

Project Number: **215219**  
 Project Acronym: **SOA4ALL**  
 Project Title: **Service Oriented Architectures for All**  
 Instrument: **Integrated Project**  
 Thematic Priority: **Information and Communication Technologies**

## D10.2.1 Exploitation Strategy and Plan v1

<b>Activity N:</b>	4 – Exploitation and Impact Activities	
<b>Work Package:</b>	10 – Exploitation	
<b>Due Date:</b>	31/08/2008	
<b>Submission Date:</b>	16/09/2008	
<b>Start Date of Project:</b>	01/03/2008	
<b>Duration of Project:</b>	36 Months	
<b>Organisation Responsible of Deliverable:</b>	Atos Origin	
<b>Revision:</b>	2.0	
<b>Author(s):</b>	M <sup>a</sup> Mercedes Avilés and Nuria de Lama	

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
<b>PU</b>	Public	
<b>PP</b>	Restricted to other programme participants (including the Commission)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission)	<b>X</b>

### Version History

Version	Date	Comments, Changes, Status	Authors, contributors, reviewers
1.0	07/08/2008	First Draft version of the deliverable	Author: M <sup>a</sup> Mercedes Avilés, Contributors: Marin Dimitrov( Ontotext),John Davies ( BT) Sven Avels ( TIE),Alain Boulze (INRIA),Inna Olar( INRIA), Adrian Mos ( INRIA), Bernhard Schreder (Hanival), Matteo Villa ( TXT), Carlos Pedrinazi,( OU), Sudhir Agarwel, Nuria de Lama ( Atos Origin), Rafael Galero ( Atos Origin), Nikolay Mehandjiev (U . Manchester), Tomas Vitvar, (STI), Michal Zaremba( Seekda), Jose Manuel Gómez( Isoco), Juergen Vogel ( SAP)
2.0			Reviewers: Santi Ristol(Atos Origin) Jose Manuel Gómez( Isoco)

# Table of Contents

<b>GLOSSARY OF ACRONYMS</b>	<b>4</b>
<b>EXECUTIVE SUMMARY</b>	<b>6</b>
<b>1. INTRODUCTION</b>	<b>7</b>
1.1 PURPOSE AND SCOPE	7
1.2 STRUCTURE	7
1.3 AUDIENCE	7
<b>2. SERVICE/PRODUCT DEFINITION (OUTCOME OF THE PROJECT)</b>	<b>8</b>
<b>3. MARKET ANALYSIS</b>	<b>13</b>
3.1 SOA	13
3.1.1 <i>Emergence of SOA</i>	20
3.1.2 <i>SCA standard</i>	22
3.2 CONTEXT ANALYSIS	24
3.3 SEMANTIC ANALYSIS	25
<b>4. ANALYSIS OF EXISTING WEB SERVICES</b>	<b>32</b>
<b>5. CLOUD COMPUTING TECHNOLOGY AROUND SOA4ALL</b>	<b>35</b>
<b>6. CONSORTIUM'S EXPLOITATION STRATEGY</b>	<b>36</b>
6.1 SOA4ALL EXPLOITABLE RESULTS	36
6.2 PARTNER ROLES IN THE EXPLOITATION PLAN	37
6.3 SOA4ALL OPEN SOURCE APPROACH	38
6.3.1 <i>SOA4ALL Licensing Schema</i>	38
6.3.2 <i>SOA4ALL partners' involvement in OSS activities</i>	41
<b>7. INDIVIDUAL EXPLOITATION PLAN</b>	<b>43</b>
7.1 INDUSTRIAL PARTNER EXPLOITATION PLAN	43
7.1.1 <i>ATOS Exploitation Plan</i>	43
7.1.2 <i>BT Exploitation Plan</i>	46
7.1.3 <i>SAP Exploitation Plan</i>	48
7.1.4 <i>TXT Exploitation Plan</i>	50
7.2 SME'S EXPLOITATION PLAN	52
7.2.1 <i>EBM Exploitation Plan</i>	52
7.2.2 <i>Hanival Exploitation Plan</i>	53
7.2.2 <i>iSOCO Exploitation Plan</i>	54
7.2.3 <i>SEEKDA Exploitation Plan</i>	56
7.2.4 <i>SIRMA Exploitation Plan</i>	57
7.2.5 <i>TIE Exploitation Plan</i>	59
7.3 ACADEMIA EXPLOITATION PLAN	61
7.3.1 <i>CEFRIEL Exploitation Plan</i>	61
7.3.2 <i>INRIA Exploitation Plan</i>	66
7.3.3 <i>University of Manchester Exploitation Plan</i>	67
<b>8. SOA4ALL AS NESSI STRATEGIC PROJECT</b>	<b>70</b>
<b>9. IPR</b>	<b>71</b>
<b>10. CONCLUSIONS</b>	<b>74</b>
10.1 FUTURE WORK	74

<b>11. REFERENCES</b>	<b>75</b>
<b>ANNEX A. OPEN SOURCE CONSIDERATIONS</b>	<b>77</b>
<b>ANNEX B. CURRENT SITUATION OF OPEN SOURCE. BUSINESS IMPLICATIONS</b>	<b>79</b>
<b>ANNEX C. TYPOLOGY OF MOST USED OPEN SOURCE LICENSES</b>	<b>83</b>
<b>ANNEX D. LEGAL ANALYSIS OF F/OSS</b>	<b>88</b>

## List of Figures

Figure 1: BT Web21C SDK leverages the Long Tail.....	18
Figure 2: The Telco 2.0 Business Model, Aepona .....	19
Figure 3: Gaining Strategic Advantages from SOA.....	20
Figure 4: Before SOA, OMG, SOA Consortium .....	21
Figure 5: SOA, OMG, SOA Consortium.....	21
Figure 6: “SOA executes the business model”, OMG, SOA Consortium.....	22
Figure 7: Semantic Wave Source .....	26
Figure 8: Semantic Web Application Evolution Prediction.....	27
Figure 9: del.icio.us web application for bookmark management.....	28
Figure 10: flickr web application for images management .....	28
Figure 11: Google Base for Products Description.....	28
Figure 12: Market Predictions in 2010 .....	30
Figure 13: Financing of SW Technology, TopQuadrant .....	31

## List of Tables

Table 1 SOA Infrastructures Providers .....	15
Table 2 Spanish Web Services Providers.....	34
Table 3 Exploitable Results .....	37
Table 4 SOA4ALL Licensing Schema.....	40
Table 5 Intellectual Property Rights.....	72
Table 6 Characteristics of the main Open Source Licenses.....	86
Table 7 Legal Characteristics of the main Open Source Licenses .....	89

## Glossary of Acronyms

Acronym	Definition
<b>B2B</b>	Business to Business
<b>C2C</b>	Consumer to Consumer
<b>DOW</b>	Description of Work
<b>EC</b>	European Commission
<b>ETP's</b>	European Technology Platforms
<b>ESB</b>	Enterprise Service Bus
<b>EU</b>	European Union
<b>FP's</b>	Framework Programs
<b>ICT</b>	Information and Communication Technology
<b>IST</b>	Information Society Technology
<b>NEPs</b>	NESSI Strategic Projects
<b>IPR</b>	Industry Property Right
<b>SLA</b>	Service Level Agreement
<b>SOA</b>	Service oriented Architecture
<b>OSS</b>	Open Source Software
<b>R&amp;D</b>	Research and Development
<b>RTD</b>	Research and Technological Development
<b>SAAS</b>	Software as a Service
<b>SME's</b>	Small and Medium Enterprise
<b>SSAIE</b>	Service and Software Architecture, Infrastructures and Engineering
<b>WG</b>	Working Group
<b>WS</b>	Web Service

## Executive summary

This document summarizes the preliminary exploitation plan of the consortium, taking into account the individual exploitation strategies that each partner will use in the medium or long term with the expected benefits resulting from the corresponding invested efforts.

SOA4ALL will have the challenge of introducing semantic Web services in the real market, by making efforts to help stakeholders to understand all the possibilities for the new SW generation. In this context, a brief analysis of current web service providers by category, number of services offered and the functionality of those services is included in this document, taking as example one of the countries represented in the SOA4ALL Consortium. In addition, a special mention to the technological trend of cloud computing is considered because of the SOA4ALL framework support to this technology, able to solve many management related issues of organizations and help making the best use of resources available within an organization.

Furthermore, it exposes the SOA4ALL business perspectives starting with market analysis of technologies, such as SOA, Context and Semantic Web in order to identify gaps to be abolished for achieving a comprehensive framework and infrastructure that integrates these technologies into a coherent and domain independent service delivery platform. However, SOA4ALL business perspectives will be showed deeply in the Final Exploitation Plan.

This document contains some initial ideas for the use of the SOA4ALL results in the future, providing the basis that will help SOA4ALL project to take the right decisions in what exploitation is concerned. SOA4ALL will be implemented close to real environments thanks to three case studies in different scenarios: E-government, (SAP) Telecommunications (BT) and several C2C e-Commerce scenarios, based on existing products and services by Hanival, TXT and TIE as a proof of concept of the technologies envisaged within the project.

Expected outcomes of SOA4ALL will be displayed beyond SOA4ALL Consortium by establishing collaboration channels with other initiatives such as NESSI in order to share synergies between technical results

To exploit SOA4ALL results, we should keep in mind the legal considerations as the type of Open Source licences by we are going to utilize in our exploitation, examining which one/ones would be more suitable to the Consortium. Finally, a brief analysis of IPR is considered in the last section of the document before exposing main conclusions on this preliminary exploitation plan.

# 1. Introduction

## 1.1 Purpose and Scope

This deliverable has as main goal providing an overall idea of the SOA4ALL context in terms of exploitation. Therefore, the technical analysis will not provide complex technical details, but a complete study of the current state of the art of these technologies and their application/commercial possibilities, as well as the emerging trends that have been recognized in our market analysis.

In the present document are highlighted the basic strategies that will be followed to set-up project exploitations on the basis of SOA4ALL consortium / partners opportunities, market trends and evolutions.

It is worth noticing that there is a very close relation between exploitation and business plan. As the former describes how something could be exploited for making business, while the latter actually describes how business is going to be set-up and conducted so to be the most profitable as possible. Thus we derived from the consolidated business best practices the rules and references to structure and produce the basis for the current document. We have taken into account some of the following, and giving apart to analyze others to the Final Exploitation Plan when we would have more information available.

Having said so it is clear that we are on the good track and that we have already prepared a good part of the requested data, yet we still have a long way to go and it will be necessary to keep market analysis trend and data constantly updated and monitored. Furthermore, given the relevant research aspects of SOA4ALL and its pre-competitive stage it is apparent that some of the aforementioned criteria will be kept in mind as reference principle, but will not probably be met. From all this we can now derive the document structure and target audience.

## 1.2 Structure

Besides the executive summary and the introduction to the document, main sections will be focused on: Service/ Product Definition (section 2) Market Analysis, (section 3), Analysis of Existing Web Services, (section 4) Cloud Computing Technology (section 5), Consortium and Individual Exploitation Plans (section 6 and 7), SOA4ALL as NESSI Strategic Project (section 8), IPR (section 9) and some Conclusions (section 10). The document is also complemented by some annexes: Open Source considerations, current situation of the Open Source and business implications, typology of most used OSS licenses and legal analysis of F/OSS .

