



*Empowering the Service Economy with
SLA-aware Infrastructures*



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Executive Summary

This document reports the status of the collaboration activities of SLA@SOI with the academic and industrial communities. In particular, the document describes both the collaboration activities undertaken within the first year of the project as well as the collaboration plan for the forthcoming years.

The document covers collaborations with the European Service and Software Architectures, Infrastructures and Engineering (SSAI&E) projects, as well as broader collaboration with academics, industry and other representative groups.

So far, we have identified and described 25 distinct collaboration activities grouped in six different categories. Each activity identifies a specific target for the collaboration and specific collaboration goals and modalities, reports the actions we have already undertaken and the plan for the future activities. The current list of activities follows:

- Collaborations within the SSAI&E cluster
 - Participation to the SSAI&E collaboration events
 - Collaboration with the SSAI&E working group on QoS & SLA
 - Collaboration with the SSAI&E working group on Standards
 - Collaboration with the SSAI&E working group on Virtualised Service Platforms
- Collaborations with the NESSI initiative
 - Collaboration with NESSI
 - Collaboration with NEXOF-RA Architecture Board
 - Contribution to the NEXOF-RA's Requests For Proposal
- Collaborations with the Future Internet
 - Participation to the Future Internet Assembly
- Collaboration with specific FP7 European projects
 - Collaboration with project Q-ImPRESS
 - Collaboration with project RESERVOIR
 - Collaboration with the S-Cube network of excellence
 - Collaboration with project SOA4All
- Collaboration with specific FP6 European projects
 - Collaboration with project ASG
 - Collaboration with project AssessGrid
 - Collaboration with project BeInGrid
 - Collaboration with project BREIN
 - Collaboration with project CONTRACT
 - Collaboration with project GridECON
 - Collaboration with project InfraWebs
 - Collaboration with project ONE
 - Collaboration with project SecSE
- Collaboration with specific initiatives outside FP7
 - Collaboration with IVI, the Innovation Value Institute
 - Collaboration with the Theseus German programme
 - Collaboration with the CoreGRID ERCIM working group
 - Collaboration with Gridipedia

This list is however not final, and new collaborations activities will be added during the lifetime of SLA@SOI.

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1 Introduction

The purpose of this document is to report the status of the collaboration activities with both the academic and industrial communities. In particular, this document presents the collaboration activities undertaken within the first year of the project as well as an updated plan for collaborations, resulting from the reviewers' recommendations and the feedback obtained during the evolution of the project.

Following the Description of Work (DoW), the SLA@SOI collaboration activities are undertaken in two tasks of WP B8.

- The first task, B8.3 "Collaboration with ICT SSAI&E Projects" addresses the liaison and co-operation activities with other ICT projects under Objective "Service and Software Architectures, Infrastructure and Engineering" of the ICT Work Programme 2007-08¹. It also aims to ensure that the work performed by the SLA@SOI project is aligned with the "Networked European Software and Services Initiative" (NESSI²) European Technology Platform. This cooperation aims at exploiting synergies between the projects and increasing the impact of the ICT initiative.
- The second task, B8.4 "Collaboration with academics, industry and other representative groups", fosters collaboration with other communities in order to promote the achievements of the project. The goal is to ensure that the project results and activities become known by the academic and research communities, by industries, and by other representative groups.

The collaboration plan covers both project tasks and the collaboration initiatives and can be grouped in five different categories, namely:

- Collaborations within the SSAI&E cluster
- Collaborations with NESSI
- Collaborations with the Future Internet Assembly
- Collaboration with specific European projects
- Collaboration with specific initiatives outside FP7

Each category contains one or more concrete collaboration tasks, which identify a specific target for the collaboration and specific collaboration goals and modalities.

With respect to the M6 Collaboration plan (Deliverable D.B8b), new tasks have been added in this version of the plan, in order to cover all relevant initiatives/projects/communities. In particular, FP6 European projects in the negotiation, grid and service areas have been considered with the aim of evaluating the possibility to exploit some existing results in the SLA@SOI project. As a result of this analysis, several FP6 European projects have been added to the collaboration tasks.

Another major change with respect to the previous version of the plan is that, as required by the reviewers, a collaboration roadmap has been defined. In particular, each responsible of a collaboration activity defined a plan describing the steps to be performed in order to tackle the objectives of the particular

¹ ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2007-08_en.pdf

² <http://www.nessi-europe.com/>

activity. The choice of having a specific roadmap for each activity, instead of a general collaboration plan, was driven by the fact that collaborations should consider the peculiarities of the considered activity as well as the specific relations with SLA@SOI.

The document is structured as follows. Sections 2-7 of this document describe in more detail the five collaboration categories. For each specific task within a collaboration category, we briefly describe the target, the goals and modalities of the collaboration task, we report the activities performed during Y1, and we present a detailed roadmap.

In addition to the descriptions of the collaboration tasks in these six sections, the document discusses the next steps of the collaboration plan (Section 8).

2 Collaborations within SSAI&E

SLA@SOI is a key project in the set of funded projects addressing Objective 1.2 "Service and Software Architectures, Infrastructure and Engineering" (SSAI&E³) of the ICT Work Programme 2007-08. At the time of writing, this cluster contains 28 projects – 1 Network of Excellence (NoE), 6 Integrated Projects (IPs), 18 Specific Targeted Research Projects (STREPs), and 3 support actions (SAs) – structured according to the areas depicted in Figure 1.

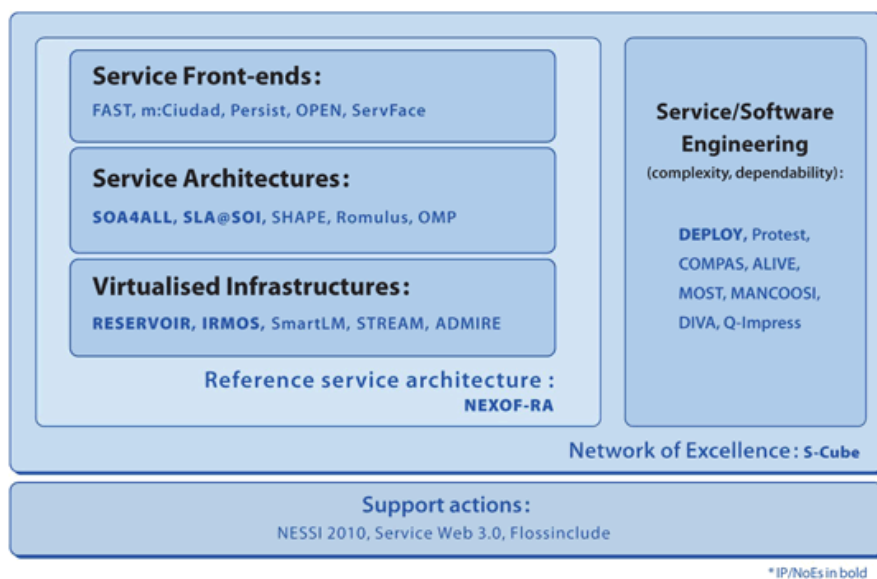


Figure 1: Projects in the SSAI&E cluster⁴

Within the SSAI&E cluster, projects participate in Collaboration Working Groups (CWGs⁵), which address specific topics of common interest for the projects, with the aim of achieving an improved sharing and understanding and ultimately an improved impact of the results of the participating projects. Figure 2 depicts the CWGs which have currently been launched.

SLA@SOI is currently participating in the following working groups:

- QoS and SLA;
- Virtualised Service Platforms;
- Coordination of contribution to standards.

Moreover, SLA@SOI is participating in SSAI&E collaboration events.

In the following sub-sections we describe the past collaboration activities and future roadmap of SLA@SOI within the SSAI&E CWGs and report the results of the collaboration events.

³ <http://cordis.europa.eu/fp7/ict/ssai/>

⁴ Source of the picture: http://cordis.europa.eu/fp7/ict/ssai/projects_en.html

⁵ <http://www.eu-ecss.eu/technical-group/contents/collaboration-working-groups>

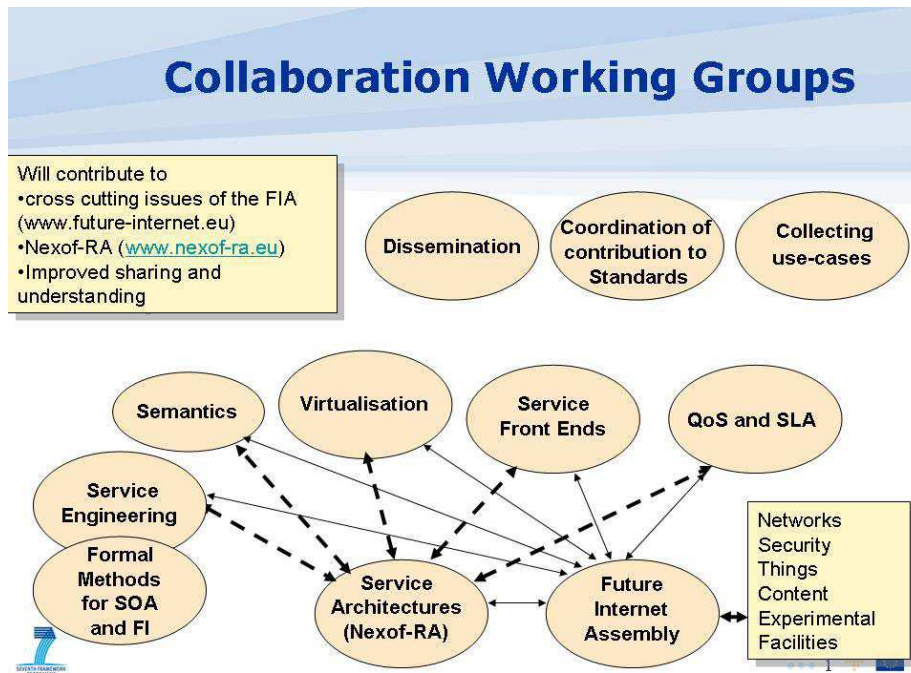


Figure 2: SSAI&E Collaboration Working Groups⁶

In addition, SLA@SOI is contributing to the Service Architecture working group through the NEXOF-RA project, as described in Section 3.

