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Management Summary

This deliverable updates the figures provided in deliverable CD-IA-2.1.3 “Initial assessment of results of a separate mobility program for researchers and students” about how the scientific subjects for mobility and the S-Cube integration framework elements have been covered by the mobility initiatives. The reference period goes from month 1 to month 29. It also proposes a restructuring of the scientific subjects for mobility based on the current focus of S-Cube and on the information recorded in the Knowledge Model. Finally, the deliverable provides some guidelines for the future mobility initiatives.

[1] Please note that this deliverable has been merged with PO-IA-2.1.5 (“Optimisation of mobility policies and exchange scheme”).

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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
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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.

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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
SC&C	Service Composition and Coordination
SI	Service Infrastructure
SLA	Service Level Agreement
SN	Service Network
SOA	Service Oriented Architecture

1 Introduction

The S-Cube mobility program supports researchers of the network in carrying out joint research through the reimbursement of travel and living expenses at the host institution. The goal of the mobility program is to support the integration of knowledge and the alignment of research activities between different research groups and across S-Cube research domains.

In Deliverable CD-IA-2.1.3 "Initial assessment of results of a separate mobility program for researchers and students" we have reported about the visits that have been performed during the first 18 months of the project. In this deliverable we update the figures to take into account all visits occurred till month 29.

Overall, 62 mobility stays took place (38 in the period M18-M30). For each stay the results have been collected and summarized (see Appendix B). Based on that data, we have analyzed the results using different views. The objective is to assess the results of the mobility program and use them to understand how we can proceed in the future to cover the identified gaps. We first analyze how the scientific subjects have been covered so far, and how the competencies of the partners have been combined. Then, we analyze how the results have contributed to research workpackages and how the integration framework baseline with its different views has been covered. We finally perform a quantitative analysis based on S-Cube KPIs and further indicators.

In its final part, this deliverable also reviews the organization of the mobility subjects and proposes a restructuring that better fits the major goals of S-Cube and the information stored in the Knowledge Model. Based on the analysis performed so far and on the changes proposed in this deliverable, we provide some guidelines for the future mobility initiatives.

The structure of this deliverable is as follows. Section 2 focuses on assessing if the mobility visits performed from the beginning of the project until M30 cover the scientific subjects defined for the mobility program. Section 3 focuses on evaluating how the visits cover the areas of study of the various workpackages. Section 4 analyzes the coverage of the S-Cube integration framework. Section 5 provides some indicators to evaluate the mobility performance of the entire project and of each partner. Section 6 provides a summary of the assessment of mobility visits performed in the previous sections and introduces the need for a redefinition of subjects, which is given within Section 7 and of the mapping between subjects and workpackages, given in Section 8. Section 9 proposes a vade-mecum to be developed to support partners involved in mobility both in the identification of the best mobility opportunities and in the reporting of performed initiatives. Section 10 briefly presents additional actions aiming at improving mobility. Section 11 provides a short conclusion. Finally, Appendix A lists the mobility subjects that have been used for collecting and classifying the current data on mobility, Appendix B provides the list of the mobility stays performed so far, and Appendix C provides tables that map each visit on mobility subjects, partners' competences, and S-Cube research workpackages.

2 Scientific Subject Coverage and Synergy of Competencies

Based on the descriptions of the mobility stays provided by the visitors and summarized in Appendix B, we can assess the coverage of mobility subjects. These subjects have been defined in deliverable CD-IA-2.1.2 and are summarized in Appendix A.

The result of this analysis shows that the following subjects have not been covered (details are provided in Appendix C):

- Subject 6: Interaction
  - Interaction Design & Research, Personalization
- Subject 7: Grid computing
  - Grid Scheduling, Grid Workflow, Grid Brokering, Load Balancing & Scheduling, Knowledge Sharing Networks
- Subject 14: Service architectures
  - Service Architecture, Service-Oriented Architecture, Service Orientation
- Subject 15: Security
  - Security, Authorisation, Authentication
- Subject 22: User-centered requirements engineering
  - User-Centred Requirements Engineering, User Centric Services

Of these uncovered subjects, ”Security” (15) appears to be at the boundaries of the S-Cube project. While S-Cube recognizes its importance in the context of SBA development and operation, the project has also chosen not to invest in research on this area also due to the skills and background of the consortium. Subject 22 “User-Centered Requirements Engineering” is being covered by a collaboration between UniDue and City for which travels are not being directly paid by the S-Cube mobility program. Finally, we think that Subject 14 “Service Architectures” was not considered by the subjects involved in the mobility as it was too broad to be plausible for their initiative.

The synergy of competences between hosting and visiting partners is highlighted in Table 16 (see Appendix C). This table indicates a synergy of research at different institutions.

Table 1 synthesizes the research visits by considering the pairs sending institution (lines) and hosting institution (columns). The partners listed here and in the rest of the document do not include the associate members that will be included starting from the next forthcoming report. In Table 1 the numbers in black refer to the visits performed in the first 18 months of the project while the numbers in red to the last period. The numbers show that the situation has improved as now all institutions except VUA have acted as sending institutions and all except SZTAKI and VUA have acted as hosts. VUA, however, is actually involved in mobility, both as a visitor and as a guest, but it is not claiming for funding for internal reasons. SZTAKI has significantly improved its performance in the last year, but, because of its geographical decentralization, has not attracted visitors so far.

