) • Research material, publications and knowledge	UPC Barcelona, UniDue

Organisation	Areas of interest	Possible collaboration objectives	Possible collaboration routes	Potential research partners
			exchange	

Table 14. Further research collaboration interests