## 1.3 Audience

To start with, this document, according to the Description of Work (DOW) is restricted to consortium partners, which will contribute to task 10.2, in which this deliverable (D.10.2.1) has been included). This document will be also supported by three main categories of partners involved in SOA4ALL project, that means, not only Industry will participate in this issue through marketing/ product development departments but also SME's and Academia will be involved in this exploitation strategy.

## 2. Service/Product Definition (Outcome of the project)

General outcome of the project will be a comprehensive framework and infrastructure that integrates four complimentary and revolutionary technical advances into a coherent and domain independent service delivery platform:

- Web principles and technology as the underlying infrastructure for the integration of services at a world wide scale.
- Web 2.0 as a means to structure human-machine cooperation in an efficient and cost effective manner.
- Semantic Web technology as a means to abstract from syntax to semantics as required for meaningful service discovery.
- Context management as a way to process in a machine understandable way user needs that facilitates the customization of existing services for the needs of users.

Besides of the SOA4ALL framework, different expected product and services are supposed to be developed during the project by all WP. The short description below , shows information regarding main key project achievement by WP.

### WP1

Semantic Enabled SOA, more precisely, a solution (Specification, Middleware, reference architecture, etc) for scalable and dynamic service oriented computing, along a semantic-driven approach of the involved services. Some Research results beyond the state of the art will be represented by the Architecture and tools enabling semantic enabled service compositions, a web scale publish-subscribe single space, peer-to-peer overlay for hosting a semantic space and Large-scale distributed and agile service composition and orchestration.

What more ambitious outcomes are concerned, research efforts conducted in SOA4All could give some insights on the feasibility of semantic-based service oriented networking (i.e., include directly into a content-based networking protocol all the machinery that could enact autonomic and semantic aware compositions of data and services and even, execution of those compositions at the level of the network devices directly acting upon the exchanged data flow). Provide an effective and concrete example of the visionary concept known as the “web 3.0” An effective solution for cloud computing at the scale of the whole internet.

### WP2

Main key project outcome to be achieved by WP 2 will be an integrated platform for service provisioning, consuming, and management & monitoring.

Contributions from the scientific point of view within the following research tracks:

- Easily modelling, annotating and deploying semantically enhanced web services and goals in a lightweight and web-based fashion.



- Community-driven, semi-automated composition of personalized service mash-ups and NLP-based goal invocation.
- Runtime and postmortem analysis facilities of service executions, including support for interpretation of provenance information.

**Possible components/ SW packages will be:** Service provisioning platform, Service consumption platform and Service management & monitoring platform

The research efforts conducted in SOA4ALL address the union between SOA and Web2.0 principles, aiming to provide users with an infrastructure to interact with the service world in a Web 2.0 fashion. We will pursue the following outcomes:

- *Provisioning:* Framework for the deployment of machine and human services in a unified manner. Our tools will be designed such that users will be able to collaboratively annotate goals and services, applying consensus mechanisms to balance consistency with popularity.
- *Consumption (personalisation):* Enablement of users to compose and interact with services pre-existing on the Web. In a collaborative Web scenario, the social network of the user will be taken into account when personalising access to the services, including reputation and feedback as mechanisms to enrich service usage.

#### WP4

The main contribution of this work package will be Contextual Service Adaptation Platform able to support the adaptation of services to be delivered based on contextual information. Our platform will provide three main generic services to the overall SOA4ALL vision: Context Management, Context Recognition and Service Adaptation based on Context. To do so, we shall base our development on the use of PSMs<sup>1</sup> for capturing the dynamic knowledge for supporting Context Recognition and Service Adaptation in a domain-independent way, and ontologies both for defining the interfaces of these services and for capturing contextual information in a sharable and machine processable way. These generic services as well as the overall platform will be the main exploitable results from this work package.

#### WP 5

For the time being the shape of product/services are not well defined. Below you will find mainly a short description compliant with the DOW but that may change in the near future.

- A service locator that allow user to find and locate services thanks to the following functionalities:
  - *Service Crawling* for collecting services information and store them into a distributed registry.

---

<sup>1</sup> Platform Specific Model

- Semantic indexing that allows storing and retrieving services thanks to semantic information. Services may be retrieved by users thanks to a web interface or by other services.
- Service Discovery allows users to find new services based on semantic based matching.
- Service Selection provides means to select the most suitable service among those services discovered by utilizing a service ranking algorithm.
- Service Adaptation refines the results of discovery using interaction with the services or their providers, tailored according to the users' needs.

## WP6

WP6 will allow the user to create (model), edit, adapt, and execute lightweight business processes on the basis of web services. For this purpose, five interconnected software components will be developed, that can also be reused and exploited independently from SOA4ALL:

- A novel, web-based **user interface** will be developed to specify composite services and processes. A graph-oriented lightweight process modeling language will be used as specification language. To further improve the usability, pre-designed and user-designed process templates are stored in the semantic service & template repository. In the repository, the web services and processes are provided according to their semantic meaning. An additional feature of template management should allow the user to store his process model as a new template. A template rating system allows for collaborative recommendation of templates. The user should further get help in distinguishing similar existing templates, and be offered the ability to search for related templates.
- A **process generation, verification & evaluation engine** will first transform the graphical model specified requirements into an executable process. If more than one process is found, the processes can first be verified to avoid potential problems such as deadlocks, livelocks, and other anomalies. The validated processes are then evaluated. The best one is proposed for execution.
- A **service execution engine** provides the available services in the semantic service and template repository to composed processes and then executes the selected composite services.
- The execution of a process is monitored by the **process monitoring & adaptation component** in case of the changes of different web services or a failure of execution. In case of failure, the adaptation part attempts to remediate the problems.
- A **semantic service & process template repository** lists atomic services from a global market place as well as sets of predefined templates for services and processes. All services and templates should be provided according to their semantic meaning.

## WP 7

Existing enterprise SOA platforms such as SAP NetWeaver are usually designed for software developers and business process experts and are rather complex and heavyweight. Creating, adapting, and deploying services with such a platform requires substantial technical skills and is therefore not suitable for end users. However, to increase an organization's flexibility and response time and to lower the total cost of ownership for its enterprise SOA, end users should be enabled to fulfill simple service composition and consumption tasks on their own.

Therefore, the use case “End-user Integrated Enterprise Service Delivery Platform” investigates how enterprise services can be integrated into the open, dynamic, lightweight, and end-user driven service platform that is envisioned by SOA4All. For this, it is necessary to develop a virtualization layer (“facade”) closing the gap between the existing, heavyweight enterprise services and the user-designed composite processes. Additionally, a new user interface has to be developed in order to provide an intuitive environment for lightweight service composition and consumption. In order to collect requirements for the use case and the other SOA4All work packages and to evaluate the SOA4ALL results, a realistic scenario that targets non-technical end-users from the public administration sector is considered. The overall result of this WP will therefore be a prototype demonstrating how enterprise services can be efficiently composed and consumed by end-users from the public sector by means of SOA4ALL technologies.

## WP 8

Web21C<sup>2</sup> is a platform that allows developers to consume services exposed by BT. It abstracts the services into a simple interface accessible through a number of different programming languages that free the developer to focus on creating their application. Services so exposed include voice calls, messaging, authentication, call flow, conference calls, inbound SMS, and more.

The main project outcome for BT with respect to products and services will be a semantically enhanced and expanded version of the Web 21C platform supporting

internal and external user communities. Utilizing the technology developed in the various core research areas of the project it will allow BT to provide third parties access to Virtualised IT and Network resource by exposing its common capabilities to third parties, making them easy to consume, combine and share.

Currently, Web21C requires detailed technical knowledge of web service languages (e.g. WSDL) and programming languages (e.g. Java) to be able to access, combine and use web services. Using Web 2.0 principles, the new Web 21C site should encourage ease of use and a low barrier to entry in utilising SOA, whilst supporting innovation and collaboration. Use of contextual knowledge will support both the composition and provisioning of services in a customized manner. The complexity for

---

<sup>2</sup> <http://web21c.bt.com>

achieving this will however remain hidden from the service user, and be handled in an automated fashion. BT will also take advantage of the semantically enabled improvements in provisioning, consumption and monitoring tools that will take place during the project. The case study will also enable the inclusion of third party on the Web21C platform. In addition, it will consider several key issues for BT's transformation into Telco 2.0, including: reducing time to market; enabling integration of third party services into BT's portfolio; increasing New Wave revenue and extending BT-wide SOA to the web.

## WP 9

While a large selection of e-Commerce frameworks exist which allow end users to create their own web shops and e-Commerce applications, these traditionally target either experienced users with at least rudimentary programming or scripting skills, or, if they target broader user groups, those frameworks restrict the amount of customization and adaptation of the offered services and interfaces. In the "C2C Service e-Commerce" use case, we will examine different scenarios in which SOA4All technology is applied to e-Commerce applications, ranging from open web shops to solutions integrated with a ISPs usual product range. In WP9 the major achievements will include actual prototype products and services resulting from these efforts, which can be introduced to the partner's product portfolio after further development. These prototypes feature functionalities and capabilities traditionally not available to end customers, due to the possibilities of SOA4All technology of integrating large numbers of services in an intuitive and flexible manner.

- **ISP e-Commerce platform:** The ISP C2C e-Commerce infrastructure, which allows end customers to build their own e-Commerce applications from a set of services provided either by the ISP or by third party suppliers. Using a collection of Web 2.0 applications, such as a dedicated Web site builder, end customer can create e-Commerce applications offering their own products (using a combination of services, such as payment providers, fraud detection, delivery and notification services etc.). The major achievement is to offer new possibilities to end customers to become providers themselves, while opening up new market opportunities for ISPs and service providers as well.
- **Open Web Shop:** Similar to the previous scenario, this application allows users to create a flexible Web shop-solution that is based on composing different services (using a mash-up approach). The idea is to use the SOA4All framework for combining different providers that address specific concerns of a Web shop. Major achievements will include the combination of different supply chains for these products and flexible means to interact with the different roles and actors of these chains, based on SOA4All technology.
- **Social Internet TV platform:** The creation of a "Social Internet TV" platform allows users and user communities to co-create their own Internet TV content. Using SOA4ALL technology, the platform will provide flexible means to integrate content from existing service providers. A major achievement here is that this kind of platform will enable end customers to access professional functionalities for the production and distribution of digital content, which are currently only available to bigger companies, like broadcasters.

## 3. Market Analysis

### 3.1 SOA

The notion of service oriented architecture has been bouncing around the world of IT for several years and only really caught the eye of major software vendors with the emergence of the web services technology platform. In what business is concerned, current SOA solutions are still restricted in their application context to being in-house solutions of companies. While service orientation is widely acknowledged for its potential to revolutionize the world of computing by abstracting from the underlying hardware and software layers, its success depends on resolving a number of fundamental challenges that SOA does not address today. SOA4ALL will help to realize a world where billions of parties are exposing and consuming services via advanced Web technology. The main message of SOA4ALL is therefore following the acronym of the project: “enabling the Service Oriented Architecture (SOA) revolution on a world-wide scale”.