	Hosting Institutions																	
Visiting Institutions		**UniDue**	**Tilburg**	**CITY**	**CNR**	**FBK**	**INRIA**	**Lero-UL**	**SZTAKI**	**POLIMI**	**TUW**	**UCBL**	**UoC**	**UPM**	**USTUTT**	**UniHH**	**VUA**	**UPC**
	UniDue			1	1	1									2			
	Tilburg							1		1		1+1		2	3			
	CITY												1					
	CNR						1				1							
	FBK									1					1			
	INRIA			1												1		

	LERO-UL		1	1+1	1							1						
	SZTAKI				1						1				3			
	POLIMI			1									2+1		1			
	TUW		1		1									1	1			
	UCBL		1		2		1											
	UoC		1		1					1		2			1			
	UPM										2							
	USTUTT	1	1			1					1		1+1					
	UniHH														1			
	VUA																	
	UPC													1				

Table 1: Research exchanges between partners

3 Workpackage Coverage

Analyzing the reports concerning each visit, we have identified the association between visits and workpackages that is reported in Appendix C (Table 17). This association is summarized in Figure 1. On average we have about 16 visits per WP, with the highest coverage in JRA-2.1 (24 visits) and JRA-2.2 (23 visits).

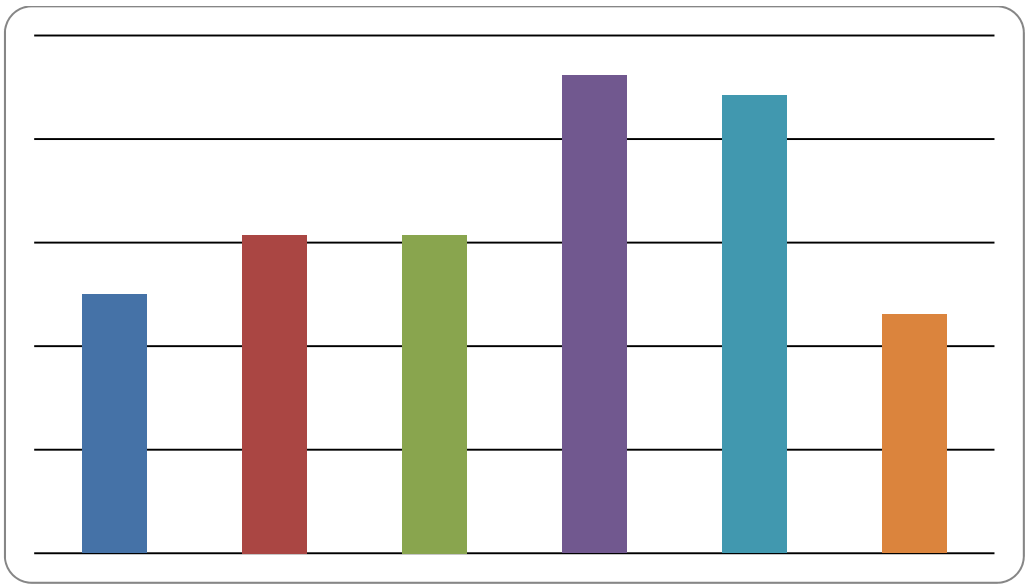

Figure 1: Percentage of research visits devoted to each workpackage

4 Integration Research Framework Coverage

The goal of this section is to perform a coverage analysis of mobility stays with respect to the S-Cube Integration Framework Baseline as defined in deliverable CD-IA-3.1.1. The section is divided into two subsections covering the views “Reference Lifecycle” and “Runtime Architecture”, respectively.

4.1 Coverage of the Reference Lifecycle View

Figure 3 shows the Reference Lifecycle and Table 2 shows how it has been covered through visits. Each visit in the table is identified by a unique ID, as defined in Table 14. Most results have addressed the "Requirements Engineering & Design" phase while "Early Requirements Engineering" and "Enact Adaptation" phases have clearly not been in the main focus. As far as the "Early Requirements Engineering" phase is concerned, this may be simply due to the fact that early requirement activities for service-based applications are not dramatically different from those undertaken when considering other kinds of applications. Therefore, the attention of the consortium to this phase has been low. As for the "Enact Adaptation" aspect, the small number of visits is due to the fact that S-Cube does not aim at building new enactment environments. Instead, it reuses the existing ones, either standard or developed by the partners in the context of other projects.

The relatively small number of visits concerned with the "Identify Adaptation Strategy" phase, instead, needs to be monitored and possibly improved.

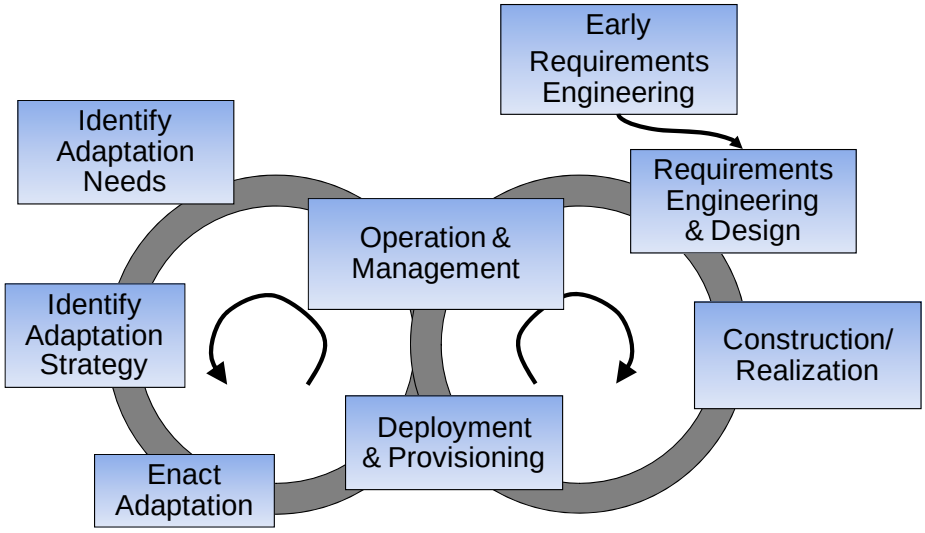

Figure 3: Reference Life Cycle View.