Finally, SLA@SOI is also undertaking collaborations with specific projects within the SSAI&E cluster, as described in Section 5.

2.1 Participation to the SSAI&E collaboration events

Description of the target of the collaboration task

The SSAI&E collaboration events bring together all the currently active projects within the software & service architectures cluster as well as interested stakeholders.

They serve as a general platform for knowledge exchange, demonstration and collaboration.

Description of goals and modalities of the collaboration

The goals of SLA@SOI with respect to the SSAI&E collaboration events include

- dissemination of results and news about the progress of SLA@SOI
- collaboration with other projects and stakeholders on selected topics
- discovery of possibly new research questions for adaptation of the research roadmaps of projects, partners and possibly the SSAI&E cluster.

⁶ Source of the picture: ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ssai/events-20080922-23-collaboration-activities-aims-of-each-working-group_en.pdf

Actual activities include

- facilitation of an event
- contributions to the overall agenda of the event
- preparation of dissemination material to be distributed at the event
- contributions/hosting of collaboration workgroups
- participation in panels and discussion rounds

Past Activities

Past and upcoming activities include

- Collaboration Event, 10-11 June 2008, Brussels
 - Organization of event, WG contributions on QoS&SLA, Virtualization, etc.
- Collaboration Event, 22-23 September 2008, Brussels
 - WG contributions on QoS&SLA, Virtualization, Demos, Front ends, Trust, use cases; Panel on governance

Future Roadmap

Participation to future collaboration events. In particular, SLA@SOI is organizing, together with IRMOS and SOA4All, the collaboration event on "Internet of Services" that will be held on 10-11 June 2009 in Brussels.

Responsible partner

SAP (Contact: Wolfgang Theilmann – <mailto:wolfgang.theilmann@sap.com>)

2.2 SSAI&E CWG on QoS & SLA

Description of the target of the collaboration task

The primary aim of the QoS&SLA working group is to provide a forum for collaboration in the area of quality of service and service level agreements amongst the researchers working in European projects, mainly within the SSAI&E cluster.

The main objectives of the QoS&SLA CWG are to:

- Share mutual understanding of QoS and SLAs across various projects, including terminology, functional and non-functional requirements, relevant standards and technologies.
- Define common terms such as: quality attributes, quality metrics, quality annotations etc.
- Develop a mediation framework that allows translation between different perspectives.
- Drive joint initiatives towards broader communities e.g. NEXOF-RA, Future Internet Assembly, etc.
- Identify dependencies, barriers, etc. between QoS provisioning and SLAs.
- Examine the role of QoS and SLAs in the future of internet.

More information can be found at <http://www.eu-ecss.eu/contents/private-area/qos-and-slas/qos-and-slas>.

Description of goals and modalities of the collaboration

SLA@SOI is taking a leading role (together with IRMOS project) in this CWG. This implies the organisation of meetings, administrative tasks, for example, taking care of the collaboration tools, editing documents, and reporting to the European Commission (EC).

The topics of SLA and QoS are core in SLA@SOI, and hence the project will develop results and perform activities that will be cornerstones for the objectives of the CWG. Consequently, SLA@SOI seeks to become one of the major contributors of the working group in terms of content, by bringing to it the vision and results of the project in the area of QoS and SLA, and guaranteeing an alignment between the SLA@SOI perspective on QoS and SLA and the common framework developed by the CWG.

Past Activities

- June 2008: The Working group's kickoff meeting held in Brussels. Various projects were invited to present their interests in the WG. Initial consensus on the agenda and preliminary roadmap of the WG were established.
- October 2008: First working group meeting held in Karlsruhe, Germany. 11 projects participated in the WG meeting and presented their perspective on the topic of QoS / SLAs. The main highlights of the meeting were:
 - A process for tangible outcomes of collaboration was agreed among the participants.
 - A plan for collaboration activities like audio conferences, F2F meeting was discussed and finalized
 - Research topics to be undertaken by the WG were discussed and based on the presentations given by the participating projects; potential contributions from various projects on the topics were identified.
 - The meeting minutes and supplementary material were made available to the group through the WG's website
- An initiative to write a joint whitepaper with the WG participants was undertaken. A template for the whitepaper was created and circulated among the members; work on this whitepaper is on-going.
- SLA@SOI (?) took the initiative to compile a document with information about various types of service level objectives and services being considered within various member projects. A template was created and circulated among the members. This document will help understand member projects' perspective on the nature of service level objective and the service to which these objectives are applied. There is ongoing work on this document.

Future Roadmap

The following activities have been planned and/or currently being pursued:

- A half-day session is planned as part of the collaboration event in June 2009 to discuss and review progress on the ongoing activities (WG whitepaper and SLO document) and engage in technical discussions among WG's member on the topic of QoS / SLAs
- Completion of the document being prepared by the WG members and dissemination of it to various groups
- Organisation of an event for member projects to demonstrate their developments and identifying potential for some joint demonstrations on the topic of QoS / SLA.

Responsible partner

SAP (Contact: Tariq Ellahi – tariq.ellahi@sap.com)

2.3 *SSAI&E CWG on Standards*

Description of the target of the collaboration task

The majority of the SSAI&E projects have a strong interest in taking forward their results into standardisation initiatives and producing results which comply with existing and evolving standards. But with so many different and potentially parallel standardisation activities, which are often driven by global standardisation bodies, it is vital to co-ordinate the projects' efforts to strengthen collaboration, exploit synergies and increase the impact of European standardisation activities on the world stage.

To achieve the aforementioned goals, a CWG focusing on "Coordination of Contribution to Standards" has been created. The mission of this group is to "support and foster the collaboration, co-ordination and dissemination of standardisation efforts for the SSAI&E projects within the FP7".

CWG is still in its early stages, but the goals and expected results have already been specified and can be found at <http://www.eu-ecss.eu/contents/private-area/standards/standards>.

Description of goals and modalities of the collaboration

SLA@SOI is taking a leading role (together with NESSI) in this collaboration task. This implies the organisation of meetings, undertaking administrative tasks like taking care of the collaboration instruments, editing documents, and reporting to the EC.

In addition to this leading role, SLA@SOI will actively contribute to gathering information about the ongoing standardisation activities both within the SLA@SOI project and in the broader community, and building a consolidated view on standardisation activities, needs, and news.

In general, SLA@SOI considers the participation in the CWG a cornerstone of its strategy for contributing to standards. The collaboration with NESSI and other SSAE&I projects that are active in the standardisation landscape will offer an invaluable opportunity for building a critical mass and defining strong promotion channels within the standardisation bodies.

Past Activities

The Standardisation Collaboration group met twice during the first year of the SLA@SOI project: at the [Internet of Services Collaboration meeting for FP6 & FP7 Projects](#) (September 22/23, 2008) and at the [1st European Conference on Software Services and SOKU technologies](#) (SSOKU09) (January 13/14, 2009). In both meetings well-known members of the community and experts in the standardisation bodies have presented their approaches towards standardisation and raised issues and challenges for European research to stay competitive in a global market. Based on the presentations, the group discussed potential instruments and strategies for standardisation activities within the group of Objective 1.2 projects.

In addition, the means to collaborate in the above mentioned web site and a discussion forum have been set up, and Philipp Wieder as a representative of SLA@SOI participated in regular phone calls regarding the future planning of the various collaboration groups.

Future Roadmap

The main upcoming event is the [Internet of Services 2009 Collaboration Meeting for FP6 & FP7 Projects](#) (June 10/11, 2009). The session on Standardisation co-chaired by SLA@SOI will focus on the advances specifically regarding NESSI projects, which will include a presentation of SLA@SOI's first year's results. Apart from the presentation of results, the Standards collaboration group will use the meeting to exploit synergies between the projects and focus on specific standardisation issues which need urgent action.

Responsible partner

UDO (Contact: Philipp Wieder – philipp.wieder@udo.edu)

2.4 SSAI&E CWG on Virtualised Service Platforms

Description of the target of the collaboration task

The objectives of this CWG are to:

- Define what is meant by a service, and determine the set of requirements a service must meet in order to be supported. This will take into account potential future Internet trends such as sensors, RFIDs, and "smart dust". The output of this definition task will give their vision on the difference between the "Internet of Services" and the "Internet of Things" as envisioned by the EC.
- Identify other FP7 stakeholders in a virtualized service platform and solicit their involvement.
- Formulate the non-functional requirements on a virtualized service platform from an application provider point of view.
- Formulate the non-functional requirements on a virtualized service platform from an infrastructure provider point of view.
- Verify the set of requirement against contributed use-cases.
- Start working on a common definition of the interfaces required by service/application providers for lifecycle management.
- Examine the objectives of the other CWGs (e.g. Service Architecture) to identify potential overlaps and points for collaboration.

More information can be found at <http://www.eu-ecss.eu/contents/private-area/virtualised-service-platforms/virtualised-service-platforms>.

Description of goals and modalities of the collaboration

The development of a virtualized service platform has a key relevance for the SLA@SOI project. For this reason, even if we do not play a leading role in this CWG⁷, we seek to become one of the core contributors. In particular, we will actively contribute to the definition of the requirements for the virtualized service

⁷ The CWG is led by the RESERVOIR project – see also Collaboration Task 11.

platform and to the definition of the interfaces for lifecycle management, bringing to the CWG the SLA@SOI perspective and the results developed within the project. Given the wide range of industrial scenarios that we will develop within SLA@SOI, we will also be able to contribute to the collection of use-cases for requirements validation.