At the present time, SOA Market is becoming wide open and growing market, since few large size companies have implemented SOA. Several potential customers are probably waiting until good practice and technologies get stable, simpler, and get a lower cost of implementation. Market is not absolutely clear yet: Vendors, as well as consultants, tell different stories about SOA. Most of SOA-called projects are not considered as SOA by purists, but just as a superficial lifting of previous practices and technologies. The main message of SOA4ALL is therefore following the acronym of the project: “enabling the Service Oriented Architecture (SOA) revolution on a world-wide scale”.

The estimation of the SOA market size usually varies from one study to another. Depending on these research works, worldwide SOA market size in 2007, for developers and consultants, was evaluated between 2G\$ and 10 G\$. Depending on IDC previsions (2007), Service Oriented Architecture (SOA) markets are expected to growth from 58% in 2008 to 27% in 2011. Market growth comes because SOA enables the flexible IT architecture that is needed to respond to market shifts brought by speeded product cycles and competitive challenges

According to IDC, by 2012, at least more than 50% of large companies will be involved in SOA projects, with respect to the 10% that currently use SOA. The profile of the company will be composed of at least between 1000 and 5000 employees. Due to this change, a new kind of company more focused on the business with a relevant investment in SOA will be set up. The new adaptation to SOA by large companies will be carried out in a pragmatically and sequential way.

Today, SOA will top the list of CIOs' must-have technologies, according to a survey carried out by research firm IDC<sup>3</sup>, with SOA use predicted to rise 144% between 2007 and 2009. Last year, 22 percent of CIOs said their company was using SOA whereas 53 percent said it would be in 2009. Whereas companies first saw SOA as yet another standard and application development wave (“one of those trendy buzzword”, said the article), key actor such as IBM conclude that SOA is evolving from an IT activity to a more strategic business initiative.

---

<sup>3</sup> SOA and RFID top CIO wish lists, ZDNet, March, 19, 2008, [http://news.zdnet.com/2424-9595\\_22-193137.html](http://news.zdnet.com/2424-9595_22-193137.html)



What SOA vendors is concerned, according to Butler Group, SOA is widely recognized as a growth opportunity for software vendors, and because of the very broad functionality needed to enable a SOA deployment it has attracted vendors from several different specializations to compete for market space. The current market has a large number of vendors all attempting to provide complete suites. As the market matures it is inevitable that the number of competing vendors will be reduced through acquisitions, mergers, and vendors deciding unilaterally to target different markets. At the present time SOA vendors mainly target large enterprises, so the market is dominated by high value, low volume sales. This will start to change within two or three years as the large enterprise market starts to become saturated. The need to address medium-sized enterprises will not just impact sales and marketing strategies, but will also have a large impact on the products themselves, with ease-of-use and reduced administration being prerequisites to mid-market success.

According to IDC, main SOA vendor profile is as follows:

- Independent supplier
- Innovation as key element
- Big size in order to provide the right service
- Financial solvency
- Innovation centers in different countries
- Important investment in R&D

The table<sup>4</sup> below shows main SOA infrastructures providers:

SOA provider	Infrastructures
<b>Hewlett-Packard</b>	HP offers SOA governance tools and a services registry through its acquisition of Mercury Software, as well as quality management tools through its purchase of Talking Blocks.
<b>IBM</b>	Big Blue's SOA wares include an ESB, a process server, a portal, a mashup engine, an application server, and capabilities for business services. IBM's Tivoli unit provides services management software, and IBM's acquisition of AppSoft adds event processing.
<b>Itko<sup>5</sup></b>	The company provides SOA test and validation tools.
<b>Microsoft</b>	The software giant does not offer SOA products per se, but it positions products such as BizTalk Server and Windows Communication Foundation as an ESB without actually having an

<sup>4</sup> The table has been collected from the article <sup>4</sup> How to handle SOA vendors consolidation. Infoworld online edition. July, 2008

[http://www.infoworld.com/article/08/07/22/30NF-soa-market-consolidation\\_2.html](http://www.infoworld.com/article/08/07/22/30NF-soa-market-consolidation_2.html)

<sup>5</sup> SOA Testing, Validation and Virtualization <http://www.itko.com>

	ESB in its product catalogue.
<b>Oracle</b>	Its SOA arsenal includes an ESB, a BPEL <sup>6</sup> process manager, business activity monitoring, and Web services management. Oracle also acquired a repository in its BEA buy.
<b>Progress Software</b>	The company is putting together a wide roster of SOA tools through aggressive acquisition, most recently of Iona for SOA services management. It has also bought ESB provider Sonic Systems, application infrastructure company Mindreef <sup>7</sup> , Web services management vendor Actional <sup>8</sup> , integration provider Pantero, and complex event processing firm Apama.
<b>Software AG</b>	The company offers a wide palette of SOA products for governance, design, runtime, business process management, and business activity monitoring, as well as a composite application framework. An ESB is on the roster, thanks to the company's acquisition of WebMethods.
<b>TIBCO</b>	The vendor's offerings include a runtime platform, an ESB, and a registry.
<b>WSO2<sup>9</sup></b>	Taking the open source approach to SOA, WSO2 bills itself as a full-service provider, offering an ESB, a registry, identity management, a Web services application server, and a mashup server.

*Table 1 SOA Infrastructures Providers*

With respect to SOA users, analysts consider, at least 50% of SME's /organizations consider they are losing the opportunity to implement SOA because of the conflict existing between ICT technology and company strategy besides using SOA only for specific projects. However, some benefits, considered by SOA users are the identification of SOA as the future regarding ICT technology and mean to enable improved and operational agility and flexibility while improving overall process visibility and consistency. According to Zap Think<sup>10</sup> there is a slowdown separating enterprises into two groups: organizations who have turned the corner with their SOA initiatives and are seeing) real benefits from the new architectural approach, versus those companies who are still struggling with their SOA projects. Gartner<sup>11</sup> considers companies using SOA face challenges in governance, testing configuration, security and interoperability.

<sup>6</sup> Business Process Execution Language

<sup>7</sup> SOA Quality company <http://home.mindreef.com/>

<sup>8</sup> Web Service Management Company <http://www.actional.com>

<sup>9</sup> Open Source SOA company <http://wso2.com/>

<sup>10</sup> <http://www.zapthink.com>

<sup>11</sup> <http://www.gartner.com>

One of the greatest challenges is managing application logic and data in SOA service components that are spread out over multiple business units. SOA will reach the market by getting customers which, till now, do not feel that SOA is a good infrastructure and growing SOA-based infrastructures in companies that have already done SOA projects. For the first point, reducing cost of implementation due to a better experience, and more complete products: for example, now, almost all customers are interested in more control and monitoring of the architecture.

Some customers expect from SOA a better agility to face market changes in order to save IT investments in the future. Others want to be “SOA compliant” for the future, in case SOA breaks the ice. Nowadays, main ambition is to: Integrate software and web applications with low rigidity, Use and export Web services, Follow the SOA movement. Moreover, customers are willing to pay depending on the size of the IT infrastructure involved. SOA projects (Service+ Several products) cost from 1M€ to 100M€. Most of them are between 2M€ and 10 M€. At present, many of the largest companies in key industries including banking, insurance, automotive, retail, telecommunications, and healthcare have significant investments in SOA, and are able to innovate in their industries because of the flexibility and agility that is provided by their SOA-based IT implementation.

What could help SOA is also a business process management approach, which means creating processes mixing humans and software, depending on business needs, and then giving the ability to monitor these processes. A key point is also the growth of web-services. Through SOA is not especially focused on web-services, almost all customers find value in using web-services, which they can do with tools created (or adapted) for SOA.

#### SOA implications for business managers

Gartner has identified two SOA relevant implications for business managers:

- Improvement of business process development and adaptability because SOA is flexible and can reduce the time effort and cost needed to implement it.
- More difficult management because of the big dependence on other business units and their systems.

#### Implications of a world of millions of public services for a Telecommunication Company:

With the increasing tendency of service providers of all types to publish services via the web and the emergence of Web 2.0 technologies, traditional telecoms companies (telcos) are being forced to evolve. The key technological trends which demand telcos immediate response come from Web 2.0 developments. Webcos<sup>12</sup> are able to respond to changing demands and expectations in the marketplace by innovating at multiple levels, and exhibit several key characteristics, namely:

---

<sup>12</sup> Companies adopting Web 2.0 principles in their business models



- *Web as Platform*: Platform is no longer a server or application, but exists on the web (“in the cloud”) and encompasses devices, networks, companies, etc. (cf. Google and Amazon APIs)
- *Architecture of Participation (Harness Collective Intelligence)*: designed to encourage users to take part, to share, to customise, to connect and even to participate in future product design (e.g. user generated and tagged content – Flickr, YouTube, Delicious, mySpace, eBay, Amazon; Social networks, collaborative sites such as Wikis, Amazon reviews, etc.; customer self-service sites; customer co-creation).
- *Network effects*: the more people use the service, the better it gets. (e.g. BitTorrent scales as more users share the network; Skype scales using their users’ CPU; dig gets more accurate as more users rate stories).
- *Mashups*: light weight and rapid service/product composition in an open service eco-system. Increasingly, real impact-full innovations are in smart and rapid assembly of services, rather than merely isolated component services. Hence rapid and light weight service composition will be a key enabler to success of a digital service ecosystem (c.f. Yahoo Pipes, Developer mashups, Widgets, etc.).
- *Long Tail*: the theory of long tail, largely instigated by the Web 2.0, allows WebCo’s to tap to monetise the demand from the large number of highly diverse potential customers with non-typical requirements, whereas traditionally Telcos focus their efforts on Short tail, where the majority of mainstream (hits) services and products are. Telcos can no longer ignore the revenues generated from the long-tail.

The changing needs of customers and users must be considered as it is no longer sufficient to provide ICT services as basic commodity capabilities. Increasingly, customers demand QoS<sup>13</sup>, GoS<sup>14</sup> and now QoE<sup>15</sup> is a key differentiator. QoE effectively satisfies emotional needs of customers and users as they interact with ICT services and the “context” in which those ICT services are used. Hence, service offerings must take into account the “surrounding context” (business process) of users’ lives and seek to add and enhance basic ICT services, in such a way that users can seamlessly move from one ICT service to another, regardless of the provider of those services, or what technology platform they are offered. Such services are termed, “blended services” in contrast to conventional bundling of services.

Increasing competition from the OTT<sup>16</sup> service providers - service and content providers who do not own the network they use - shows the danger for Telcos to become dis-intermediated from the digital supply chain; that Telcos become merely a commodity “dumb pipe” provider. As WebCo’s traditionally have had different business models, collecting revenues from advertising, whereas Telcos collect

---

<sup>13</sup> Quality of services

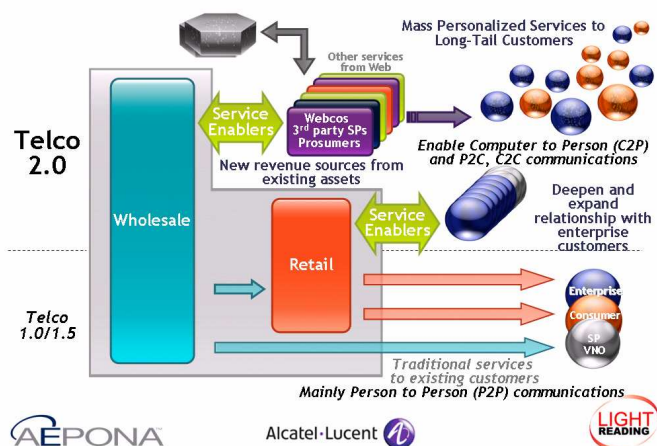
<sup>14</sup> Grade of services

<sup>15</sup> Quality of Experience

<sup>16</sup> Over the Top



**Figure 2** below shows Aepona's<sup>18</sup> representation of Telco 2.0. It illustrates two streams serving customers, with the first (upper) stream serving the long tail market from the Wholesale Division of the Telco via a range of new actors; and the second (lower) stream providing traditional services via a retail organisation in the usual way.