Lifecycle phase	**Visit ID**
Early Requirements Engineering	18, 19
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
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
Deployment & Provisioning	2, 6, 7, 8, 17, 19, 20, 21, 33, 38, 43, 46, 48, 51
Operation & Management	2, 4, 10, 11, 12, 13, 17, 18, 19, 26, 32, 41, 48, 51, 55, 59
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
Identify Adaptation Strategy	16, 22, 29, 34, 35, 39, 40, 43
Enact Adaptation	7, 11, 12

Table 2. Mapping of visits to the lifecycle phases.

4.2 Coverage of the Runtime Architecture View

Figure 4 shows how the Runtime Architecture has been covered. Most of the performed work has addressed monitoring and adaptation engines and the service container, while the resource broker has

not been addressed. This can be explained by the fact that this element is not considered to be critical by the S-Cube partners, as the focus is mainly on services and not on other kinds of web resources.

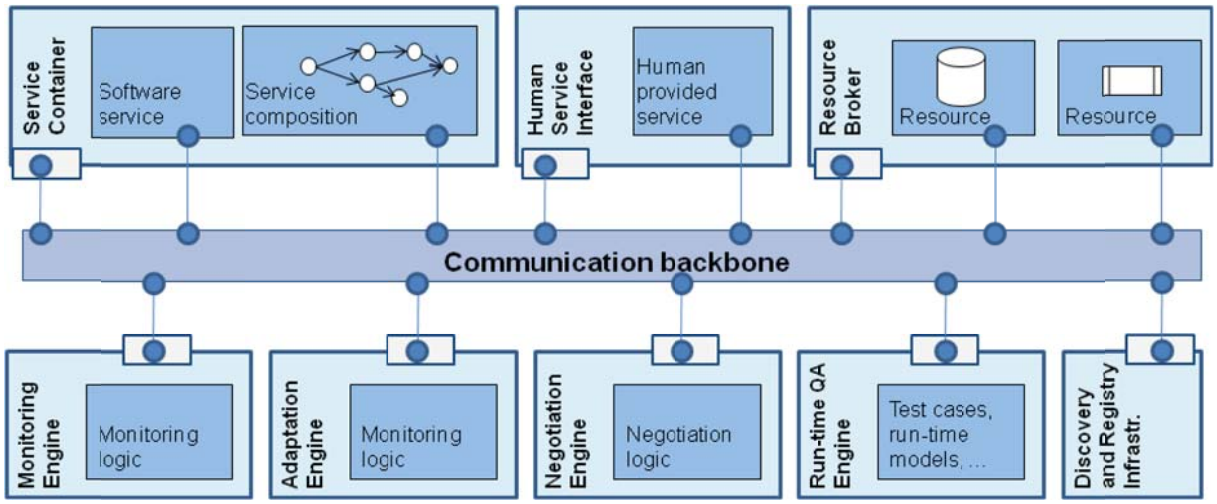

Figure 4: Runtime Architecture View.

Runtime Architecture elements	**Visit ID**
Service container	2, 4, 11, 20, 27, 28, 31, 32, 36, 38, 40, 42, 44, 57
Human service interface	28, 41, 49, 60
Resource broker	
Monitoring engine	2, 17, 18, 28, 31, 34, 39, 56, 59
Adaptation engine	11, 12, 16, 18, 22, 24, 29, 31, 32, 34, 39, 40, 43
Negotiation engine	7
Runtime QA Engine	11, 18, 24, 30, 33, 40, 46, 47, 48
Discovery and registry infrastructure	6, 17, 20, 37

Table 3. Mapping of visits on the lifecycle phases.

5 Key Performance Indicators (KPIs)

In this section we analyze the mobility program based on a set of performance indicators. In particular we have included in our analysis the KPIs specified in the DoW as part of the S-Cube Key Objective (Obj-4) "Bonding of Research Staff". Table 5 shows the performance indicators measured on the whole consortium.

Metric	M1-M18	M19-M30	Overall
Number of research visits (KPI)	24	38	62
Number of participating researchers (as visitors) (KPI)	22	28	38
Number of participating S-Cube beneficiaries as visitors (KPI)	13	15	16
Number of participating S-Cube beneficiaries as hosts	10	13	14
Average Duration per visit (in days)	14,3	18,4	16,3
Number of co-authored publications resulting from mobility (KPI)	18	17	35

Table 4: Performance Indicators

Table 4 shows that the number of mobility stays has significantly increased after M18, even though they seem to have generated a slightly smaller number of publications. This might be due to the fact that partners are at the moment trying to pursue higher quality publications compared to the workshop papers that have been the main focus in the first period.