Past Activities

- September 2008 - joint presentation with IBM and Alcatel-Lucent at the SSIA WG meeting in Brussels.
- February - March 2009 - participation in VSP WG conference calls including presentation on SLA@SOI project.

Future Roadmap

- Near term: teleconferences to discuss details of infrastructure management and interfaces.
- Medium term: pending progress identifying joint initiative with RESERVOIR project - identified as initial step.

Responsible partner

Intel (Contact: Joe Butler – joe.m.butler@intel.com)

3 Collaborations with NESSI and NEXOF

SLA@SOI participates in the NESSI ("Networked European Software and Services Initiative") European Technology Platform. More precisely, SLA@SOI is a NESSI Strategic Project (NSP), which is to say it is a project that develops a core component of the overall NESSI service platform.

In this section, we describe the different ongoing collaborations between SLA@SOI and NESSI. In particular, we report the status of generic collaborations, aimed at guaranteeing an alignment of the project results with the NESSI platform and at building synergies on dissemination and outreach activities. In addition, we describe the status of two specific collaboration tasks related to the NEXOF (the NESSI Open Framework) and to NEXOF-RA (the project aiming at defining the reference architecture for NEXOF), namely:

- The participation in the Architecture Board of NEXOF-RA.
- The participation in the Request for Proposals launched by NEXOF-RA.

More details regarding these collaboration activities are given in the following sub-sections.

3.1 NESSI

Description of the target of the collaboration task

NESSI is the European Technology Platform dedicated to Software and Services. Its name stands for the "Networked European Software and Services Initiative".

Launched in September 2005, NESSI focuses on the paradigm shift that is driving the European economy towards a service oriented approach. This shift has an enormous impact on the creation and distribution of software, while at the same time opening opportunities for unprecedented levels of collaboration between companies. NESSI's industrial goal is to deliver open, standard, interoperable, safe and secure services environments in which all ICT companies, small and large, will be able to provide new solutions by relying on a tested infrastructure and focusing on their key capacities.

More information can be found at <http://www.nessi-europe.eu/>.

Description of goals and modalities of the collaboration

The collaboration between SLA@SOI and NESSI has several goals and follows different modalities.

First of all, being a Nessi Strategic Project (NSP), SLA@SOI is realizing one of the core pillars of the overall NESSI vision. For this reason, the research activities

undertaken by SLA@SOI have to be aligned with the comprehensive NESSI research roadmap, and the results achieved within SLA@SOI have to be transferred to the NESSI Open Framework. This is achieved through the participation of SLA@SOI partners to the activities of NESSI and NEXOF-RA (see also the next sub-sections).

Secondly, collaborations with companies and actions to obtain impact on the market can be set up through NESSI, which involves the most important industrial realities in Europe.

Thirdly, NESSI offers facilities for dissemination, advertisement, organization and participation in events, which can be exploited by SLA@SOI.

Past Activities

SLA@SOI has had a particular collaboration with RESERVOIR, SOA4ALL and NEXOF-RA in order to get a common target (see Section 3.2).

NESSI has organized the new Service Wave 2008, an important conference on services held from the 10th to the 13th of December 2008 in Madrid. The objective of the conference was to create an annual European event on services, where industry and academia meet to move research to market and bring market needs to research. SLA@SOI had an important participation in this event with a paper summarising its overall approach and developments in the project entitled "Multi-level SLA Management for Service-Oriented Infrastructures"⁸.

Future Roadmap

SLA@SOI will collaborate in the different activities and events that Nessi have planed for the next year, as they will be related with future Internet and NEXOF-RA.

Responsible partner

TID (Contact: Alfonso Castro – acast@tid.es)

3.2 NEXOF-RA Architecture Board

Description of the target of the collaboration task

The NEXOF-RA (NEXOF Reference Architecture) project is the first step in the process of NEXOF for building a generic open platform for creating and delivering applications enabling the creation of service based ecosystems where service providers and third parties easily collaborate. NEXOF-RA's main results will be the Open Reference Architecture for NEXOF, a proof of concept to validate this architecture and a roadmap for the adoption of NEXOF as a whole. The Open Reference Architecture is built through an Open Construction Process, a collaborative process which is open to actors from both industry and academia. These actors can contribute by participating in investigation teams on specific aspects of the Architecture to be defined.

⁸ Towards a Service-Based Internet, Springer Verlag Lecture Notes in Computer Science 5377

The NEXOF-RA Architecture Board has the goals of (1) approving the Open Reference Architecture models and specifications, and (2) of supervising the technical aspects of the Open Construction Process. In addition to members of NEXOF-RA, representatives of the NESSI Strategic Projects participate on the Architecture Board.

More information can be found at <http://www.nexof-ra.eu/>.

Description of goals and modalities of the collaboration

This collaboration activity consists of the participation of SLA@SOI representatives on the NEXOF-RA Architecture Board. This includes participating in meetings and teleconferences of the Architecture Board, deciding on the definition of the architecture, and discussing the strategy and investigation of the NEXOF-RA project.

The objectives of this participation are:

- To assure that the SLA@SOI's SLA-based architecture becomes an integral part of the overall NEXOF reference architecture and to align the interfaces and functions of the components developed by SLA@SOI within this broader architecture.
- To guarantee that the delivery plan of SLA@SOI is aligned with the development plan of the reference architecture, that the Architecture Board is aware of the possible contributions of SLA@SOI to the architecture, and that these contributions are taken into account in the Requests for Proposal issued by NEXOF-RA (see next sub-section) .
- More generally, to guarantee awareness and alignment between the activities undertaken in SLA@SOI and the definition of the NESSI Open Framework.

Past Activities

The past activities have been of three kinds:

- Participation in the physical and telephone meetings of the Architecture Board. In particular, SLA@SOI delegates have participated to the following meetings:
 - Physical meetings: 16-17 April 2008 (Brussels), 27-28 May 2008 (Brussels), 2-3 July 2008 (Haifa), 13-14 October 2008 (Brussels), 26-27 January 2009 (Brussels).
 - Concalls: 21 May 2008, 11 September 2008, 20 November 2008, and 25 March 2009.
- Review, comments and discussions of the NEXOF-RA deliverables brought to the approval of the Architecture Board. In particular, the effort of SLA@SOI representatives has focused on the following NEXOF-RA deliverables:
 - D7.2 - Definition of an architectural framework and principles
 - D6.2/D7.3 - Reference Architecture Model V2.0 and Conceptual Architecture View
- Preparation of input material on the goals, activities, results, and plans of the SLA@SOI activity, as requested by the different NEXOF-RA WPs.

Future Roadmap

The future roadmap in this collaboration includes:

- The continuation of the activities already started in the 1st year of the project and, in particular, the participation to the Architecture Board meetings, the review of NEXOF-RA deliverables and the preparation of

input material from SLA@SOI to the NEXOF project. The overall goal is to guarantee an alignment of NEXOF with the achievements of the SLA@SOI project.

- Focused transfer activities for key results of the SLA@SOI project. In particular, these activities will include transferring to NEXOF-RA the architecture, the prototype platform and the demonstrator that are being defined for the 1st year cycle of the SLA@SOI project. This will require discussing these SLA@SOI achievements with the relevant WP representatives from NEXOF-RA, understanding which SLA@SOI results can be directly transferred to NEXOF, and which adjustments would be necessary from the SLA@SOI results to allow their inclusion in NEXOF.

Responsible partner

FBK (Contact: Marco Pistore – pistore@fbk.eu)

3.3 Contributions to NEXOF-RA's RFP

Description of the target of the collaboration task

As discussed in the previous subsection, NEXOF-RA is building an Open Reference Architecture for service frameworks through a Collaborative Process. Key tools for this collaboration are calls, each known as a Request For Proposal (RFP). Each call is devoted to specific Service Area topics. Leading actors from both industry and academia are invited to submit their proposals on such topics and to participate to the Investigation Teams launched for providing integrated answers to these topics.

More information can be found at http://www.nexof-ra.eu/open_construction_process.

Description of goals and modalities of the collaboration

Being an NSP, SLA@SOI will develop core components of the overall NESSI service platform. In particular, SLA@SOI will contribute to NESSI the results of its investigation on SLA Management and its relationships with service management at the main levels of the implementation stack (business, software, and infrastructure). The participation in the NEXOF-RA's Requests for Proposal is the main way for implementing this transfer of results from SLA@SOI to NEXOF.

The specific goal of this collaboration task is to guarantee a wide, active, and effective participation of SLA@SOI to the different RFPs launched by NEXOF-RA and to coordinate the SLA@SOI effort to answer NEXOF-RA's RFPs. More specifically, we will:

- provide information to NEXOF-RA of the topic of interests of SLA@SOI;
- identify the NEXOF-RA RFPs that are linked to the SLA@SOI project;
- select candidate WPs of SLA@SOI to contribute and key people to respond to NEXOF-RA requests;
- coordinate and facilitate the participation of these WPs and people throughout all the duration of the investigation teams.

Past Activities

Currently NEXOF-RA has issued two RFPs.

SLA@SOI has actively contributed to both the RFPs with position papers and with participation to Investigation Teams (ITs) producing both conceptual models and architectural patterns.

- ITs of the first call started on September 5th, 2008 and closed in January 16th, 2009. Conclusive documents can be found at <http://www.nexof-ra.eu/?q=rep/term/144>. In particular we contributed to the first RFP on the following topics:
 - Design time service composition
 - Service Discovery
 - Definition of Infrastructure Services
 - Scalable Approaches to SOI
 - Service Description
- ITs of the second RFP have started on February 23rd, 2009. We are currently contributing to the following topics:
 - Infrastructure Usage and Management Interfaces
 - Runtime Service Composition
 - Service Level Agreements (SLAs) and Quality of Service (QoS)

Future Roadmap

- Conclusion to second RFP is planned for June 5th, 2009.
- SLA@SOI will participate to future NEXOF-RA RFPs. Next RFP is planned in July 2009.