**Figure 2: The Telco 2.0 Business Model, Aepona**

Moreover, SOA business trend will focus on moving from an integration centric solution to a core software architecture methodology. Once this trend is in place, virtualization and infrastructure can move to align with SOA to complete the final bridge between not only business and software, but also between business and infrastructure and hardware. In addition, SOA will allow the configuration of technology in order to support business strategy at companies, enabling better agility and interoperability in interactions with other companies. Moreover, SOA will offer new business models and revenue. SOA will be considered one relevant tool in the company in order to face market and customer changes, because of the lack of this capacity by traditional architecture. SOA will also modify the way in which companies are able to process and work with information. Furthermore, in large companies, custom back office implementations will continue to be displaced by standardized ERP (Enterprise Resources Planning) packages—again, supported by the customization possible in the composite SOA application. As far as the technological SOA trend is concerned, data center SOA solutions will combine with a converging set of traditional IT technologies including ETL (Extract Transform Load) for consolidated operational data, FTP<sup>19</sup> for B2B communications, job scheduling for background process management, and APM (Application Performance Management) to manage the packaged applications components of a SOA composite. Besides this data center solution, the use of SOA will fuel greater leverage of virtualization as IT works to integrate resource utilization into application operation and holistically manage their hardware capital.

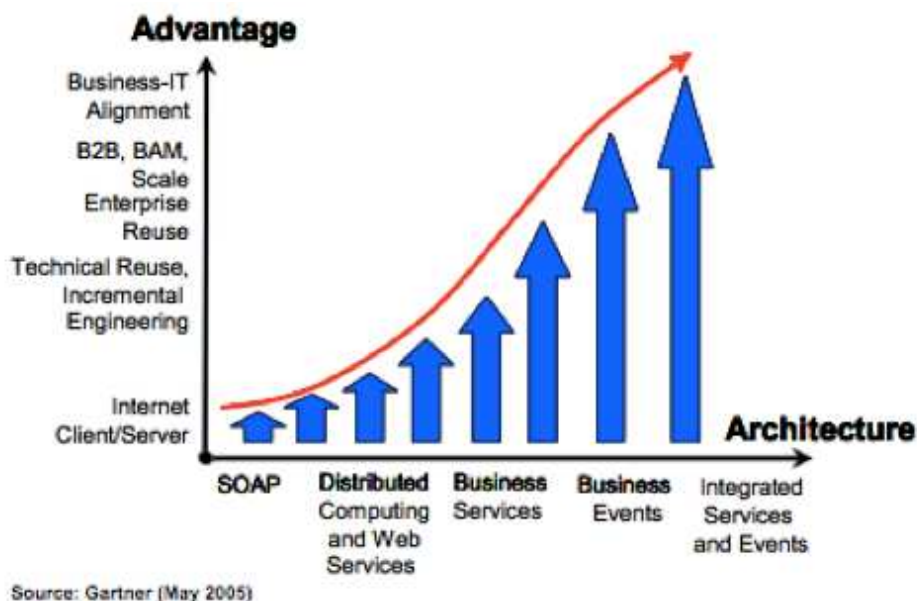
<sup>18</sup> Telecom Web Service Platform <http://aepona.com>

<sup>19</sup> File Transfer Protocol

### 3.1.1 Emergence of SOA

Emergence of SOA in the last four years has pointed out the importance of the “service” paradigm in the IT software architectures. Whereas this new paradigm is not particularly recent in the IT community (e.g. refer to the Gartner analysis in 2005<sup>20</sup>), it is visible today in other communities such as the industry (e.g. refer to Industry Week article, March 2007<sup>21</sup>).

Already in 2005, the strategic advantage of SOA was pointed out by the Gartner analysis, quoted here above (and illustrated by the Figure 3).



**Figure 3: Gaining Strategic Advantages from SOA**

In the same way, for initiatives such as the SOA Consortium hosted by OMG<sup>22</sup>, and comprised of end users, service providers and technology vendors, SOAs are seen as the right way to support agility, reusable design, performance metrics and expected change. SOA and BPM<sup>23</sup> are considered by OMG as dual and coupled activities (“SOA, BPM, Lean, Six Sigma are all basically one thing (business strategy & structure) that must work side by side”, says a CTO involved in the SOA Consortium), and SOA as a new approach strongly contributes to success, requiring business and IT Collaboration (refer to Figure 4 and

Figure 5 here below, “before and with SOA”).

<sup>20</sup> Gartner, May 2005, « Applied SOA : Conquering IT Complexity through Software Architecture »

<sup>21</sup> Industry Week, March 2007, article « SOA :The Next Disruptive Force -Industry reports suggest service-oriented architecture is a growing trend that could dramatically change IT “as we know it.”

<sup>22</sup> Richard Soley, Chairman and CEO, OMG, Executive Director, SOA Consortium, December 2006, CIO Decisions Conference, « Making the SOA Leap »

<sup>23</sup> Business Process Management

## Success Requires Business and IT Collaboration

*Achieving the benefits of SOA requires significant changes for both IT and business executives – SOA Consortium Premise 2*



Figure 4: Before SOA, OMG, SOA Consortium

## Success Requires Business and IT Collaboration

*Achieving the benefits of SOA requires significant changes for both IT and business executives – SOA Consortium Premise 2*

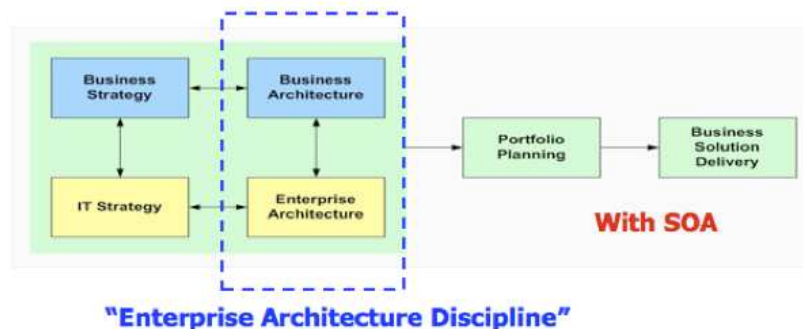


Figure 5: SOA, OMG, SOA Consortium

SOA relates to technical products, SOA labelled products, composite applications, and practices and skills too. SOA is a set of principles, it is pervasive, and it's seen as the means to "execute the business models". In this way, the methods to define and record this executable business model, and the supporting technologies must be seamless (refer to the above figure).



## No Artificial Separation of SOA and Business Process Management (BPM)



Figure 6: “SOA executes the business model”, OMG, SOA Consortium

### 3.1.2 SCA<sup>24</sup> standard

As early as the end of 2005, the new specification<sup>25</sup> SCA has been proposed to describe a model for building applications and systems using a Service Oriented Architecture. This introduction discusses the motivation behind SCA, as seen by the IT firms having created these new industry specifications (November 30, 2005, BEA Systems, IBM Corporation, IONA Technologies, Oracle, SAP AG, Siebel Systems, Sybase, Xcalia and Zend Technologies). It also describes the major features of the architecture as proposed by SCA. The specifications are now defined and hosted by OSOA<sup>26</sup>, collaboration and they are being standardised by OASIS<sup>27</sup>. SCA aims to simplify the creation and integration of business applications built using SOA. In a SOA, relatively coarse-grained business components are exposed as services, with well-defined interfaces and contracts. Interfaces are expressed using technology agnostic business terms and concepts. « Coarse grained » here means that the service interfaces use relatively few service methods to achieve a particular business goal, with large document-oriented parameters.

While SOA-based systems can have individual services that are built using object-oriented technology (among other approaches), the overall system design is service-oriented. In particular, the service interfaces involve the exchange of business data, not the exchange of objects. SCA builds on emerging best practices of removing or abstracting middleware programming model dependencies from business logic. SCA allows developers to focus on writing business logic. However, SCA complies with existing standards « under the covers » to preserve existing investment in standards,

<sup>24</sup> Service-Component Architecture

<sup>25</sup> Text from this section has been collected from the paper Service Component Architecture. Building Systems using a Service Oriented Architecture. A Joint Whitepaper by BEA, IBM, Interface21, IONA, Oracle, SAP, Siebel, Sybase. Version 09. November 2005.

<sup>26</sup> The Open Service Oriented Architecture <http://www.osoa.org>

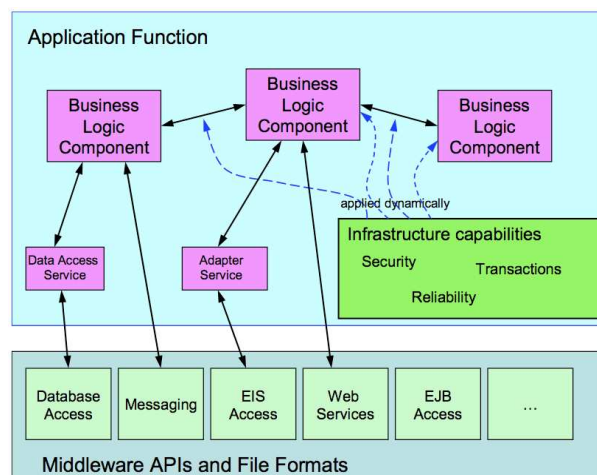
<sup>27</sup> <http://www.oasis-open.org/home/index.php>

middleware and tools.

The benefits of such an approach include:

- Simplified business component development
- Simplified assembly and deployment of business solutions built as networks of services
- Increased agility and flexibility
- Protection of business logic assets by shielding from low-level technology change
- Improved testability

SCA is based on an open specification, allowing multiple vendors to implement support for SCA in their development tools and runtimes. SCA encourages a SOA organization of business application code, based on components that implement business logic, which offer their capabilities via service-oriented interfaces and consume functions offered by other components via service-oriented interfaces. This is illustrated in the following **Error! Reference source not found.**, which can be contrasted with the organization of existing applications:



**Figure 7: SCA Application Architecture**

More advanced businesses already use an application architecture that is close to the one shown in **Error! Reference source not found.**, but the difficulty is that there is no industry-wide set of capabilities that provide support for this architecture. SCA aims to fill this gap and to help businesses create Service-oriented systems using common infrastructure and common skills. SCA divides the steps in the building of a Service Oriented Application into two major parts - first, the implementation of components, which provide services, and which consume other services; second, assembly of components to build the business application through the wiring of service references to services. SCA also provides a means of packaging and deploying sets of closely related components, which are developed and deployed together as a unit. These steps may be ordered arbitrarily, i.e. an Architecture can be defined and later implemented or components can first be implemented and later reused in an assembly. SCA caters for both approaches, which essentially correspond to top-down vs. bottom-up use of services. The model also decouples service implementation and assembly from the details of infrastructure capabilities and from the mechanisms for invoking external systems. This enables portability of

services between different infrastructures. This portability, building on the portability of implementation technologies like Java and BPEL4WS<sup>28</sup>, complements the runtime and tool interoperability of Web service standards.