As already shown in Section 2, most of the partners have participated to the mobility program. Concerning the volume of visits, the DoW specifies that: "each partner will have on the average two researchers visiting other institutes for a cumulative period extending on the average for up to four weeks (in total for both researchers) per annum…". For the first period from the beginning of the project to M18, this translates to a target of 3 researchers (visits) and an overall duration of six weeks per partner, while for the second period from M18 to M30 the target is of two researchers and a cumulative period of four weeks. Table 5 shows the corresponding data for each partner and whether it meets the targets in the two reference periods. Numbers in brackets refer to the second period, while the others refer to the first period. As it can be seen from the last row, the average numbers have improved. However, the table shows that the situation varies significantly from partner to partner and that many partners should take corrective actions in order to increase the volume of research visits.

Visiting Partner	# of visits	Duration of all visits	# of visiting researchers	Degree of KPI fulfillement	Actions M18	Actions M30
UniDue	4 (1)	14(11)	2(1)	o(-)	Increase visit time	Increase volume
Tilburg	3 (6)	42(83)	2(3)	+(+)	OK	OK
CITY	1(0)	14(0)	1(0)	o(-)	Increase # of visits	Increase volume
CNR	1(1)	19(6)	2(1)	o(-)	Increase # of visits	Increase volume
FBK	1(1)	5(4)	1(1)	-(-)	Increase volume	Increase volume
INRIA	1(1)	14(13)	1(1)	o(o)	Increase # of visits	Increase # of visits

LERO-UL	1(4)	14(34)	1(3)	o(+)	Increase # of visits	OK
SZTAKI	0(5)	0(23)	0(4)	-(o)	Increase volume	Increase visit time
POLIMI	4(0)	37(0)	3(0)	+(-)	OK	Increase volume
TUW	1(3)	15(30)	1(2)	o(+)	Increase # of visits	Increase # of visits
UCBL	1(3)	2(21)	1(2)	-(o)	Increase volume	Increase visit time
UoC	1(5)	14(42)	1(4)	o(+)	Increase # of visits	OK
UPM	0(2)	0(12)	0(1)	-(-)	Increase volume	Increase volume
USTUTT	4(2)	48(22)	3(2)	+(o)	OK	Increase visit time
UniHH	0(1)	0(6)	0(1)	-(-)	Increase volume	Increase volume
VUA	0(0)	0(0)	0(0)	-(-)	Increase volume	Increase volume
UPC	(1)	(6)	(1)	(-)	Increase volume	Increase volume
Average	**1,5 (2,11)**	**14,9 (18,41)**	**1,2(1,59)**		**Increase overall volume**	**Increase overall volume**

Table 5: Volume of visits at M18 and M30.

Table 6 shows the situation from the point of view of the hosting institutions. As it can be seen, there is a significant variability between partners in this case too.

Hosting Partner	**# of hosts**	**Duration of all hosts**	**# of hosting researchers**	**Degree of KPI fulfillement**	**Actions M18**	**Actions M30**
UniDue	1(0)	4(0)	1(0)	-(-)	Increase volume	Increase volume
Tilburg	3(2)	36(17)	3(2)	+(o)	OK	Increase hosting time
CITY	4(1)	43(14)	4(1)	+(-)	OK	Increase volume
CNR	0(7)	0(44)	0(7)	-(+)	Increase volume	OK
FBK	1(1)	4(7)	1(1)	-(-)	Increase volume	Increase volume
INRIA	1(1)	2(6)	1(1)	-(-)	Increase volume	Increase volume
LERO-UL	0(1)	0(22)	0(1)	-(o)	Increase volume	Increase # of hostings
SZTAKI	0(0)	0(0)	0(0)	-(-)	Increase volume	Increase volume
POLIMI	1(3)	5(17)	1(3)	-(o)	Increase volume	Increase hosting time
TUW	2(3)	34(18)	3(2)	+(o)	OK	Increase hosting time
UCBL	2(5)	19(34)	1(5)	-(+)	Increase volume	OK
UoC	5(1)	62(15)	4(1)	+(o)	OK	Increase # of hostings
UPM	2(1)	23(14)	1(1)	o(-)	Increase # of hostings	Increase volume
USTUTT	4(9)	22(78)	4(8)	o(+)	Increase hosting time	OK
UniHH	0(1)	0(13)	0(1)	-(-)	Increase volume	Increase volume
VUA	0(0)	0(0)	0(0)	-(-)	Increase volume	Increase volume
UPC	0(0)	0(0)	0(0)	-(-)	Increase volume	Increase volume
Average	**1.5 (2.1)**	**14.9 (17.6)**	**1.4 (2)**			

Table 6: Volume of hostings at M18 and M30.

6 Summary of assessment

Table 7 summarizes our main findings and proposed intended actions to address the problematic situations.

Analyzed Aspect	Main Results and Identified gaps	Recommended actions
Scientific Subject Coverage	The following scientific subjects have not yet been covered (4 out of 22): Interaction, Grid computing, Service architectures, Security. The situation has improved since month 18 when the number of uncovered subjects were 7.	Encourage mobility on all uncovered subject. Revise the subjects to better fit the actual S-Cube interests.
Synergy of Competencies	Synergy of competencies has been clearly shown: In most cases there is a combination of competencies in a complementary way.	None
Workpackage Coverage	JRA-2.1 and JRA-2.2 appear to be more covered than the others.	Additional effort, in terms of joint research through visits is required. Moreover, a deeper analysis of the relationships between subjects and workpackages is needed in order to understand why the cross-cutting WPs seem to be less covered than the others.
Integration Framework Coverage	The integration framework is in general well covered. Some model elements are covered less in relation to the others, in particular: Reference Lifecycle: - Early Requirements Engineering - Identify Adaptation Strategy - Enact Adaptation Runtime Architecture - Resource Broker	The lack of coverage of the listed elements is generally not critical. The early requirement engineering phase and the resource broker component are not among the main focuses of the project. The phase Identify Adaptation Strategy, instead, would require more care as it is part of the core focuses of the project. We will encourage the occurrence of more visits focusing on this aspect.
Indicator Evaluation	Considering the trend, there is an increase in the volume of mobility visits during the period M18-30 compared to the first period. Only 1 partner has not participated to mobility either as a visitor or as a hosting institution.	All partners should participate. The volume should be increased.