Responsible partner

ENG (Contacts: Francesco Torelli - torelli@eng.it; Matteo Melideo - melideo@eng.it)

4 Collaborations with the Future Internet Assembly

The Future Internet Assembly is an initiative that has been launched by the European Commission (Bled, 31 March – 2 April 2008) as a vehicle for exchanging and promoting different views in the global "Future Internet" debate and for building up relevant initiatives emerging from the first call of the ICT programme. The Future Internet Assembly hence offers a context for collaboration which is broader than the SSAI&E cluster, including aspects such as Networking, Internet of Things, Media, Trust and Security.

In the next sub-section, we describe the past collaboration activities and future collaboration roadmap that SLA@SOI is undertaking with the Future Internet Assembly.

4.1 Future Internet

Description of the target of the collaboration task

The Future Internet Assembly is an initiative organized by the European Commission designed to coordinate and inform the ICT research agenda for Europe now and into the future. At the moment, the European Future Internet Assembly brings together more than 60 research projects that are part of Challenge 1 of the ICT programme of FP7. It is organised into 7 areas: Network Architecture & Mobility; Internet of Things; Content Creation and Delivery; Service Architectures; Trust, Security, Privacy; Experimental Facilities and Test-beds.

The various areas are led by care-takers, and all FP7 research projects are aligned into one or more of the areas. It is foreseen that the various areas will have a key role in authoring the research agenda for future work programmes.

More information can be found at <http://www.future-internet.eu/>.

Description of goals and modalities of the collaboration

SLA@SOI is currently aligned to the Services Architectures working group. It is also engaged with the Management & Service Network Architecture team.

SLA@SOI will monitor and engage in all appropriate Future Internet working groups, conferences, events, calls for papers, and activities.

These opportunities will be used to promote the key concepts and output of the SLA@SOI project, as well as inform the future internet research agenda.

The modalities of collaboration will consist of participation in working groups, attendance of conferences, manning stands, and preparation of content for calls-for-papers and exhibits.

Past Activities

Participated in Future Internet Symposium at Vienna (September 2008), and Future Internet Assembly in Madrid (December 2008).

- **Management & Service Network Architecture Working Group:** We have engaged with this working group, accepted an invitation to present SLA@SOI at Future Internet Madrid workshop, and co-authored the a position paper for the Future Internet event in Prague.
- **Services Architecture Working Group:** Attended various concalls, monitoring progress of working group and contributing SLA@SOI perspective where appropriate.
- **Future Internet Research & Experimentation:** Authored and submitted two potential use cases on behalf of SLA@SOI. We have been monitoring progress of the working group and contributing SLA@SOI perspectives where appropriate.

Future Roadmap

Future plans are focused on attending and participating in the Future Internet Assembly in Prague (May 2009), embedding SLA@SOI perspective into the various working group sessions where appropriate.

Subsequent engagement and activities will depend on the outcomes of the conference, and the ongoing dialogue between the Assembly and the European Commission.

Responsible partner

Intel (Contact: John Kennedy – john.m.kennedy@intel.com)

5 Collaboration with specific FP7 European projects

This section illustrates collaborations of SLA@SOI with specific FP7 European projects which are additional to the ones undertaken within the SSAI&E, NESSI, and Future Internet umbrella initiatives.

The aim of FP7 project collaborations is to define synergic activities that will allow projects to jointly address specific cross-project research problems.

In particular, FP7 European projects include:

- the S-Cube network of excellence,
- the STREP Q-Impress, and
- the IPs SOA4ALL, and RESERVOIR.

More details on past and future collaboration activities with these projects are provided in the following sections.

5.1 Q-ImPrESS

Description of the target of the collaboration task

The Q-ImPrESS project is a STREP within the SSAI&E cluster. It aims at bringing service orientation to critical application domains, such as industrial production control, telecommunication and critical enterprise applications, where guaranteed end-to-end quality of service is particularly important. The main challenge here is to create a method for quality-driven software development and evolution, where the consequences of design decisions and system resource changes on performance, reliability and maintainability can be foreseen through quality impact analysis and simulation.

More information can be found at <http://www.q-impress.eu/>.

Description of goals and modalities of the collaboration

Like SLA@SOI, the Q-ImPrESS project introduces an open source showcase on an enterprise SOA to demonstrate its technical developments. As a result of an evaluation of potential synergies, we agreed that the primary target of this collaboration would be the integration of two showcases to one more complex application. In doing so, we will be able to deliver a more sophisticated open reference case featuring a better coverage of industry requirements.

The Q-ImPrESS showcase focuses on a service-oriented implementation of a general order management process for the retail domain. The concrete goal is to adapt this process to SLA@SOI's Open Reference Case (ORC – WP B2) and integrate it into the overall solution. Since so far the implementation of complex business processes is not covered by the ORC, this collaboration will be very valuable specifically for the business management layer targeted in WP A2. Moreover, we are planning to cooperate in the development of a workload generator for the scenario.

Regarding the modalities of this cooperation, we are planning to have meetings with the responsible stakeholders after certain milestones regarding the implementation of the showcases have been reached. A major goal of these meetings will be the definition of (additional) integration activities for the next milestone.

Past activities

SLA@SOI participated in the panel discussion on Extra-functional Contracts versus Service Level Agreements organized by Q-ImPrESS which took place at the Comparch conference 2008 in Karlsruhe. Additionally, the conjoint planning and organisation of the 1st International Workshop on the Quality of Service-Oriented Software Systems (QUASOSS) was started. This workshop was held in conjunction with the 7th ESEC/FSE Joint meeting in Amsterdam and should bring together researchers and practitioners to discuss the state-of-art in modelling and evaluating the extra-functional properties of service-oriented software systems.

The first meeting regarding the showcase collaboration took place on 18.04.2008 at the Forschungszentrum Informatik (FZI) in Karlsruhe. Both partners shortly introduced their projects and gave an overview of the current project state with a focus on the Showcase development. From the side of SLA@SOI, the first ideas and expectations on the Showcase concept have been identified and discussed. Q-ImPrESS was able to present a preliminary version of the Showcase, which had been already developed in the early project stage. Although technically not reflecting the final version, the functional side of the runnable Showcase helped both partners to become more concrete on their visions and goals during the discussion.

The second collaboration meeting took place on 10.12.2008 again at the FZI in Karlsruhe. For this meeting both partners prepared initial versions of their Showcase implementations in order to identify feasible interaction scenarios for both systems. The presented Showcase versions were equipped as follows:

- **SLA@SOI Showcase** consisted of a single system incorporating load generator and workflow processing systems. The implemented scenario reflects typical business processes in a large supermarket chain: the sales process and the order process. The sales process includes goods processing at the cash desk and the order process describes ordering of goods from the central or regional warehouse. The load generator simulates customers in the stores, and allows controlling the incoming load for the sales process. The initial version of the Showcase covered only a simple one-store case with an unlimited warehouse.
- **Q-ImPrESS Showcase** presented by ITE included a more elaborated version of the addressed business scenario, described in the Project Deliverable D8.7 "Collaboration Plan" on p. 10. To reinforce the importance of the Showcase as a realistic business process simulator, it has been enriched with further sources of business-relevant information like customers, products and pricing management. It now includes individual systems for customer management (CRM), product management (PDM) and Pricing information (Pricing) each of them exposing a separate Web frontend allowing to browse and to edit stored information. They also have been provided with a number of Web Services, designed to be used in the Showcase as well as by external systems, requiring business information from the Showcase. This allows the definition of an order generation process and it's implemented by means of a distributed system with interactions resembling real world communication scenarios. Furthermore, the Showcase included a re-implemented version of the Shipment simulator, which has been now

adjusted to generate shipment information depending on the current product availability in the inventory. This approach allows to vary product availability for different product groups and consequently to affect the order shipping time depending on the customer ordering profile. In case of a later data analysis through a BI system, this aspect plays an important role to create realistic business reports on the simulated business process.

Future Roadmap

By discussing the available interfaces in the Q-ImPRESS and SLA@SOI showcases, the identification of feasible cooperation scenarios between the two systems became possible. The following ideas, which we are planning to implement in the next steps came up during the meetings:

- SLA@SOI Showcase requires a source of pricing information. It is planned that the supermarket stores will be provided with certain autonomy in the price management i.e. will have a local price database. However, possible extension of the business process with a Payback System will require integration of an external system for discounts into the workflow. This will allow handling customers with special discount conditions, managed centrally in the enterprise-level systems. In order to check for applicable discounts for each sale, the pricing system from the Q-ImPRESS Showcase can be employed. Currently implemented functionality for volume and customer type discounts can be adjusted for this purpose to include information about the Payback customer number. This way a simple and straight integration between both Showcases will be achieved.
- In the current version, SLA@SOI Showcase does not feature inventory management for the supermarket stores. To implement this functionality, the store will have to monitor its warehouse state and to continuously monitor and replenish it according to the sold goods. This requires that goods will be ordered from the central warehouse and requires an order processing workflow. The Q-ImPRESS Showcase can offer the required order placement interfaces and supply the SLA@SOI Showcase with the shipment information. Such integration on the one side would help to put realistic load onto the Q-ImPRESS showcase and on the other side to implement the order process in the SLA@SOI Showcase.