### 3.2 Context Analysis

The size of the context market is potentially very big, since context adaptation can facilitate global deployment of service-based products or even individual services. Moreover, the growing use of web mashups and tools like Yahoo! Pipes demonstrate the potential for market growth in terms of number of users but also number of services.

In the global scale of service creation, composition and consumption envisioned by SOA4ALL, the context of use is likely to differ from the context of creation to a significant degree. To make the services useful, they should be adapted to the context of use, and this adaptation should be automated to facilitate the use of SOA4ALL services by global non-technical audience.

Context-aware software exists, although mostly in the research labs and focused on narrow pre-defined versions of context adaptation, for example adapting a mobile phone's sound volume to the level of ambient noise. Indeed, most existing work is traditionally concerned with the impact contextual information has on the behaviour of mobile devices and software entities. The premise is that a mobile software application may have to be used in different environments and on different target platforms, as highlighted by the label "mobile and pervasive computing".

This body of work focuses on simple context parameters such as location, light and noise levels and deployment platform which can be easily obtained in an automated fashion. Some of these efforts have resulted in start-up companies such as BT's "Rocking Frog". Rocking Frog provides personalisation technology that recognises users' preferences and can use contextual information about location to alert them to interesting events such as sporting events, and concerts

A more recent development of this idea is the triad of EC-funded projects MobiLife<sup>29</sup> SPICE<sup>30</sup> and Ambient Networks<sup>31</sup> working together under the Wireless World Initiative<sup>32</sup>, a research umbrella under the EC FP6. From this triad, MobiLife focuses on providing ontological representations of context but the focus is efficient information access rather than adaptation. Adaptation to context is handled by the EC-funded project MADAM<sup>33</sup> which aims to allow applications "to adapt to the changing operating environment and the context in which they are used", thus retaining "usability, usefulness, and reliability". However, the concept of context in all these projects is focused on the profiles of users, devices and communication

---

<sup>28</sup> Business Process Execution Languages for web services

<sup>29</sup> <http://www.ist-mobilife.org>

<sup>30</sup> Service Platform for Innovative Communication Environment <http://www.ist-spice.org>

<sup>31</sup> <http://www.ambient-networks.org>

<sup>32</sup> <http://www.ist-winner.org>

<sup>33</sup> Mobility and Adaptation enabling Middleware <http://www.intermedia.uio.no/display/madam/Home>



channels that help to adapt applications, user interfaces and to a limited extent the delivery methods (bandwidth determines resolution, etc.).

However, in a semantic service environment the contextual factors which are relevant to the way a service is composed are much wider in scope than the personal context above. Social and legal issues become of prime importance, for example different countries impose different rates of value-added tax and expect different payment modalities. These contextual factors would clearly impact the charging mechanisms of all services delivered against payment.

We are not aware of any commercial applications which provide these higher levels of context adaptation, because of the challenges in gathering and formalising context information at the higher levels of granularity. On SOA4ALL we aim to successfully address these challenges by using semantic encoding, parametric design and social networking principles, and combine these with automatic monitoring of service execution traces and user profiles.

### 3.3 Semantic Analysis

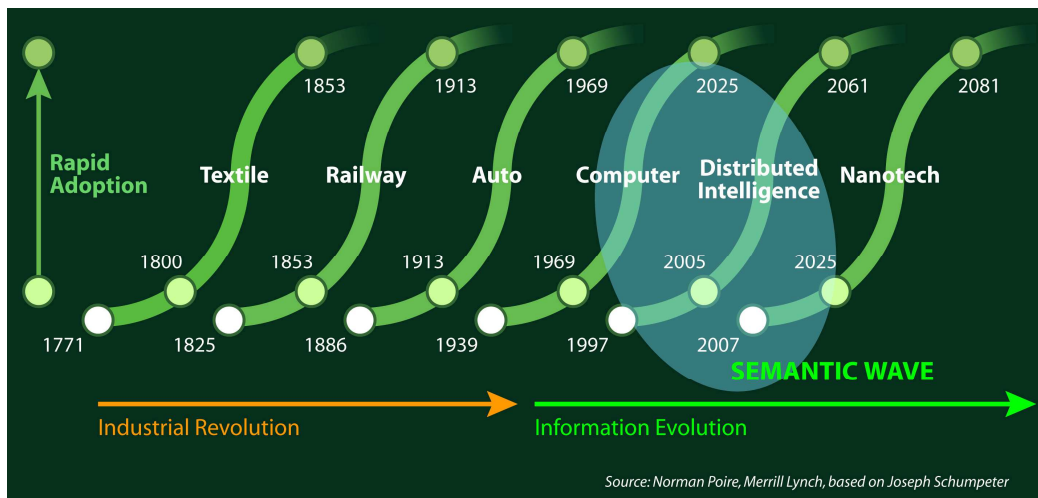
In 2001, the technology and market research company Forrester started using the term “X Internet” to designate the next generation of the Web that would include semantics for providing universal data and services. [Forrester 2001]. They foresaw a decentralized approach to the Semantic Web reality, starting with semantic sectorial islands (e.g. common semantic vocabulary for consumer electronics – imaging; enterprise application integration based on semantics – ERP<sup>34</sup> systems or healthcare for diagnostics and drug annotations). Those islands, promoted by sector leaders, would setup de facto semantic standards adopted by the major part of the sector. The sector players would adopt, by extension, these standards for their specific purposes.

In 2002, the Gartner Group published a research note [Gartner 2002] named “Semantic Web Technologies Take Middleware to Next Level”, where they predicted a massive usage of ontologies for enterprise application integration medium time horizon (2005-2010). They foresaw a roadmap using light-weight ontologies (taxonomies) evolving into strong knowledge representations in 80% of application integration projects by 2010.

In 2004, in the scope of the WonderWeb project [WonderWeb] the U.S. company TopQuadrant produced a report on the possible impact of the Semantic Web technologies in the so called “Semantic Wave”. According to this report, the Semantic Web was included in the Distributed Intelligence wave reaching a multibillion market in the next years.

---

<sup>34</sup> Enterprise Resource Planning

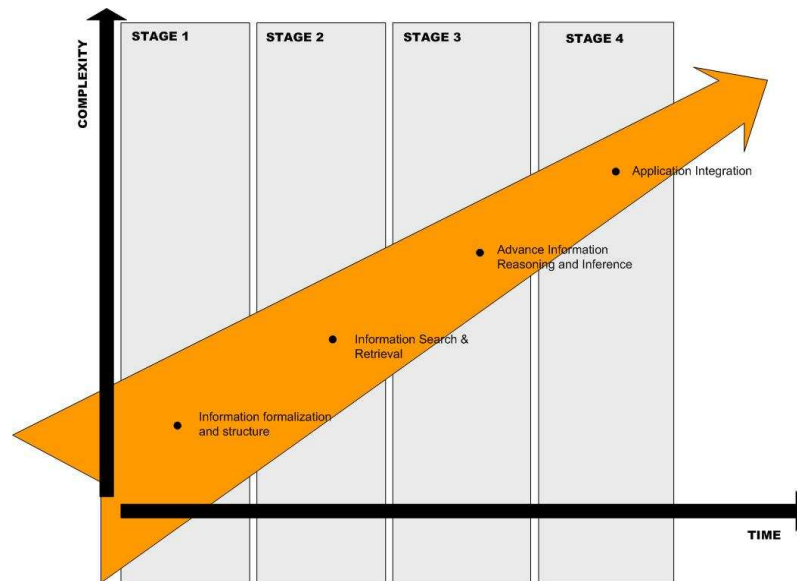


**Figure 7: Semantic Wave Source**

Experts predicting the evolution of Semantic Web applications foresee the simple usage of formal models, such as ontology, for information **structuring**, constituting an added value application for customers (e.g.: usage of ontology for component description in the ship manufacturing industry). Next level is considered to be the data **browsing, search and retrieval**. The presence of ontology for retrieving data changes completely the search paradigm: user retrieves data instead of documents. Precision becomes 100%. Next step is the full usage of **inference** over formal models. Using rules we can check existing data looking for inconsistencies, or complete inexistent data from the existing. The last level is the most attractive: EAI<sup>35</sup> using the Service-Oriented Development of Applications. In this regard, the combination of Semantic Web and Web Services has allowed for definition of Semantic Web Services, specially focused on application integration and more importantly the support of semantic data integration at the enterprise level.

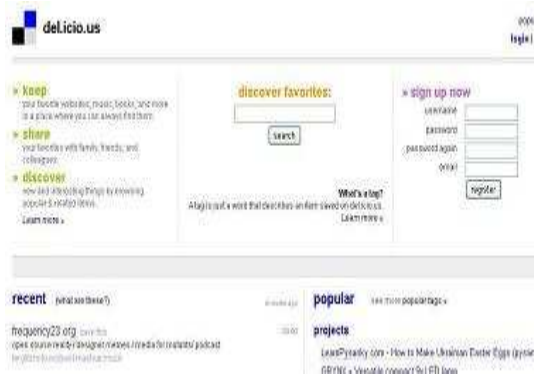
The vision of SOA4ALL goes one step further, taking services to the web as a platform, beyond corporate walls, allowing users to exploit such services, exposing, discovering, consuming an analyzing the executions of their own services on the Web. This scenario, which foresees billions of services available for billions of users, will clearly need new business models. We pursue in SOA4ALL to come up with guidelines that will provide the foundations of such future business model.

<sup>35</sup> Enterprise Application Integration



**Figure 8: Semantic Web Application Evolution Prediction**

The semantic web is evolving in the same manner that many other applications have evolved. Projects are initially launched in controlled environments: Semantic Web applications running on **intranets** (closed and low risk context). After being successful on intranets, applications jump to **internet** working with **public** or not sensitive data (sectors as public administration; cultural heritage, etc.). Over time, in the scenario predicted by SOA4ALL, applications will work on the open **Web**, requiring confidential data and **trust**. In the last years we are also witnessing a new trend that bridges the current, human oriented, Web and the future Web of services. Dubbed **Web 2.0** by O'Reilly Media, [Web 2.0], this term describes a “second generation of Internet-based services that let people collaborate and share information online in a new way—such as social networking sites, wikis, communication tools, and folksonomies. [Web 2.0 Wikipedia]” Folksonomies, allows users to annotate information using “tags”. These tags are not organized in formal models; they are rather freely defined and assigned by users. This is an example of an application with manually applied semantics.