	However, participation is still to be improved. 5 out of 17 partners have participated adequately either in the first or in the second period as visiting institutions. 7 have performed well as hosting institutions, either in the first or in the second period. Of these, two, namely, Tilburg and USTUTT, have performed well both as hosts and as visitors.	

Table 7: Summary of Assessment Results

7 Redefinition of subjects

As summarized in the previous section, while exploiting the mobility subjects to classify the visits occurred so far, we noticed that these subjects should be adjusted for the following reasons:

- Even though it is very important, subject security (15) is not in the focus of the network, given the skills and background of the consortium. Based on this consideration, we have decided to eliminate it.
- Subject grid computing (7) is at the boundary of S-Cube interest. Given the current hype of Cloud computing, we decided to add this term to the subject that has now became "Cloud and grid computing".
- Service Architectures (14) and Service-Oriented Computing (19) are so general that are implicitly the focus of all visits. Such a generality has been perceived as useless by visitors who have chosen them only rarely. For this reason, we have decided to eliminate them.
- The Service-oriented software engineering (20) is very broad and appears to include most of the other subjects. Thus, we have decided to eliminate it and to move the corresponding visits within those that could be considered its sub-subjects. In particular, visit 10 will be moved under subject Requirement Engineering (13) and Service Design and Modeling Methodologies (18), visit 11 under the subject Requirement Engineering (13), and visit 18 under the subject Service Design and Modeling Methodologies (18). Finally, visit 15 is already classified under the proper subjects.
- Business Processes (2) and Business Protocols (3) appear to be strictly related. Therefore, we have decided to merge them into "Business Processes and protocols (2, 3)". Similar considerations apply to Information Quality (5) and Quality of Service (12) (merged into "Quality of Service (5, 12)").
- The term Interaction (6) is unclear, and this may be the main reason for which it has not been chosen by the participants at the mobility program. Therefore we decided to change it in "Personalization and Interaction Design (6)" as this term better reflects the meaning we wanted to assign to this subject. We also decided to classify this term as a specialization of Service Design and Modelling Methodologies (18).
- Some subjects can be considered as a specialization of others. This concerns, in particular, Model-Driven Engineering (8) and the new subject "Personalization and Interaction Design (6)", which can be both seen as a specialization of Service Design and Modelling Methodologies (18), and User-Centred Requirement Engineering (22), which can be seen as a specialization of Requirement Engineering (13). Given the small number of visits occurring in the specializations, we have decided that we could abstract from them and refer exclusively to their parent subjects. Thus, we have deleted them from the mobility subjects.
- Finally, discussing with the other partners, a new aspect appeared to be of interest of the consortium and not covered by the available subjects. This was Prediction. As this is related to the Monitoring activities, we have decided to extend this last subject that is now called "Monitoring and Prediction (9)".

Given the above consideration, the reorganized list of subjects is shown in Table 8.

Scientific Subjects for Mobility	***Common & Complementary Competencies***
Business Processes and protocols (2, 3)	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
Cloud and grid computing (7)	Grid Scheduling, Grid Workflow, Grid Brokering, Load Balancing & Scheduling, Knowledge Sharing Networks
Adaptation (1)	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
Evolution (4)	Service Evolution, Software Architecture Evolution, Dependable Evolvable Pervasive Service Engineering
Quality of Service (5, 12)	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
Service Discovery (17)	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
Service Composition (16)	Model-Driven Service Composition, Service Composition, Web Service Orchestration & QoS Optimisation, Service Choreography & Orchestration, Service Networks
Negotiation and QoS Agreement (10)	Service Level Agreement (SLA) Negotiation, Quality Assurance Negotiation & QoS Agreement, Estimation of the Quality of Service Providers
Monitoring and Prediction (9)	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
Lifecycle (21)	Software Processes, Software Architecture, Software Engineering, Software Quality Assurance, Software Product-Line Engineering & Variability Management
Requirement Engineering (13)	Requirements Engineering, Requirements & Model-Based Testing, User-Centred Requirements Engineering, User-Centred

	Requirements Engineering, User Centric Services
Service Design and Modelling Methodologies (18)	Service-Centric Systems Engineering, Service Design & Modelling Methodologies, Model-Driven Service Composition, Model-Driven Engineering, Interaction Design & Research, Personalisation
Quality Assurance (11)	Software Quality Assurance, Testing, Analysis, Monitoring, Prediction

Table 8. Revised mobility subjects.

As shown in Table 8, the number of subjects is reduced from 22 to 13. We assume this factorization will help participants to the mobility program to better classify the scope of their visits. Given the new structure of mobility subjects, Table 9 (below) provides the mapping of such subjects on the S-Cube research challenge listed in deliverable PO-IA-1.1.4. The table shows also that all research challenges are covered by one or more mobility subjects, thus guaranteeing that a good coverage of mobility subjects could help in the achievement of the research challenges.