Responsible partner

FZI (Contacts: Christof Momm – momm@fzi.de; Steffen Becker– sbecker@fzi.de)

5.2 RESERVOIR

Description of the target of the collaboration task

RESERVOIR is a Large-Scale Integrating Project within the SSAI&E cluster which investigates technologies for advanced Cloud Computing. More precisely, the objectives of RESERVOIR are:

- To provide a software architecture where resources and services can be transparently and dynamically managed, provisioned and relocated like utilities – virtually “without borders”
- To support for federation of clouds, able to leverage the diversity factor to achieve economies of scale, as well as to leverage locality. This is because no single cloud can create a seemingly infinite infrastructure capable of serving massive amounts of users at all times, from all locations,

More information can be found at <http://www.reservoir-fp7.eu/>.

Description of goals and modalities of the collaboration

SLA@SOI and RESERVOIR have clearly distinct ambitions. RESERVOIR is focused on advanced infrastructure technologies supporting virtualisation and their management across administrative domains. SLAs are incorporated as a specific concern within the overall service lifecycle management at infrastructure level. SLA@SOI is focused on vertical SLA management across the whole stack from business to infrastructures. It simply seeks to exploit existing infrastructure technologies for bringing more flexibility for the service provisioning business. The specific infrastructure research will be always performed in the light of the vertical integration. While RESERVOIR follows a horizontal approach on advancing infrastructure technologies, SLA@SOI follows a vertical approach including the complete business/IT stack.

Despite the differences, we foresee possibilities of collaboration. In particular, with RESERVOIR focused on horizontal scalability through federation at the infrastructure layer, and SLA@SOI dealing with mappable SLAs from the business layer, there is a natural point of intersection related to the activities of the SLA@SOI infrastructure work-package (WP A4).

Collaboration outcomes could include the following:

- information sharing on overlapping research and implementation learning,
- comparison of techniques and results in areas of mutual interest,
- use case and business value assessment sharing,
- consultation on interoperability issues and standardisation opportunities,
- possibly joint demos which demonstrate use case and technology interoperability.

Past activities

Bilateral / informal meetings to share architectural details, identify at a high level what possibilities exist: most preferably a joint demo to show vertical SLA mapping (SLA@SOI) with seamless horizontal scaling by 'cloudbursting' to a RESERVOIR cloud.

Future Roadmap

Near term formal discussion to validate the most appropriate collaboration and establish a formal plan with expected outcomes, success criteria and resource commitments.

Responsible partner

Intel (Contact: Joe Butler – joe.m.butler@intel.com)

5.3 S-Cube

Description of the target of the collaboration task

S-Cube (Software Services and Systems) is a NoE funded by the EC within the context of FP7. The goal of S-Cube is to 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. S-Cube intends to achieve world-wide scientific excellence by pursuing agile & holistic service engineering & adaptation principles, techniques & methods to foster innovation, and by serving as incubator for the next wave of service technologies. S-Cube also intends to inaugurate a Europe-wide education and training programme for researchers and industry and to create a European distributed services laboratory.

More information can be found at <http://www.s-cube-network.eu/>.

Description of goals and modalities of the collaboration

SLA@SOI and S-Cube have clearly distinct objectives and setups. SLA@SOI research is heavily founded in industrial use cases from which requirements are derived and against which research results are evaluated, and is heading for industry mature solutions. S-Cube aims at advancing the state-of-the-art by long term research in the overall field of service engineering and management. Content-wise, SLA and SOI are key concepts in both projects, but with different scopes. SLA@SOI takes largely the perspective of a single provider and focuses on SLA definition, monitoring and adaptation within a single provider. In contrast to that, S-Cube investigates complete service provider chains and the related end-to-end management issues.

Though the two projects are quite distinct in nature, both projects consider it beneficial to share their respective modelling and technical approaches in order to improve the broad applicability of the project results. In particular, S-Cube will offer to SLA@SOI the possibility to transfer to the broad research community on software service those research challenges that are relevant for the long term adoption of the SLA@SOI results, but that cannot be investigated within the scope of the project.

To achieve these objectives, the SLA@SOI partners participating also to S-Cube will guarantee a continuous mutual awareness and the cross-fertilization between the two projects. Furthermore, we will have yearly meetings for an in-depth analysis and discussion of collaboration opportunities.

Past activities

During the first year of the SLA@SOI project, the activities within this collaboration task have been informal, and based on the work of the partners and persons participating in both projects.

Furthermore, the work on the monitoring infrastructure that is being developed in SLA@SOI was presented by City University (George Spanoudakis) at the Service and Software Architectures, Infrastructures and Engineering (SSAIE) Summer School that was organised by S-Cube (16-19 June 2009).

Finally, face-to-face meeting has taken place on April 29, 2009 in Essen, with the participation of Marco Pistore (FBK) for SLA@SOI and Andreas Metzger and Andreas Gehlert (University of Duisburg-Essen) for S-Cube.

Informal collaboration activities and face-to-face meeting have lead to the identification of collaboration areas and to an initial alignment of the research agendas of the two projects. The collaboration areas identified so far are Service Level Agreements and SOA Monitoring.

Future Roadmap

The plan for future activities in this collaboration task includes work in the two collaboration areas identified so far and a deeper analysis of possible areas of collaboration.

For what concerns the latter activity, S-Cube has recently produced a whitepaper with the project vision and a set of vision documents on the different research areas covered by the NoE. These documents describe the research challenges that the NoE intends to address, in collaboration with the broader research community on services. These documents are hence a convenient starting point for the definition of specific collaboration opportunities, and in particular for defining how the results of SLA@SOI relate to the S-Cube challenges.

A second face-to-face meeting is scheduled for the 4th quarter of 2009. The outcome of the meeting will be a joint document identifying detailed collaboration areas and actions.

Responsible partner

FBK (Contact: Marco Pistore – pistore@fbk.eu)

5.4 SOA4All

Description of the target of the collaboration task

Service Oriented Architectures for All (SOA4All) is an IP within the SSAI&E cluster.

SOA4All will help to realize a world where billions of parties are exposing and consuming services via advanced Web technology: the main objective of the project is to provide a comprehensive framework and infrastructure that integrates complementary and evolutionary technical advances (i.e., SOA, context management, Web principles, Web 2.0 and Semantic Web) into a coherent and domain-independent service delivery platform.

More information can be found at <http://www.soa4all.eu/>.

Description of goals and modalities of the collaboration

SLA@SOI and SOA4All have completely distinct ambitions. SLA@SOI is focused on industry-services, i.e., services that represent an economic asset and where the service provisioning and consumption are formally negotiated via SLAs. SOA4All, instead, focuses on light-weight services and their spontaneous composition. Furthermore, SLA@SOI focuses on the non-functional characteristics of services, such as dependability and performance, while SOA4All focuses on the functional service behaviour.

For these reasons the collaboration will be lightweight, and will focus on the exchange of the approaches and techniques being developed in the two projects and on some experiments, which will be conducted by CEFRIEL and Politecnico di Milano, to understand if these results could be integrated and exploited in a conjunct way.

In more detail, SOA4All will offer to SLA@SOI the results obtained in the area of service construction. In turn, SOA4All will gather the SLA@SOI results concerning negotiation and monitoring of SLAs. The analysis on the possibility of integrating these approaches will occur in the background during the progress of the two projects and, compatibly with their milestones, will be executed in an iterative manner.

Past activities

The activities performed so far have been focusing on discussions between CEFRIEL and Politecnico di Milano about the work being developed in both projects.

In particular, CEFRIEL has presented the prototype it has developed within the context of SOA4All. This prototype⁹ concerns the possibility to automatically adapt service requests to the actual service interface offered by the service. The prototype is useful in the context of dynamic discovery and binding where the actual service to be used is decided at runtime based on its functional and extra-functional characteristics.

Politecnico di Milano has presented the formalization of the SLA developed within SLA@SOI and the approach to collect data from various sources.

Future roadmap

The future roadmap is based on the following two parallel threads:

- Incorporating SLA information within SOA4All
 - We will investigate if and how the SLA information offered by SLA@SOI could be helpful in the SOA4All platform for selecting the service to be used at runtime and for influencing the way the mapping to its interface is performed.
 - We will design a possible integration and perform some experiment internal to CEFRIEL and Politecnico di Milano.
- Incorporating dynamic binding and interface mapping mechanisms within SLA@SOI
 - We will investigate if and how the mapping approach developed by CEFRIEL within SOA4All can be incorporated into the service life cycle that is being developed by Politecnico di Milano within SLA@SOI.
 - We will design a possible integration and perform some experiment internal to CEFRIEL and Politecnico di Milano.

Responsible partner

PMI (Contact: Luciano Baresi - baresi@elet.polimi.it, Elisabetta Di Nitto - dinitto@elet.polimi.it)

⁹ Luca Cavallaro, Gianluca Ripa and Maurilio Zuccalà. *Adapting Service Requests to Actual Service Interfaces through Semantic Annotations*. To appear in the Proceedings of the ICSE 2009 workshop on Principles of Engineering Service Oriented Systems, Vancouver, May 2009

6 Collaboration with specific FP6 European projects

This section illustrates collaborations of SLA@SOI with specific FP6 European projects.

With respect to the initial collaboration plan (Deliverable D.B8b) issued at M6, the list of projects has been extended to include FP6 projects on topics related to the ones SLA@SOI is addressing (i.e. negotiation, grid, services).

The aim of FP6 project collaborations is to check whether there is any result that SLA@SOI can exploit and, more in general, that work already done in previous projects is not replicated.

Collaboration has been planned/taken place with the following FP6 European projects:

- the STREPs AssessGrid, CONTRACT, GridECON, InfraWebs, and ONE, and
- the IPs ASG, BEInGRID, BREIN, and SeCSE.

More details on past and future collaboration activities with these projects are provided in the following sections.

6.1 ASG

Description of the target of the collaboration task

Adaptive Service Grids (ASG) was a EC IST 6FP program funded from September 2004 until February 2007.