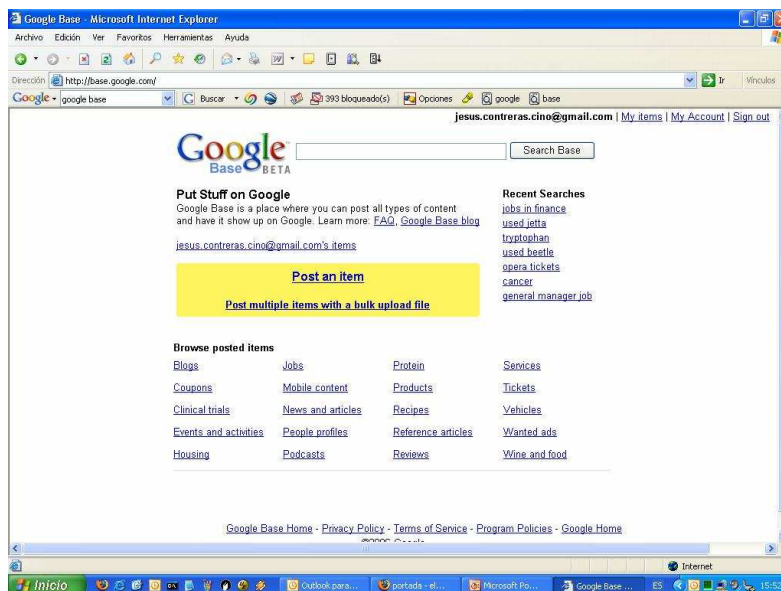


**Figure 9: del.icio.us web application for bookmark management**



**Figure 10: flickr web application for images management**

Two of the more successful folksonomy based applications are del.icio.us<sup>36</sup>, (a web application for social bookmarks and flickr<sup>37</sup> a digital photo sharing and tagging application. Both of them, have enormous success and were both acquired by Internet giant Yahoo! in 2005 for significant money. These examples show the success of semantic applications in general use. In addition to Yahoo!, search giant Google is entering this formalization stream. Its application, Google Base, includes a simple predefined taxonomy for resources description. Any users may input their resources and describe them using Google’s taxonomy. This provides for semantics that adhere to a specification; with specific taxonomy nodes being available.



**Figure 11: Google Base for Products Description**

<sup>36</sup> <http://del.icio.us>

<sup>37</sup> <http://flickr.com>

One of the most promising markets, from the opportunity and size point of view, for this kind of technologies is using Semantics to integrate first corporate and now online applications as the ones described above and services. The combination of Web Services and Semantic Web has allowed for Semantic Web Services creation. Initiatives as WSMO<sup>38</sup> and OWL-S<sup>39</sup> are in the way of defining the definitive language for Semantic Web Services creation and description. Leading players as SAP or ORACLE are positioning themselves into this market using concepts for integration [Forrester 2006].

The future market of semantic technology will be thus characterised by the need to support interaction between the different actors, addressing both humans and computers. Altogether, this market is raising the need for i) means that enable online cooperation between people and ii) methods and techniques that guarantee scalability of the ever-growing underlying Web infrastructures to support such interaction patterns in the forthcoming scenario.

The appearance of Internet as a disruptive platform has given rise to new business models such as SaaS and advertisement-based models (e.g., Google). In the light of this trend, experts are suggesting managers to think about “servitizing” their products to provide added value, and “productizing” their services so that they can be delivered more efficiently and at lower costs [Cusumano]. Indeed, in this respect the fully automated delivery of services over the Web appears as the silver-bullet for delivering IT services since it minimizes costs and maximizes the potential market. The Internet is thus evolving towards an Internet of Services at different levels, appealing to both individuals and organizations. We believe that the main characteristics of the upcoming market will be based on a technological evolution towards a **fully-fledged platform for supporting businesses** and a **focus on social aspects** largely intending to support collaboration between people as one of the main enactors for human interaction in the modern society.

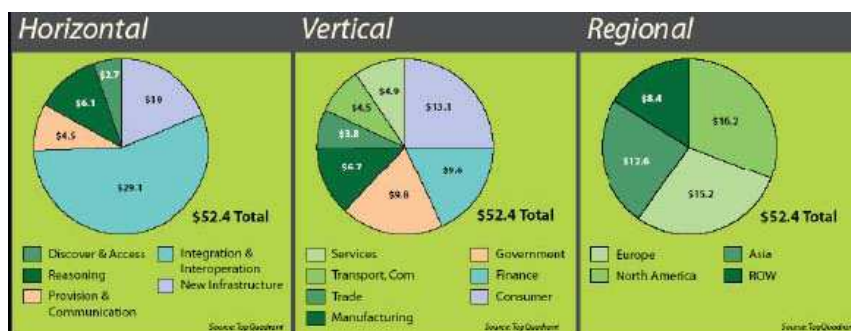
Indicators show that approaches aiming to integrate distributed applications and services on the consumer side will provide much more realistic business opportunities than those addressing the integration of large corporations’ business processes (see Figure 12<sup>40</sup> vertical perspective, consumer quadrant). Therefore, it will be necessary to address the individual requirements and consumption trends of billions users on a personalized basis. Companies like Amazon have already realized the advantages of “selling less of more” and in consequence have oriented their business towards the long tail [Anderson]. Addressing the long tail builds on service personalization, where the role of context awareness and user profiling will be a key aspect for a successful uptake of the technology in the market.

---

<sup>38</sup> Web Service Modelling Ontology <http://www.wsmo.org>

<sup>39</sup> OWL-based Web service ontology

<sup>40</sup> Source: TopQuadrant’s



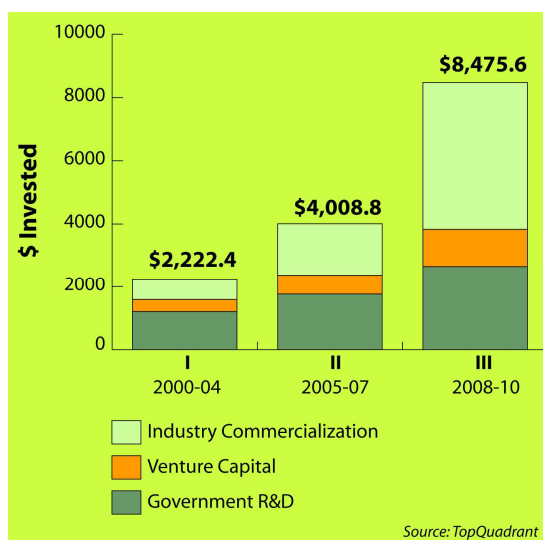
**Figure 12: Market Predictions in 2010**

However, it is still necessary to deal with several pending issues. In this scenario, where billions of users will cooperate and interact and exchange information by means of millions of online services, the trust issue clearly needs to be addressed. How can we be sure that services actually do what they are meant to and behave like they are supposed to? Additionally, after executing a process comprising several complex services in a context-based, self-customized service mashup, users will need to understand how their input data was transformed into the resulting output. The use of advanced post-mortem, analysis techniques will play a fundamental role in this regard, increasing user understanding of the interactions between services by explaining process executions in a way closer to human understanding. Additionally, supporting the establishment of secure transactions is a fundamental feature that needs to be provided as a very basic vertical service that would protect the privacy and integrity of sensible data exchanged in the course of business transactions. It is only in the presence of such a facility that the automated delivery of business services will gain the necessary trust from individuals and organisations in order to achieve our vision.

In order to fulfill this market vision one of the critical factors is financing activities until the mainstream market is reached. There are a set of challenges that need to be overtaken such as critical mass of semantic content, production and management tools, standards for ontology, etc. According to TopQuadrant's study the total funding for the Semantic Web in the period of 2000-2004 was about \$2.2 Billion (USD).

Figure 13 shows the projection of funding until 2010, with an expected and significant increase of private funding against venture capital and government investment. This means that the market is mature (if economy permits) in order to start transiting to this new semantically supported, online service market paradigm.





**Figure 13: Financing of SW Technology, TopQuadrant**

## 4. Analysis of existing Web Services

A 'Web service' is defined by the W3C<sup>41</sup> as "a software system designed to support interoperable machine-to-machine interaction over a network. Web services are frequently just Web APIs that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services. At worldwide level, the total number of valid Web Services is around 3184<sup>42</sup>, a minuscule amount, in comparison to the 30<sup>43</sup> billion Web pages constituting its content.

In consequence, SOA is largely still an enterprise specific solution exploited by and located within large corporations as part of their in-house supply chains. Nevertheless, complex mobile devices and more efficient wireless communications facilitate ubiquitous computing; and as optical and broadband communication infrastructures expand, we expect the number of Web services to grow exponentially in the next few years. In particular:

- More companies will publish their offerings as services accessible through the Web inspired by the success of early adopters companies (e.g. Amazon).
- Web 2.0 has popularized concepts such as mash-ups and syndication though, for example, technologies such as RSS<sup>44</sup>, Atom. They have thereby illustrated comparatively simple means for business networking and business flexibility.
- Efforts to turn the Web into a general platform for accessing and interconnecting arbitrary devices and services are maturing.

Given the fact *SOA4ALL will help to realize a world where billions of parties are exposing and consuming services via advanced Web technology*, SOA4ALL will have a strategic impact in terms of new frameworks, new platforms and new infrastructures transforming the Web into a Web of billions of services. That is why we have decided to make a brief analysis about the state of the art of WS providers in one of the countries represented in the SOA4ALL Consortium as a matter of example for identifying, WS providers by category, number of services offered and the functionality of those services, taking as reference Seekda<sup>45</sup> data. In order to make the document easy to understand, we have divided Web Services providers in four

---

<sup>41</sup> World Wide Web Consortium <http://www.w3.org>

<sup>42</sup> Paper presented on April to the WWW2008 in Beijing called "Investigating Web Services on the World Wide Web", the authors E. Al-Masri and Q. H. Mahmoud show the results coming from a specific crawling, verification, and validation process of WSDL-based Web Services resident on the Web. Starting from a total of 5.077 crawled services the total number of valid Web Services obtained is 3184. <http://www2008.org/papers/pdf/p795-almasriA.pdf>

<sup>43</sup> J. Domingue, D. Fensel, and R. González-Cabero: SOA4ALL, Enabling the SOA Revolution on a World Wide Scale. In Proceedings of the 2nd IEEE International Conference on Semantic Computing (ICSC 2008), August 4-7, 2008, Santa Clara, CA, USA.

<sup>44</sup> Really Simple Syndication.

<sup>45</sup> Spin-off of the University of Innsbruck, Semantic Technology Institute (STI) Innsbruck that operates providing access to available web services. <http://seekda.org>



main categories depending of the nature of the service offered to consumers as follows:

- **Marketing Service:** A service is used only as one tool to support the real product.
- **Commercial Service:** The product is the service.
- **Academic:** Information about research activities is available to general public. It's not intended to commercial use.
- **Governmental:** Service provided by government agency or government funded non-profit organization. Services are typically free for public usage.

According to Seekda at least 140 web services providers are located in the Spanish market. Most WS providers are represented by SME's followed by governmental and academic institutions. In what company profile is concerned, not only technological but also some companies from agro-industry, tourism, insurance or housing sector offer services at national level. Government or Public Administration is represented by local, regional and national administrations. Academic providers consist of several universities and research centres.

With respect to the quantity of services offered, the information displayed below, shows, that few providers offer a high level of services to consumers. Most of them only offer a specific service according to their target market needs. Main reason why not large amount of services are offered, seems to be a hot topic to be discussed. The lack of resources for investing or information about how to proceed in order to offer a wide range of services, could be some of the reasons to answer this question. In this context, SOA4ALL will play a key role in terms of discovering the composition and execution of web services.