8 Revision of the assessment based on the new subjects

While the introduction of the new subjects does not impact the general metrics discussed in Sections 4 and 5, it impacts on the way visits distribute through subjects. Table 10 shows the new distribution. As we have already mentioned, subjects number 7 and 6 remain uncovered.

In the analysis of mobility results, we have noticed that visits were focusing on JRA-2.1 and JRA-2.2 more than on the other WPs. This is particularly surprising for those vertical WPs that should have been impacted, even though indirectly, by visits occurring as part of JRA-2.1 and JRA-2.2. This gives an indication of two problems:

- Interaction between horizontal and vertical WPs has not been encouraged so far through proper visits. This issue will be handled by explicitly encouraging cross-workpackage visits.
- The allocation of subjects to WPs as perceived by visitors might not be fully correct. The analysis provided in this section aims at overcoming this problem by offering a predefined association between subjects and WPs.

Table 11 shows the mapping of subjects to WPs based on the issues actually handled by each WP. In the table, an “X” shows the main correspondence between a subject and its main reference WP. An “x” indicates a secondary correspondence between a subject and a WP.
If, at this point, we cross the data in Table 11with those in Table 10, we obtain Table 12 where we can notice a more uniform allocation of visits to WPs compared to the one shown in Figure 1. Based on this consideration, we plan to exploit Table 11 to highlight cross-WPs relationships for the benefit of visiting partners and to encourage them in contributing research results to all the WPs that could be possibly be affected by their research.

Table 9. Mapping between new subjects and S-Cube research challenges.

	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	RC9	RC10	RC11	RC12	RC13	RC14	RC15	RC16	RC17	RC18	RC19	RC20	RC21	RC22	RC23
Business Processes and Protocols (2,3)		x				x																	
Cloud and grid computing (7)					x																		
Adaptation (1)			x	x	x								x		x				x	x			
Evolution (4)					x																		
Quality of Service (5,12)	x							x	x	x				x					x	x	x		
Service Discovery (17)																	x						
Service Composition (16)	x	x	x	x	x	x	x			x	x		x	x	x	x			x	x			x
Negotiation and QoS Agreement (10)							x									x							
Monitoring and Prediction (9)	x		x	x		x								x	x								
Lifecycle (21)			x	x	x	x			x		x	x									x	x	x
Requirement Engineering (13)				x				x			x												x
Service Design and Modelling Methodologies (14,18)			x		x					x	x												
Quality Assurance (11)	x							x		x										x		x	

Table 10. Number of visits per each new subject.

	Number of visits
Business Processes and Protocols (2,3)	25
Cloud and grid computing (7)	0
Adaptation (1)	15
Evolution (4)	4
Quality of Service (5,12)	7
Service Discovery (17)	4
Service Composition (16)	20
Negotiation and QoS Agreement (10)	3
Monitoring and Prediction (9)	11
Lifecycle (21)	1
Requirement Engineering (13)	6
Service Design and Modelling Methodologies (14,18)	9
Quality Assurance (11)	1

Table 11. Mapping between subjects and WPs.

	1.1	1.2	1.3	2.1	2.2	2.3
Business Processes and Protocols (2,3)				X		
Cloud and grid computing (7)						X
Adaptation (1)	x	X				
Evolution (4)	X					
Quality of Service (5,12)			X	x	x	x
Service Discovery (17)						X
Service Composition (16)	x				X	
Negotiation and QoS Agreement (10)			X	x	x	x
Monitoring and Prediction (9)		X		x	x	x
Lifecycle (21)	X					
Requirement Engineering (13)	X					
Service Design and Modelling Methodologies (14,18)	X				x	
Quality Assurance (11)			X			

Table 12. Number of visits per subject per main WP.

	1.1	1.2	1.3	2.1	2.2	2.3
Business Processes and Protocols (2,3)				25		
Cloud and grid computing (7)						
Adaptation (1)		15				
Evolution (4)	4					
Quality of Service (5,12)			7			
Service Discovery (17)						4
Service Composition (16)					20	
Negotiation and QoS Agreement (10)			3			
Monitoring and Prediction (9)		11				
Lifecycle (21)	1					
Requirement Engineering (13)	6					
Service Design and Modelling Methodologies (14,18)	9					
Quality Assurance (11)			1			
Total	20	26	11	25	20	4

9 Definition of a vade-mecum for visitors and visiting organizations

The redefinition of subjects, as well as the explicit definition of the mappings between WPs and subjects, aims at offering to the institutions interested in visiting other institutions the information useful to correlate in the best way their mobility initiative to the S-Cube objectives. Another important tool to simplify mobility and to encourage its development consists in developing a vade-mecum for visitors and visiting organizations that packages all needed pieces of information in the proper format and makes them available on the S-Cube portal under the mobility area. This vade-mecum should contain the information to be checked before organizing a visit and the process to be followed during and after the visit.

General information to be checked before organizing a visit

The aim of this information is to make all S-Cube partners aware about the possibilities offered by the mobility programme as well as about the situation of partners and workpackages with respect to mobility. In particular, this section of the vade mecum will contain the practical guidelines published in Deliverable CD-IA-2.1.1 as well as the following data:

- Subject list (Table 8) and mapping on workpackages (Table 11)
- List of competences per partner (see Deliverable CD-IA-2.1.2)
- Coverage of subjects and WPs (Table 12)
- Visit performance of each partner (Table 5 and Table 6)

Process to be followed during or after the visit

Information about this process is already partially available on the S-Cube portal, but it is encapsulated in a number of different pdf files. Thus, it is not immediately visible. Moreover, the process lacks an explicit definition of the information needed for assessing the result of mobility. This results in the fact that collecting all data and building the synthetic metrics provided in this report has been a cumbersome activity. To overcome this problem, we will explicitly require visitors to follow the steps listed below:

- Introduce information about visits even if they are not directly paid by the S-Cube mobility programme. Of course, we will make sure that these visits are clearly distinguishable from the others.