The goal of the Adaptive Services Grid project was to develop an architectural blueprint and a proof-of-concept prototype of an open development platform for adaptive and reliable discovery, composition, and enactment of services.

The platform is advertised as having delivered the following goals:

- seamless integration of heterogeneous external services
- on-demand creation of service compositions
- reliable service provisioning with assured quality of service

Given the thematic overlap with service integration, composition and provisioning with the SLA@SOI topics of service aggregation in creating SLAs out of various service offerings, we will seek to analyze the re-use of ASG ideas and technologies in the scope of SLA@SOI, especially in the context of work-package B5 which seeks to prototype such service aggregations.

Description of goals and modalities of the collaboration

The goal of the collaboration shall be the re-use of techniques presumed by SLA@SOI's research programs (e.g. service composition, heterogeneous service integration, reliable service provisioning).

The interaction shall consist of contacting partners involved with eTel Telekom Austria in EC research projects (Polska Telefonia Cyfrowa, Pozan University, Hanival, National University of Galway) for assistance in studying the results of the research project. As time allows, collaboration with such identified research partners will be conducted by electronic correspondence or, when time and resources permit, informal physical meetings, where the research program of SLA@SOI will be presented for soliciting advice.

Past activities

The identified participants have been contacted, looking for the relevant partners will take some time. So far, only collaboration with Hanival has yielded a good correspondence.

Relevant deliverables are being identified and procured.

Future roadmap

Derive a timeline for when these activities can reasonably be concluded, which should happen as soon as possible before the SLA@SOI architecture gets too much more solidified. SLA@SOI M14 is identified as the latest date for meaningful contribution from this collaboration.

Responsible partner

eTel (Contact: Marc Evenson – mark.evenson@etel.at)

6.2 AssessGrid

Description of the target of the collaboration task

AssessGrid is a European research project which is working on an SLA-based Grid environment enhanced through risk management and assessment features.

The collaboration group on SLAs, which is targeting inter-project SLA issues for Objective 1.2, also includes the European projects BREIN (see Section 6.4), BEinGRID (see Section 6.3), the CoreGRID follower (see Section 7.3) and SmartLM.

Regarding the collaboration with AssessGrid, the WS-Agreement based negotiation solutions and the ongoing work of AssessGrid project partners at the Open Grid Forum in the area of WS-Agreement and SLA negotiation are of interest to SLA@SOI.

Description of goals and modalities of the collaboration

The overall goal of the collaboration is to exploit synergies between the two projects (and the others mentioned above) in the area of SLA modelling and negotiation and drive the development and standardisation of domain-specific WS-Agreement profiles and enhancements as well as an WS-Agreement-based negotiation protocol.

The collaboration is executed through a network of researchers which meet regularly at various events. With respect to AssessGrid, the Technical University Berlin is the partner involved in this collaboration.

Past activities

The last meeting regarding this collaboration (including partners from CoreGRID, BEinGRID, BREIN and SmartLM) took place in Schloss Dagstuhl, Germany, in March 2009. The meeting on WS-Agreement was embedded in the "Service Level Agreements in Grids" seminar, which brought together people working on SLAs in the context of grid computing mainly from computer science, but also from information systems and application areas. These researchers came from different areas and brought in a wide range of research work. The topics covered by people on the invitation list include but are not limited to the following areas:

- SLA languages
- Business models
- Grid economy
- SLA management
- Resource management
- Job scheduling
- Application deployment mechanisms
- Negotiation strategies

A5 related issues have been discussed in a side meeting between the above mentioned projects. This discussion resulted in progress regarding a standardised negotiation protocol and domain-specific additions to WS-Agreement. SLA@SOI's use case related requirements have not yet been incorporated into this process since they have not been evaluated at the time of the meeting.

Future roadmap

The next scheduled meeting is the Open Grid Forum 25 in Chapel Hill, US, in May 2009. There the results from the Dagstuhl meeting will be presented and incorporated into the ongoing work on WS-Agreement.

Responsible partner

UDO (Contact: Philipp Wieder – philipp.wieder@udo.edu)

6.3 BeInGrid

Description of the target of the collaboration task

BEinGRID is a huge European integrated research project which combines 25 business experiments. By highlighting the scenario, solution and result for each one of the experiments, developing missing software and releasing best practice guides, the project encourages other end users in a similar situation to investigate the role that Grid technology could have for them.

The collaboration group on SLAs, which is targeting inter-project SLA issues for Objective 1.2, also includes the European projects AssessGrid (see Section 6.2), BREIN (see Section 6.4), the CoreGRID follower (see Section 7.3) and SmartLM.

Regarding the collaboration with BEinGRID, for SLA@SOI especially the business experiments using WS-Agreement are in the focus for collaboration. As of today, these are those named BE20, BE22 and BE25.

Description of goals and modalities of the collaboration

The overall goal of the collaboration is to exploit synergies between the two projects (and the others mentioned above) in the area of SLA modelling and negotiation and to drive the development and standardisation of domain-specific WS-Agreement profiles and enhancements as well as an WS-Agreement-based negotiation protocol.

The collaboration is executed through a network of researchers which meet regularly at various events. With respect to AssessGrid, the High-performance Computing Center Stuttgart is the partner involved in this collaboration.

Past activities

For details please see the respective section at the AssessGrid collaboration task (Section 6.2).

Future roadmap

For details please see the respective section at the AssessGrid collaboration task (Section 6.2).

Responsible partner

UDO (Contact: Philipp Wieder – philipp.wieder@udo.edu)

6.4 BREIN

Description of the target of the collaboration task

BREIN takes the e-business concept developed in previous Grid research projects, namely the concept of so-called "dynamic virtual organisations" towards a more business-centric model, by enhancing the system with methods from artificial intelligence, intelligent systems, semantic web etc. Thus, the BREIN project will enable business participants to easily and effectively use Grid technologies for their respective business needs.

The collaboration group on SLAs, which is targeting inter-project SLA issues for Objective 1.2, does also include the European projects AssessGrid (see Section 6.2), BEinGRID (see Section 6.3), the CoreGRID successor (see Section 7.3) and SmartLM.

Regarding the collaboration with BREIN, SLA@SOI can especially benefit from the WS-Agreement-based negotiation solutions which BREIN is developing and which include experience from projects such as NextGRID and Akogrimo.

Description of goals and modalities of the collaboration

The overall goal of the collaboration is to exploit synergies between the two projects (and the others mentioned above) in the area of SLA modelling and negotiation and to drive the development and standardisation of domain-specific

WS-Agreement profiles and enhancements as well as an WS-Agreement-based negotiation protocol.

The collaboration is executed through a network of researchers which meet regularly at various events. Within AssessGrid, the Technical University Berlin is the partner involved in this collaboration.

Past activities

For details please see the respective section at the AssessGrid collaboration task (Section 6.2).

Future roadmap

For details please see the respective section at the AssessGrid collaboration task (Section 6.2).

Responsible partner

UDO (Contact: Philipp Wieder – philipp.wieder@udo.edu)

6.5 CONTRACT

Description of the target of the collaboration task

CONTRACT is a research project funded by the European Commission in the context of the 6th Framework Programme.

The project started on the 1st of September, 2006 and will finish in 2009.

The aim of the project is to develop frameworks, components and tools which make it possible to model, build, verify and monitor distributed electronic business systems on the basis of dynamically generated, cross-organisational contracts which underpin formal descriptions of the expected behaviours of individual services and the system as a whole. The project covers both theoretical and practical aspects and the resulting systems will make it possible to:

- specify electronic business-to-business interactions in terms of contracts,
- dynamically establish and manage contracts at runtime in a digital business environment,
- apply formal verification techniques to collections of contracts in a digital business environment, and,
- apply monitoring techniques to contract implementation in order to help provide the basis for business confidence in e-Business infrastructures.

More information can be found at <http://www.ist-contract.org/> .

Description of goals and modalities of the collaboration

The collaboration goals are to investigate whether:

- the B2B interactions in terms of contracts are applicable to the work in SLA@SOI,
- the dynamically establishment and management of contracts done by CONTRACT project are applicable to the SLA negotiation process of SLA@SOI, and

- the monitoring techniques studied in CONTRACT relate to and/or can enrich relevant work in SLA@SOI.

Past activities

An analysis of the project objectives and results has been performed and led to the conclusion that a collaboration within the two projects is not interesting. Attempts to contact the project manager of CONTRACT have been unsuccessful.

Future Roadmap

Due to the outcomes of the analysis and the lack of collaboration interests on CONTRACT side, the decision is to drop this collaboration activity.

Responsible partner

TID (Contact: Alfonso Castro – acast@tid.es)

6.6 GridECON

Description of the target of the collaboration task

GridEcon is a European community FP6 project, exploring the perceived economic barriers to the adoption of Grid Computing.

The overall goal of the GridEcon project is to advance the functionality of existing Grid technology with respect to its capability to allow the economics-aware operation of Grid applications. The project aim is to propose the necessary solutions and extensions to this technology, so that new Grid business models can be implemented.

The specific project objectives are to:

- Define Grid economics based on current Grid business models using scenarios
- Define micro-economic models for resource sharing across organizations
- Analyze new paradigms of accounting and settlement in the utility services model
- Validate these findings by implementing specific components
- Maximize the commercial impact of GridEcon by influencing existing technology trends

To reach these objectives the GridEcon consortium envisages the Grid as being more than just a large distributed system which provides virtualized services to its users and enables computing on demand on a best-effort basis at zero cost. Instead, GridEcon expects the Grid to offer services that span many economically independent enterprises, forming a real economy. The Grid is expected to evolve into a platform allowing the resolution of differences in service preferences of its users and the expression of their utility through interaction in an economy.