Regarding functionalities, activities such as sending sms and mails, receiving news, watching TV, booking hotels, renting cars, exploring commercial opportunities, claim services as well as digital firm services are practical examples of what these services consist of. The table below collects a wide range of different WS providers in the Spanish market, from the 140 identified by Seekda.

Web Service Provider	Category	WS number	Details	Comments
<a href="http://catcert.net/">http://catcert.net/</a>	Governmental	1	WSDL	Electronic signature service provider
<a href="http://gva.es/jsp/xper.jsp">http://gva.es/jsp/xper.jsp</a>	Governmental	1	WSDL	Web service provider focused on offering key data and information concerning main issues dealt by the regional ministries of the Valencia Region
<a href="http://bsc.es/">http://bsc.es/</a>	Commercial service	115	WSDL	Supercomputing services provider.
<a href="http://www.ciset.es/">http://www.ciset.es/</a>	Academic	1	WSDL	Provider of configuration services
<a href="http://cnio.es/es/index.asp">http://cnio.es/es/index.asp</a>	Academic	1	WSDL	Oncologic Spanish Research Centre
<a href="http://hellehollis.com">http://hellehollis.com</a>	Commercial service	1	WSDL	Rent a car enterprise

<a href="http://seglan.com/">http://seglan.com/</a>	Marketing Service	1	WSDL	Pay solution based company
<a href="http://todoexpertos.com/">http://todoexpertos.com/</a>	Commercial service	1	WSDL	Blog importer provider
<a href="http://mensajetexto.com.es">http://mensajetexto.com.es</a>	Marketing Service	2	WSDL	Send SMS and bulksms provider
<a href="http://solidq.com/">http://solidq.com/</a>	??	25	WSDL	Services offered by this WS provider will be focus on Query services, list , meetings, webs, forms, site data etc..
<a href="http://upcomillas.es">http://upcomillas.es</a>	Academic	25	WSDL	Few specific web services such as user profile, query, list, site data or area service are offered by this academic WS provider.
<a href="http://seguromiquelseco.com">http://seguromiquelseco.com</a>	Commercial service	8	WSDL	Insurance vendor. Main services consist of user groups, lists, permissions, versions, webs etc
<a href="http://abysal.com/">http://abysal.com/</a>	Commercial service	1	WSDL	European information technology company which provides an effective and simple solution for Internet/Intranet e-business applications.
<a href="http://www.fotocasa.es">http://www.fotocasa.es</a>	Marketing Service	5	WSDL	Houses for renting. Main web service offered by this WS provider includes average price, template object and other services.
<a href="http://iberojet.es/">http://iberojet.es/</a>	Commercial service	1	WSDL	Hotels and holidays searcher. Transaction is main service offered by this provider.
<a href="http://csic.es/">http://csic.es/</a>	Academic	1	WSDL	Spanish National Research Council focused on petition services
<a href="http://metromadrid.es/">http://metromadrid.es/</a>	Governmental	1	WSDL	Calculation service provider
<a href="http://webhotelplus.com/">http://webhotelplus.com/</a>	Marketing Service	1	WSDL	Market hotel provider
<a href="http://pymesoft.net/">http://pymesoft.net/</a>	Commercial service	1	WSDL	Software enterprise. It is focuses on code service.
<a href="http://segundamano.es/">http://segundamano.es/</a>	Commercial service	1	WSDL	Classified advertisement for selling and buying. Alerts are main service covered by this provider
<a href="http://europeadeseguros.com/">http://europeadeseguros.com/</a>	Commercial service	1	WSDL	Insurance company focuses on claim service.
<a href="http://gobiernodecanarias.org/">http://gobiernodecanarias.org/</a>	Governmental	1	WSDL	Governmental provider focuses on unity web service.
<a href="http://www.europapress.es/">http://www.europapress.es/</a>	Commercial service	1	WSDL	Online news provider
<a href="http://atsoftline.com/">http://atsoftline.com/</a>	Commercial service	1	WSDL	Software company specialist on updating PDA services
<a href="https://www.camerpyme.com/camerpyme/portal/index.asp?">https://www.camerpyme.com/camerpyme/portal/index.asp?</a>	Marketing Service	1	WSDL	Active web services provider
<a href="http://mityc.es/">http://mityc.es/</a>	Governmental	2	WSDL	Spanish Ministry of Industry, Tourism and Commerce. Main web services are related to folder web service, enterprise and Ws Directory
<a href="http://planea.com/">http://planea.com/</a>	Commercial service	1	WSDL	Solution Vendor for information technology focused on e-learning services.
<a href="http://aragob.es/">http://aragob.es/</a>	Governmental	8	WSDL	Aragon Regional Government covers statistics data, environment, tax or label services.

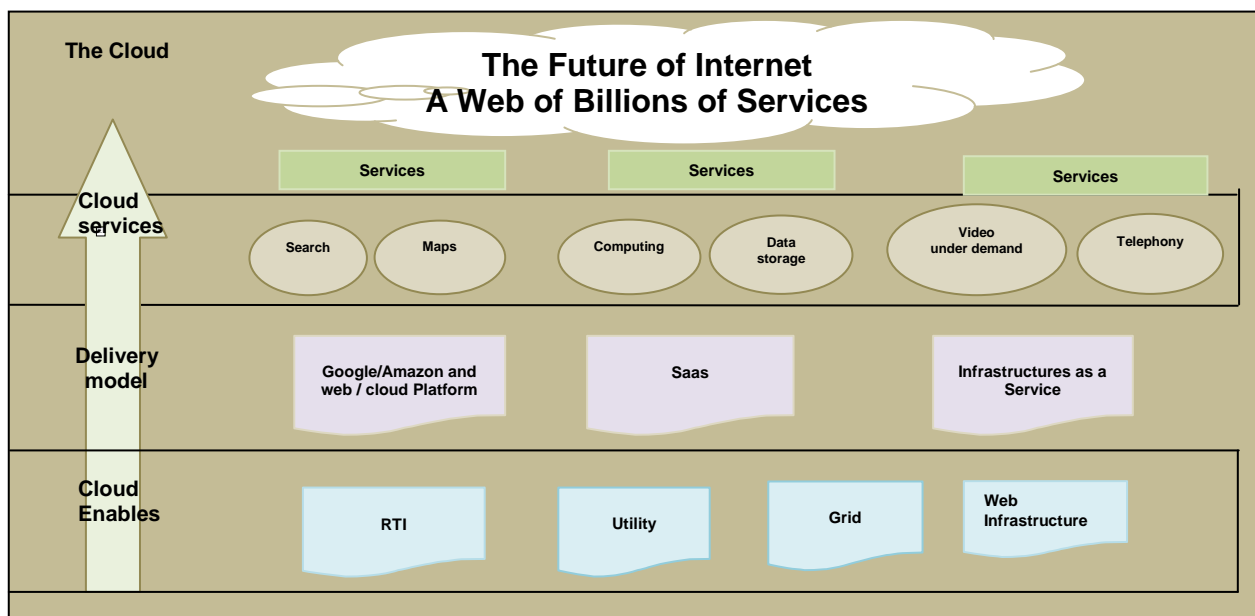
Table 2 Spanish Web Services Providers

## 5. Cloud Computing Technology around SOA4ALL

Cloud computing means Internet ('Cloud') based development and use of computer technology. It is a style of computing where IT capabilities are provided as infrastructure, allowing users to access services without knowledge of, expertise with, or control over the technology infrastructure that supports them.

The immediate benefits and implications of Cloud computing are enormous, since it drastically lowers of the operational costs, as there is not hardware investment; allows quicker development times, allows accessing to increased computing power if necessary, etc. The whole spectrum of companies are potential beneficiaries of this trend (for examples most SME's with low investment capacity and without a relevant IT environment do not have their own infrastructures or applications). This concept is also useful for large companies in order to support some specific projects with a limited duration. Thanks to the cloud, customers will be able to buy under demand, following the pay-per-use model. Some web services providers such as Amazon, Google, Yahoo are putting the power of cloud computing on work.

The main endeavour of SOA4ALL is to provide an infrastructure that realizes a world where billions of parties expose and consume services via advanced Web technology, objective that is clearly in line with the purpose of Cloud computing. Initially SOA4ALL will integrate four complimentary and revolutionary technical advances (SOA, Context, Semantic Web, Web 2.0); and moreover its architecture incorporates several principles that stem from different fields such as Grid computing, autonomic computing, etc. into a coherent and domain independent world-wide service delivery platform. We consider the SOA4ALL platform as perfect candidate to enable a huge-scale Cloud computing infrastructure. The Figure below shows four main different level of cloud computing according to Gartner<sup>46</sup>.



**Figure15: The Four Levels of Cloud Computing**

<sup>46</sup> This graphic from Gartner has been taken into consideration from one article about Cloud computing on the Network world- June.2008 edition by Alhambra-Eidos Spanish firm. <http://www.alhambra-eidos.es/>

## 6. Consortium’s Exploitation Strategy

The present section reports the common preliminary exploitation of SOA4ALL thus making clear possible benefits coming from project efforts at all level. The section is structured in three levels, first summary about what the expected exploitable results of the project are, a second more detailed description where roles of partner are described in relation to the exploitation plan and a third level, covering some considerations on the SOA4ALL approach to the Open Source approach.

### 6.1 SOA4ALL Exploitable Results

In this section a table-based approach has been adopted presenting briefly description of exploitable knowledge as well as exploitable results. Besides that, estimated timetables for using the outcomes of the project and IPR –related issues have been pointed out.

Exploitable Knowledge (description of the exploitable results),	Exploitable results	Sector of Application	Timetable for commercial/ non commercial use/	Patents or other IPR protection	Partners involved and owner
SOA4ALL Framework. The outcome of the project will be a comprehensive framework and infrastructure that integrates four complimentary and revolutionary technical advances into a coherent and domain independent service delivery platform.	SOA4ALL framework and infrastructure.	Possible adaption to multiple domains	End of the project	Under revision	All partner
A federation of distributed service buses to easily semantically compose, run and annotate any service available on the soa4all web of services.	A new generation service bus for the agile enterprise: distributed and semantic service bus, distributed and agile service orchestration engine and related tools	Possible adaptation to multiple domains (enterprise collaborative systems, HPC-high performance computing-)	End of project: POC – Proof of Concept- and some more mature components (such as SCA-compliant Java framework or Java middleware for parallel computing), ready to be industrialized	Open Source – potentially LGPL	ALL partners – INRIA owner for some components
Deployment of machine and human services in a unified manner, designed such that users will be able to collaboratively annotate goals and services, applying consensus mechanisms to balance consistency with popularity.	service provisioning platform	EAI, Telco, e-Commerce, others	First versions on M18, commercial exploitation gradually from then on, most probably from M30.	To be defined	WP2 partners
Enablement of users to compose and interact with services pre-existing on the Web. The social network of the user will be taken into account when personalising access to the services, including reputation and feedback as mechanisms to enrich service usage.	service consumption platform	EAI, Telco, e-Commerce, others	First versions on M18, commercial exploitation gradually from then on, most probably from M30.	To be defined	WP2 partners
Provenance interpretation environment for post-mortem analysis and validation of the execution of service compositions.	Knowledge-oriented provenance environment	EAI, Telco, e-Commerce, e-Science, others	First versions on M18, commercial exploitation gradually from then on, most probably from M30.	To be defined	iSOCO