- Select the subject of visit and indicate the WPs the visit is contributing to by specifying the rationale for this choice.
- Indicate the deliverable the visit is contributing to.
- Indicate if the visit is a follow up of a previous visit (either performed by the same visitor or by another researcher from the hosting organization).
- Indicate the status of joint publications resulting from the visit. This part is supposed to be updated when new data are reported in the partner's quarterly report.

10 Other actions to encourage mobility

Other actions to encourage mobility will be the following:

1. We will specifically focus on increasing the number of mobility initiatives impacting on JRA-2.3 and on the vertical workpackages (JRA-1.1, JRA-1.2, and JRA-1.3).
2. Cross-workpackages contributions will be encouraged, for instance, by allowing for longer staying in these cases.
3. The production of concrete outcomes out of each mobility initiative will be encouraged by explicitly asking all researchers to indicate these outcomes in their quarterly reports.
4. Associate partners will be actively involved in collaborations with the other S-Cube members, taking into account their specific competences and the way these complement the ones already existing in S-Cube.
5. Even if mobility funding cannot be used for refunding the "additional personnel" as established in the DoW, from Month 30 on the mobility performance indicators will consider visits performed by these researchers as well.
6. Information about the best performing partners in terms of mobility will be periodically distributed to all partners. A presentation of the updated situation of mobility will be given at each global meeting to ensure partners awareness.

11 Conclusions

This deliverable reports about the status of mobility at Month 30, provides an evaluation of the current situation and proposes a new structure for mobility subjects and the definition of a vade-mecum to offer to mobility partners all needed information and support. The new organization of mobility subjects is more compact than the previous one and better reflects the goals of S-Cube. Based on this, we assume that it will be easier to use for classifying and reporting about the mobility initiatives. The explicit identification of primary and secondary mappings between subjects and workpackages will help in highlighting the possible interactions between WPs in the context of specific subjects, thus encouraging researchers in cross-workpackage discussion and fertilization. Finally, the introduction in the S-Cube project of Associate Members will help covering the existing gaps. In particular, we expect an improvement for what concerns the subjects on Cloud and grid computing as partners with specific skills in these areas are now part of the NoE.

As a concluding remark, we highlight the fact that the current report does not provide a complete overview of all mobility initiatives as it reports only on those initiatives that have been funded by the mobility programme. Other initiatives self-funded by the partners are not reported here. As already mentioned in Section 10, in the future we plan to report as part of mobility about all initiatives independently on the source that has funded them.

Appendix A

The following table lists the scientific subjects for mobility as described in CD-IA-2.1.2. This information is used for the coverage analysis in Section 2.

	Scientific Subject for Mobility	**Common & Complementary Competencies**
1	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
2	Business Processes	Business Process Management, Distributed Business Processes, Business Processes & Protocols, E-Business, Business Process Analysis, Monitoring & Auditing
3	Business Protocols	Business Processes & Protocols, Business Protocol Languages, Multi-Party Business Protocols, Adaptation in Business Protocols
4	Evolution	Service Evolution, Software Architecture Evolution, Dependable Evolvable Pervasive Service Engineering
5	Information Quality	Data & Information Related Quality, Data-Related Quality
6	Interaction	Interaction Design & Research, Personalisation
7	Grid Computing	Grid Scheduling, Grid Workflow, Grid Brokering, Load Balancing & Scheduling, Knowledge Sharing Networks
8	Model-Driven Engineering	Requirements & Model-Based Testing, Model-Driven Service Composition, Model-Driven Engineering
9	Monitoring	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
10	Negotiation & QoS Agreement	Service Level Agreement (SLA) Negotiation, Quality Assurance Negotiation & QoS Agreement, Estimation of the Quality of Service Providers
11	Quality Assurance	Software Quality Assurance, Quality Assurance, Static Analysis
12	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
13	Requirements Engineering	Requirements Engineering, Requirements & Model-Based Testing, User-Centred Requirements Engineering
14	Service Architectures	Service Architecture, Service-Oriented Architecture, Service Orientation
15	Security	Security, Authorisation, Authentication
16	Service Composition	Model-Driven Service Composition, Service Composition, Web Service Orchestration & QoS Optimisation, Service Choreography & Orchestration, Service Networks
17	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
18	Service Design & Modelling Methodologies	Service-Centric Systems Engineering, Service Design & Modelling Methodologies
19	Service-Oriented Computing	Service Orientation, Service-Oriented Computing, Service-Based Applications (SBAs), Service-Oriented Applications
20	Service Oriented Software Engineering	Dependable Evolvable Pervasive Service Engineering, Service-Oriented Software Engineering
21	Software Engineering Life-Cycle	Software Processes, Software Architecture, Software Engineering, Software Quality Assurance, Software Product-Line Engineering & Variability Management
22	User-Centred Requirements Engineering	User-Centred Requirements Engineering, User Centric Services

Table 13: Scientific subjects for mobility (see CD-IA-2.1.2)

Appendix B

This section lists all mobility. Only visits with the start date lying within the first 30 months of the project are analyzed. The stays are sorted based on the start date of the stay.