The expected benefits to the end-user include:

- The ability to generate income by selling services or sharing resources across individual organization boundaries
- The capability of choosing the appropriate level of service by paying the appropriate price

- A robust and highly utilized system that reacts more effectively to dynamic changes of demand
- The fast deployment of Grid infrastructures

Description of goals and modalities of the collaboration

The goal of a collaboration with GridEcon shall be to share information on overlapping research and implementation, to compare techniques and results in areas of mutual interest, and to share use case and business value assessment.

Past activities

An analysis of GridEcon results and produced documentation led to the conclusion that a collaboration within the two projects is not needed. This is due to the fact that the work conducted in SLA@SOI in Year 1 did not have synchronisation points with GridECONs objectives and output.

Future roadmap

As GridONE#ECON will end in May 2009 there will be no further direct collaboration between the project and SLA@SOI, but the economic-related activities in SLA@SOI will take the outcomes of GridECON into account for further work.

Responsible partner

UDO (Contact: Philipp Wieder – philipp.wieder@udo.edu)

6.7 InfraWebs

Description of the target of the collaboration task

Infrawebs was a EC 6FP IST project that lasted from August 2004 until October 2006.

The main INFRAWEBs project focus and objective is the development of an application-oriented software toolset for creating, maintaining and executing WSMO-based Semantic Web Services (SWS) within their whole life cycle. Although SLA@SOI is not pursuing tight integration with Semantic Web based descriptions of service capabilities, INFRAWEBs had some notion of co-operation with non-semantically encapsulated service units which would provide a bridge to understanding.

The goal of INFRAWEBs was to provide a comfortable and “easy to use” knowledge- brokering unit, being used for analysis, design and composition of SW services within a collaborative workflow environment, and supplemented with security and privacy preserving run- time and maintenance tools.

Of particular interest to SLA@SOI was the development of a QoS (Quality of Service) Broker providing functionalities for monitoring the SW service execution process and feeding back extracted metric data. Additionally, the Infrawebs framework investigated notions of dynamic reconfiguration which possibly is of interest to the dynamic re-provisioning needed by SLA@SOI.

Description of goals and modalities of the collaboration

The goal of collaboration with INFRAWEBBS for SLA@SOI would be to re-use techniques and technologies for SLA@SOI, as well as to contribute to our understanding of current state-of-the-art.

The modality of interaction shall be to pursue pre-existing informal contacts with partners in INFRAWEBBS (Ontotext and DERI (now STI) Innsbruck) for advice in approaching the relevant deliverables and prototypes.

Past activities

Ontotext has been contacted for initial discussions conducted via electronic correspondence.

Future roadmap

A specific roadmap for collaboration must be worked out in detail, preferably with a conclusion of an initial phase by SLA@SOI M14 to allow for time to take into account collaboration results in the definition of the Year 2 SLA@SOI architecture.

Responsible partner

Eng, eTel (Contact: Marc Evenson – mark.evenson@etel.at)

6.8 ONE

Description of the target of the collaboration task

The main aim of the ONE project is to allow organizations to create contract agreements in order to supply complex, integrated services as a virtual organization (or coalition).

ONE is a STREP project funded by the European Commission under the DG-INFISO that is geared towards SME's in order to provide them with a trusted, secure and free of charge technological environment in which they are able to create tactical and strategic alliances; for the ultimate goal of pursuing business opportunities and growth.

To deal with the aforementioned problem, the ONE project provides a negotiation platform that is:

1. Open Source, compatible with the Digital Ecosystem Initiative and platform;
2. Distributed and de-centralized both from a technical (no single point of failure) and organizational (no "big brother" controlling the marketplace) point of view. The enabling technology is based on the peer-to-peer approach;
3. Self-learning and adaptive to changes in the negotiation process and the business ecosystem environment.

The ONE platform actively supports the human negotiators by exploiting automatic learning techniques applied to the goal of learning the best negotiation strategies in a multi-agent environment. Optimized strategies are suggested through a learning process based on the observation of user behaviour, other partners' actions as perceived by the user and concurrent running negotiations. The supported model of collaboration and trust is based on the idea of "collaborative multi-agent systems", where agents can work and learn with other trusted agents and develop collaborative learning schemes. The policy learning

algorithms are based on the observation and storage of real interactions between the user and the negotiation service and between the user and other players (Trust), as these are performed in the negotiation environment.

More information can be found at <http://one-project.eu/>.

Description of goals and modalities of the collaboration

As described in previous section, the main problem addressed by the ONE project, is to support human negotiators suggesting negotiation strategies on the basis of past negotiation procedures and service provisioning history. Negotiation, being the project main focus, has been investigated in depth in all its facets, considering not only IT technologies and methods, but also economic, legal, societal and user aspects.

The negotiation problem tackled in SLA@SOI is much more narrow and specific: its aim is not to support human negotiators but to automate the SLA negotiation process according to some predefined negotiation schema.

The goal of collaboration with ONE for SLA@SOI would be to exploit the exhaustive analysis done within ONE in order to better position the specific aspects tackled within SLA@SOI within a broader picture of the negotiation problem. Moreover, the work done within ONE is a precious source for our understanding of current state-of-the-art.

Past activities

Bilateral meetings to discuss the project perspectives and possible synergies and collaboration activities have taken place. An analysis of the work done within the ONE project through project deliverables and main publications has been performed.

Future Roadmap

- Exploit the exhaustive analysis done within ONE in order to better position the specific aspect tackled within SLA@SOI within a broader picture of the negotiation problem
- Exploit the work done within ONE as a source for our understanding of current state-of-the-art.

Responsible partner

FBK (Contact: Annapaola Marconi – marconi@fbk.eu)

6.9 SecSE

Description of the target of the collaboration task

The SeCSE project was aimed at creating new methods, tools and techniques for system integrators and service providers and to support the cost-effective development and use of dependable services and service-centric applications.

This project started in September 2004 and ended in November 2008. It produced contributions in the areas of service and systems specifications, service

discovery, service-centric systems architectures and service monitoring and management.

Several of these topics are relevant also in SLA@SOI.

Description of goals and modalities of the collaboration

Our goal is mainly to exploit the know-how acquired in SeCSE, thanks to the involvement in SLA@SOI of some key people involved in both projects, especially from Engineering (coordinator of the SeCSE project), City and (through the CEFRIEL) PMI.

In particular, we expect to leverage on approaches for service negotiation, monitoring and instrumentation matured in SeCSE.

Past activities

Experience acquired from PMI with the open source BPEL engine "ActiveBPEL" has been disseminated in SLA@SOI and used to design extensions of this engine for dynamic composition and for process instrumentation.

Future roadmap

The approach and experience on monitoring will be reused and generalized in SLA@SOI. More specifically, the general vision is to develop a generic infrastructure to enable the configuration, deployment and coordination of different types of monitors (including SeCSE-like monitors).

The possibility to reuse SeCSE results on QoS negotiation is under evaluation.

Responsible partner

ENG (Contacts: Francesco Torelli - torelli@eng.it; Matteo Melideo - melideo@eng.it)

7 Collaboration with specific initiatives

This section illustrates ongoing collaborations with specific initiatives which are not related to European projects and to European cluster initiatives. This includes collaborations with national or non-European projects and programmes, as well as with European initiatives outside the SSAI&E area.

At the moment, three such initiatives have been identified, namely:

- Theseus, a German program on services;
- IVI, the Innovation Value Institute;
- The CoreGrid ERCIM working group;
- Gridipedia, the European repository on Grid computing.

The past and planned collaboration activities within these four collaboration tasks are reported in the following sub-sections.

7.1 IVI - Innovation Value Institute

Description of the target of the collaboration task

The Innovation Value Institute researches and develops unifying frameworks and road-maps for IT and Business executives to create more value from IT and better deliver IT enabled innovation whilst validating that these frameworks/tools have a broad applicability across differing industries and contexts.

The IVI, under the core themes of IT Value and IT Innovation, researches and develops advanced methodologies, tools and practices that will allow organisations to optimally manage their IT Capability to answer the needs of improved IT Value and IT Innovation delivery. Initial research is focused on developing a Capability Maturity Framework. The IT-Capability Maturity Framework is an integrating framework that enables CIOs and business management to deliver more value from IT investments and practices.

The IVI Working Groups are currently researching five critical processes: Innovation Management, Infrastructure Management, Enterprise Architecture, Value Analytics & Intelligence and Benefits Assessment & Realisation. The research of the Infrastructure Management Working Group covers the critical processes of managing the distributed technology assets within an organisation. Assets include Client and Server Hardware/Operating System.

More information can be found at <http://ivi.nuim.ie/research/>.

Description of goals and modalities of the collaboration

IVI is defining maturity curves for management of IT infrastructure and information services. This includes investment strategies and tactics, and means of assessing business value from complex service configurations. The SLA@SOI Enterprise IT use case will focus on allocation of IT resources as a function of criticality and value/impact. As the criticality of business processes and information services have cycles and interdependencies, the configuration of the

IT stack, driven by SLAs and policies, can become more dynamic in an automated manner.

We expect that tools developed by IVI will be of use in determining and comparing impact of workload, and therefore be a complement to general management policies in managing SLAs. Results from SLA@SOI will be useful in maintaining and updating maturity curves especially for infrastructure management during the lifetime of the project.

Past activities

Direct meeting with IVI research leads to introduce the Industrial Use Case structure and confirm interest in collaborating with SLA@SOI in value assessment of SLA framework through the use case activity, and to develop the results to form input to the Industrial Evaluation of SLA@SOI.

Future roadmap

Formal engagement at the beginning of Y2 pending complete specification of the Industrial Use Cases. Secure IVI engagement to guide the value measurement aspect of the use cases.

Responsible partner

Intel (Contact: Joe Butler – joe.m.butler@intel.com)

7.2 Theseus

Description of the target of the collaboration task

Theseus is a German national research project aiming at developing the next generation business service delivery platform. This platform shall allow for trading and managing all kinds of services, from business to IT services, including the provisioning of auxiliary services for monitoring, payment, discovery, and so on. Theseus does not consider – or only barely considers – the underlying IT platform and related issues such as hardware provisioning, virtualisation, automatic deployment, and so on.

Theseus consists of a large consortium of industrial and academic players, including the SLA@SOI partners SAP AG and FZI Research Centre for Information Technologies.

More information can be found at <http://theseus-programm.de/>.

Description of goals and modalities of the collaboration

Both SLA@SOI and Theseus will collaborate in order to:

- share/develop a joint service description model (i.e., a way to describe services and their related non-functional aspects and SLAs),
- exchange business and IT requirements in order to complement their respective industry requirement collection process, and
- architectures for SLA management.

In addition, there might even be potential for

- joint use cases, and/or
- joint demos.

The collaboration will be realized via a set of workshops incorporating members from both Theseus and SLA@SOI team.

Past Activities

The collaboration between Theseus & SLA@SOI so far spans the following activities

- June 2008: 1st workshop on designing a Service Description Framework. Results have been mainly fed into the general glossary and service lifecycle model of SLA@SOI.
- September 2008: 2nd workshop on designing a Service Description Framework. Input from SLA@SOI has been largely fed into the first SLA model adopted by Theseus.
- February 2009: Theseus gave detailed feedback on their requirements for requirements for an SLA Management Framework. These results have been fed into the overall requirements process managed by work package B1.
- March 2009: A meeting on synchronizing service dependency management with SLA management has been conducted. Results have been mainly fed into the Theseus research work.

Future Roadmap

The future collaboration roadmap includes the following milestones:

- mid of 2009: revisiting the respective service/SLA description models after a first set of experiments.
- end of 2009: collaboration on appropriate SLA management architectures
- mid of 2010: evaluation of the possibility for a joined demonstrator.

Responsible partner

SAP (Contact: Wolfgang Theilmann – wolfgang.theilmann@sap.com)

7.3 CoreGRID

Description of the target of the collaboration task

The CoreGRID FP6 Network of Excellence has evolved into an ERCIM working group to formulate an EU-wide plan for the continuation of the CoreGRID activities.

Amongst the CoreGRID goals, the one that is more relevant for the collaboration is that of delivering a definition of a lightweight, component programming model that can be usefully exploited to design, implement and run grid applications. This goal is split into different sub goals, namely:

- Definition of a programming model suitable for the implementation of the single component model.
- Definition of the component system in such a way that interoperability with existing, commonly agreed standards is guaranteed.
- Definition of a component composition such that complex, multidisciplinary applications can be written as composition of building block components,

possibly obtained by suitably wrapping existing code. Component composition must support and guarantee that scalability is achieved.

- Definition of clear component and component composition semantics allowing a user to prove the correctness of the transformation and/or improvement techniques derived and designed for the lightweight component model.
- Definition of performance/cost models allowing the development of tools reasoning about component and component composition programs.

More information can be found at <http://www.coregrid.net/>.

Description of goals and modalities of the collaboration

In general, CoreGRID represents for SLA@SOI an additional opportunity to reach the Grid research community. The specific interest of the collaboration with CoreGRID is in the activities related to the definition of the lightweight programming model for grid applications. In particular, the collaborations will focus on the SLA@SOI research activities on the infrastructure (WP A4) and the financial Grid use case (WP B7).

Past Activities

The CoreGrid ERCIM working group is still in its set-up phase. The results achieved so far have been to introduce explicitly SLA as one of the investigation tasks, and to include SLA@SOI representatives in the investigation team for this topic.

Future Roadmap

CoreGRID will have the first formal meeting in August 2009. During the meeting, efforts in the different areas will be discussed. Since CoreGRID covers only travel costs and no staff, the effort of the working group in the different research topics depends on the interest of the partners. The goal for the first formal meeting is to push SLA as an interesting and prominent topic. A detailed plan on the future activities will depend on the success of this action, and is hence postponed till autumn 2009.

Responsible partner

QUB (Contact: Ron Perrott – R.Perrott@qub.ac.uk)

7.4 Gridipedia

Description of the target of the collaboration task

Gridipedia (<http://www.gridipedia.eu/>) is a Web portal that collects technical information and resources about Grid computing. More precisely it contains a list of technical articles, white papers and other publications on Grid computing as well as a set of software solutions which can be freely downloaded. Contribution to the portal with documental or software artefacts is open as well.

The current (April 2009) content of the portal can be summarized as follows:

- 2 white papers

- 8 articles
- 19 publications
- 45 software solution grouped in the following areas:
 - Network (1)
 - Data Management (5)
 - License Management (4)
 - Security (7)
 - Service Level Agreement (7)
 - Portals (10)
 - Virtual Organisation Management (5)
 - Virtualization (1)
 - Middleware Clients and Extensions (3)
 - Scheduling (2)

Description of goals and modalities of the collaboration

The goal of this collaboration task is to identify possible components of Gridipedia that are of interest for the SLA@SOI project and, vice-versa, to identify possible contributions of the project to Gridipedia.

The process to achieve this is based on the following activities:

- A periodic scan (every 3 months) of the Gridipedia components to identify new entries and new collaboration opportunities. This will lead to periodic updates of the state of the art in grid.
- The involvement of other SLA@SOI partners, as necessary for identifying relations on specific components of Gridipedia, for performing detailed analysis, or for contributing to Gridipedia.

Past Activities

A first scan of Gridipedia has been performed. The outcome of the scan has been the identification of the components that are more relevant for SLA@SOI. This includes 1 article about SLA, 6 publications, and 7 solutions.

The identified solutions are in the following areas:

- SLA negotiation:
 - *SLA Negotiator component*, which implements the interfaces suggested by WS-Agreement, specification that provides a simple protocol for negotiating SLAs.
 - *AssessGrid Negotiation Manager*; this is an open source implementation of the WS-Agreement specification for negotiating Service Level Agreements between End-Users, Brokers and Providers.
- SLA runtime monitoring and evaluation
 - *SLA evaluator for .NET* and *SLA evaluator for GT4*, which evaluate the execution of an electronic contract (SLA), making sure the guarantees expressed by the different parties are continually respected, and sending WS-notifications when events are discovered.
 - *SLA violation notifier*, which aims to modify and enhance GRIA SLA Monitoring and Evaluation functionality in compliance with the SLA Runtime Monitoring Design pattern
- *SLA accounting*, which aims at calculating the costs during and after the execution of an electronic contract (SLA), making sure the penalties corresponding to guarantee violations are applied.
- *Resource selection optimization*, which offers a service aiming at optimizing the scheduling of the jobs in the environment. In particular, the Optimization

provides a service that can be used by the Scheduler to improve quality of resource allocation.

Future Roadmap

A periodic (every 3 months) scan of Gridipedia has been planned, as discussed previously.

In addition to this, activities have been launched to further investigate concrete collaboration possibilities in the following areas:

- SLA runtime monitoring (responsible person: Marco Comuzzi – CITY)
- SLA negotiation (responsible person: Costas Kotsokalis – UDO)

These investigation activities will end by M14 and will possibly trigger follow-up actions.

Responsible partner

FBK (Gabriele Zacco – zacco@fbk.eu)

8 *Future steps and concluding remarks*

In this document, we have presented the status of the collaboration activities both with the academic and the industry communities. More precisely, we have identified and described 25 distinct collaboration activities covering collaborations within the SSAI&E cluster and with specific FP6 and FP7 projects, participation to NESSI and to the Future Internet Assembly, as well as collaborations with other initiatives and projects outside FP6 and FP7.

During the past 6 months, the effort dedicated to the collaboration activities has been directed to the achievement of the following objectives.

- Identification of new collaboration activities, of their goals, and of the responsible persons / partners within SLA@SOI (evolution of the initial Collaboration Plan presented in D.B8b). In particular, we identified a set of European projects within FP6 that have been evaluated to check whether their results can be exploited within SLA@SOI.
- Definition of a detailed plan for each collaboration activity describing the steps to be performed in order to tackle the objectives of the specific activity.
- Bootstrap and participation to the structured collaboration activities: participation to the periodic meetings organized by SSAI&E, NESSI, NEXOF, Future Internet Assembly.
- Participation to the activities of the SSAI&E and Future Internet working groups. SLA@SOI, as reported in the specific sections of this document, has taken a leading role in several working groups.
- Bilateral meetings with the identified FP6 and FP7 European projects and with the other specific initiatives, in order to agree with a common collaboration agenda and to start the exchange of results.

During the next months, the objectives of the collaboration activities will be the following.

- Participation to the structured collaboration activities:
 - Participation to the periodic meetings and to the events organized by SSAI&E, NESSI, NEXOF, Future Internet Assembly.
 - Participation to the activities of the SSAI&E and Future Internet working groups
- Bilateral meeting with the identified European projects and with the other specific initiatives, in order to push forward the collaboration activities identified so far.
- Exploitation of the demonstrator results as a key mean for establishing new and stronger collaborations, especially within NESSI/NEXOF.
- Evaluation of the collaboration activities according to the success criteria defined within SLA@SOI. Success criteria include the number of analyzed collaboration links, the number of active collaborations (e.g. working groups lead/co-lead, working groups joined), transfer of results to NESSI/NEXOF, as well as collaboration-specific measures.
- In addition, we will keep working on the identification of new collaboration activities. In particular, we will investigate the possibility of collaborating with COIN, DEPLOY and IRMOS European FP7 projects.

Reports on the progress of the collaboration activities and updates of the collaboration plan will be provided in dedicated deliverables at the end of each reporting period.