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[2]	USTUTT	UniDue	29.09.2008	02.10.2008	4
9	Michele Mancioppi	Tilburg	UPM	06.10.2008	16.10.2008	11
10	Andreas Gehlert[3]	UniDue	CITY	15.10.2008	17.10.2008	3
11	Andreas Gehlert & J. Hielscher[4]	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[5]	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	CITY	10.01.2010	23.01.2010	14

[2] The research stay of Ralph Mietzner at UniDue was less than one week as it served the purpose of discussing a very specific issue, namely the combination of previous research of UniDue on variability in software with previous research of USTUTT on variability in software as a service applications. The research stay served as an initial kickoff for further distributed collaboration on that specific issue resulting in a paper at PESOS [1].
[1] Mietzner, Ralph; Metzger, Andreas; Leymann, Frank; Pohl, Klaus: Variability Modeling to Support Customization and Deployment of Multi-Tenant-Aware Software as a Service Applications. In: Proceedings of ICSE 2009 Workshop - Principles of Engineering Service Oriented Systems (PESOS).

[3] The visit to CITY became necessary in order to discuss first ideas of a prospective collaboration between UniDue and CITY (namely wrt. context). In addition, the goal of this first meeting was to agree upon, set up and start writing the joint deliverable PO-JRA-1.1.3.

[4] The research visit at Suttgart was intended to integrate the ideas of three existing papers. This clear focus allowed us to efficiently work on a structure and on the main contents of the envisioned paper, which was later on finalized offline.

[5] The research stay lasts two days because it was mainly concerned with the presentation of an overview of concepts of model driven engineering and verification tools and discussion on related tools. Two days were sufficient to perform the analysis of existing approaches since the material was already prepared.

27	Michele Mancioppi	Tilburg	USTUTT	15.02.2010	28.02.2010	14
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	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	Tilburg	31.05.2010	11.06.2010	12
50	Noel Carroll	Lero	UCBL/Paris	08.06.2010	11.06.2010	4
51	Manolis Voskakis	UoC	UCBL/Paris	08.06.2010	13.06.2010	6
52	Mariana Karmazi	UoC	UCBL/Paris	08.06.2010	13.06.2010	6
53	A.K.M. Rafiqul Haque	Tilburg	Lero	19.06.2010	10.07.2010	22
54	Olha Danylevych	USTUTT	UoC	21.06.2010	05.07.2010	15
55	Vasilios Andrikopoulos	Tilburg	UCBL/Paris	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/Paris	08.06.2010	13.06.2010	6

Table 14: List of Mobility Stays

Appendix C

The following table (Table 15) gives, for each performed visit (in the rows), the covered scientific subjects for mobility as specified in the previous deliverable CD-IA-2.1.2. The table column numbers refer to the list of scientific subjects (Appendix A). Visits from 1 to 22 are those that occurred in the first 18 months of the project and already reported in CD-IA-2.1.3. The green line separates these from the ones performed from Month 19 to Month 30.

Id	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
1		X																				
2		X							X			X				X			X			
3			X																			
4.a				X														X				
4.b				X														X				
5.a		X						X								X		X				
5.b		X						X								X		X				
6		X														X	X					
7										X							X					
8								X					X					X			X	
9			X																			
10	X								X											X		
11	X															X				X		
12	X															X			X			
13									X										X			
14		X														X						
15		X											X							X		
16	X	X							X			X				X			X			
17		X							X			X				X			X			
18													X							X		
19		X							X			X				X			X			
20	X	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																	X			
39	X	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						

Table 15: Research Topics of Visits – Scientific Subjects for Mobility

Table 16 shows which of the competencies that partners have declared in the Knowledge Model (glossary, see CD-IA-2.1.2) have been exploited during the visits. For example, for the mobility initiative number 1, titled Service Systems and Business Process Management, UoC's expertise in service networks has been combined with Tilburg's competency in business processes and service composition. Note that only the partner competencies relevant for the topic have been listed here. The table clearly indicates a synergy of research at different institutions.

Id	Research topic	Partner 1	Competencies of partner 1	Partner 2	Competencies of partner 2
1	Service Systems and Business Process	UoC	Service networks	Tilburg	Business processes, service composition

	Management				
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
5 a, 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 *SCENE* and BPEL'n'Aspects	POLIMI	Design for adaptation	USTUTT	Business 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
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	UPM	Modeling dynamic behavior and verification	TUW	Service composition

	of service composition				
29	Context modeling of adaptable SBA – service engineering and design service adaptation and monitoring	FBK-IRST	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
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	SZTAKI	Deployment, service execution	USTUTT	Workflows

	management of service and self-*in service execution				
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
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

Table 16: Research subjects of the visits – competencies of the partners

Table 17 shows, for each performed visit, the covered research topic and the related workpackages in whose deliverables the results will be described. This information has been derived, where possible, from the field “Related to S-Cube WPs/Deliverables” in the mobility stay descriptions. For example,

the research stay number 2 regarding "Monitoring and Analysis of Influential Factors of Business Process Performance" is concerned with the work packages JRA-2.2 and JRA-1.2 and its results have been or will be described in corresponding deliverables in these workpackages.

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	
4a, 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 Requirements-based 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			
20	Replacement policies for dynamic Adaptation	X	X				

	of SBAs						
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
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		X	X			X

	self-*in service execution						
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	

Table 17: Research subject of visits – S-Cube workpackages