Monitoring and management of services through a graphical user interface available over the Web.	service monitoring & management platform	EAI, Telco, e-Commerce, others	First versions on M18, commercial exploitation gradually from then on, most probably from M30.	To be defined	WP2 partners
A service locator that allow user to find and locate services thanks to the following functionalities: Service Crawling for collecting services information and store them into a distributed registry; Semantic indexing that allows storing and retrieving services thanks to semantic information. Services may be retrieved by users thanks to a web interface or by other services; Service Discovery allows users to find new services based on semantic based matching; Service Selection provides means to select the most suitable service among those services discovered by utilizing a service ranking algorithm; Service Adaptation refines the results of discovery using interaction with the services or their providers, tailored according to the users' needs.	Service locator	Under revision	Under revision	Under revision	WP 5
The process generator and verifier will first transform the graphical model of requirements into an executable process. If more than one process is found, the processes can first be verified to avoid potential problems such as deadlocks, livelocks, and other anomalies. The validated processes are then evaluated. The best one is proposed for execution.	Process generation, verification & evaluation engine	Under revision	Under revision	Under revision	WP6
This prototype investigates how enterprise services can be integrated into the open, dynamic, lightweight, and end-user driven service platform that is envisioned by SOA4ALL.	End-user Integrated Enterprise Service Delivery Platform Prototype	Public sector	End of the project	Under revision	WP7 partners
Semantically enhanced and expanded version of BT's Web21C platform which will utilize the SOA4ALL technologies.	BT's Web21C platform	Public sector	End of the project	Under revision	WP8 partners
Prototypes for various C2C and B2C e-Commerce scenarios, including an open web shop infrastructure, a social internet TV platform, and an e-Commerce framework for ISPs and their customers.	C2C and B2C Service e-Commerce prototypes	ISPs, Content providers, Infrastructure Providers	After end of project	Under revision	WP9 partners

*Table 3 Exploitable Results*

## 6.2 Partner roles in the Exploitation Plan

Industrial partners will play a key role in the exploitation plan because, they will have potentially the best possibilities to directly market and exploit SOA4ALL results (per se or derived ones), due to its transfer of knowledge and results from research projects into the product development. In addition, they will use the exploitation to spread their network of academic and other research partners.

Due to the fact most companies in the EU environment are SME's and most of them are developing technology it seem that SME's could be relevant users of SOA4ALL exploitable results.

That means SME's involved in the project will be taken as reference by the Consortium in order to focus on this main target market needs. SME's will support the Exploitation plan by getting more innovation with the project results and being the pioneers in best practice. SME's will also implement strategies aimed at reinforcing the exploitation of project outcomes and will gradually incorporate SOA4ALL results into their commercial portfolio in different sectors.

In what academia and research partner is concerned, they will be active players in the exploitation plan as ICT innovation enablers in order to avoid the existing gap between the research activities carried out by Universities and the innovation needed of industries and Public Administration. Moreover, partners, will also support the exploitation of relevant outcomes in terms of research by transferring technologies, through the participation in European and national research activities, dissemination and training activities hanks to Innovative Education Programs for professional and post- graduate students, regarding SOA4ALL results.

### **6.3 SOA4ALL Open Source Approach**

This section addresses an extremely relevant issue that is the current phenomenon of the open source in comparison to the traditional proprietary software development. Such a phenomenon is not only relevant per se, but has also a very relevant economical impact both for the producers and the customers. Moreover, given the context in which SOA4ALL is located, that is the EU co-funded research and development, it is necessary to take into account such an important aspect of the current software development scenario.

Because of the openness of the SOA4ALL consortium to decide how to exploit the results of the project, and taking into account that this deliverable studies the different approaches we can follow, we have included four specific annexes on Open Source issues such as Open Source Considerations( Annex A), Current Situation of the OSS( Annex B), Typology of most used Open Source Licenses( Annex C) and Legal Analysis of F/OSS (Annex D) in order to be used by the consortium as complementary information to the market analysis to help in the decision making process of business-related aspects.

#### **6.3.1 SOA4ALL Licensing Schema**

The SOA4ALL Framework will be licensed according to the individual licensing schema. The framework, being open to the addition of other components, can adopt several licensing schemas. As there are many examples of OSS licenses with few differences between them, the following table shows the current idea the partners have about the type of Open Source license, considering the legal analysis of F/OSS considered in Annex D. This is only a preliminary study, and some of the licenses are not clear yet.

Component	Responsible	OSS license	Comments
SOA4ALL Distributed Service Bus (WSMX) Execution Management	INRIA	LGPL	Execution Management for SOA4ALL Distributed Service Bus, based on Web Service Execution Environment (WSMX)
Semantic Spaces for storage and communication	INRIA	LGPL	Semantic Spaces for storage and communication for SOA4ALL platform and business services.
FraSCAti	INRIA	LGPL	Framework implementing OASIS SCA specifications.
ProActive	INRIA	LGPL	Java middleware for parallel, distributed and concurrent computing
Repository Reasoner for WSML-Core	UIBK	LGPL	No comments
Rule Reasoner for WSML-Rule	UIBK	LGPL	No comments
Description Logic Reasoner for WSML-DL	UIBK	LGPL	No comments
Context Recognition Service	OU	Kmi License v2	This is the 6 clause version of a simple standard license requiring acknowledgement of the originator of the Software. It does not restrict future use, it allows commercial exploitation and does not impose this license on future developments, merely the terms of this license. It is drawn from the BSD model with additional material based on Loom license
Context Adaptation Service	OU	Kmi License v2	This is the 6 clause version of a simple standard license requiring acknowledgement of the originator of the Software. It does not restrict future use, it allows commercial exploitation and does not impose this license on future developments, merely the terms of this license. It is drawn from the BSD model with additional material based on Loom license
Context Management Service	UNIMAN	LGPL	Possibly derived from Semantic Spaces. This will have to be revisited when a concrete technical approach will be decided.
Selection prototype	UKARL	LGPL	No comments
Ranking prototype	UKARL	LGPL	No comments
All TIE developments created in SOA4ALL	TIE	LGPL-like license (maybe original LGPL)	Basically we can put all that we will develop in/for SOA4ALL as LGPL
Libraries from TIE	TIE	Case by case decision	It will be free usage for SOA4ALL members within the project time



SCENE	SeCSE FP6 IP Project	SeCSE License (BSD style license)	A service composition execution environment supporting dynamic changes disciplined through rules
TXT Process Miner	TXT	LGPL-like license (maybe original LGPL)	Same license as Template Management component
Hibernate	JBoss, a division of Red Hat	LGPL	Object Persistence by mapping to relational database <a href="http://www.hibernate.org/">http://www.hibernate.org/</a>
Log4J	Apache project	Apache License, Version 2.0	Logging <a href="http://logging.apache.org/log4j/">http://logging.apache.org/log4j/</a>
Ext-GWT	Ext ( <a href="http://extjs.com">http://extjs.com</a> )	2 different licenses: an OS one based on GPL v3, another one is a commercial license, see <a href="http://extjs.com/products/licenses.php">http://extjs.com/products/licenses.php</a>	Library that extends GWT by widgets and layouts
GWT	Google	Apache License, Version 2.0	Support for browser-based, client-side development
Apache ODE	Apache Software Foundation	Apache License v2.0	Executes business processes written following the WS-BPEL standard
SAP components Enterprise Service Adapter Extensions to SOA4All Components	SAP	Proprietary license	SAP does not contribute to OSS. Project partners are granted access rights to foreground and background as stated in the CA.
ISP e-Commerce platform prototype	Hanival	to be determined	No comments
ISP e-Commerce platform prototype	TIE	to be determined	No comments
Social Internet TV platform	TXT	to be determined	No comments

*Table 4 SOA4ALL Licensing Schema*

As it is clear from the previous table, the license schema for individual components will be completely decided in the last version of the exploitation plan. The SOA4ALL Framework will be licensed according to the individual licensing schema. The framework, being open to the addition of other components, can adopt several licensing schemas.

The idea is that at least one version of the SOA4ALL Framework will be Open Source. The final decision about the concrete open source license for the whole framework will be decided in the last version of the exploitation plan.



### 6.3.2 SOA4ALL partners' involvement in OSS activities

Several SOA4ALL partners (ATOS, EBM Websourcing, INRIA,) are strongly involved in Open Source activities. The most relevant of them with the SOA4ALL exploitation needs are the following ones:

- **NESSI OSS Working Group**<sup>47</sup>, whose kickoff has been held on May, 19-20, in the NESSI office in Brussels.
- **OSS contribution to the NESSI European Software Strategy**, as described in the NESSI Position Paper, whose first publication has been done in June 2008, and announced in the NESSI Newsletter in June 2008.
- **OW2 Local Chapter Europe**<sup>48</sup>, whose goal is to contribute to the sustainable development of the OW2 community and business systems on an European scale.
- **QUALIPSO**<sup>49</sup> **Project**, in which INRIA and Atos Origin are involved. QualiPSo is one of the largest Open Source initiative funded by the European Commission, and is funded under EU's sixth framework program (FP6), as part of the Information Society Technologies (IST) initiative. QualiPSo is launched in synergy with Europe's technology initiatives such as NESSI and Artemis.

The NESSI Open Source Working Group will deliver inputs and contributions about the impact of OSS (Open Source Software) strong impacts on the software landscape in terms of process, business models, economic issues and global impacts in the ICT. The main objective of the NESSI OSS WG will be to support NESSI in defining an overall strategy for European companies wishing to implement or adopt Open Source, as well to Open Source development communities willing to collaborate with NESSI. Specifically, the NESSI OSS WG still provide other NESSI committees and working groups with all support, help and inputs needed for positioning Open Source as major channel for the dissemination of NESSI outcome, e.g. SOA4ALL project's outcome. Also, the NESSI OSS WG will promote integration of Open Source within NESSI platforms and services, like SOA4ALL. Main activities will be about:

- Analysis of OSS components according to maturity model to support delivery of NEXOF open source implementation.
- Liaison with OSS communities, ETPs, FP7 projects, national initiatives, etc...
- Study of existing initiatives and proposals for OSS education and training.
- Guidance on OSS licenses and business models to support NESSI WGs and Strategic Projects such as SOA4ALL.
- Dissemination within and outside NESSI.

---

<sup>47</sup> [www.nessieurope.com/Nessi/WorkingGroups/NESSIOpenSourceSoftwareWorkingGroup/tabid/269/Default.aspx](http://www.nessieurope.com/Nessi/WorkingGroups/NESSIOpenSourceSoftwareWorkingGroup/tabid/269/Default.aspx)

<sup>48</sup> [www.ow2.org/view/Activities/EuropeLocalChapter](http://www.ow2.org/view/Activities/EuropeLocalChapter)

<sup>49</sup> Trust and Quality in Open Source systems <http://www.qualipso.org/>

Open Source Software model appears in the very recent NESSI Position Paper as a one of the new software Eco-systems for software, just as SaaS Supply Chain integration and collaborative model, and Cluster model. Specifically, European stakeholders (industry, academia, SME's, EC states and members) have to reinforce their collaboration towards the establishment of Open Source consortia by:

- Identifying market opportunities where there is a demand from industry and an active European community of OSS developers.
- Proposing technology roadmaps and development plans.
- Pushing further usage of Open Source Software to establish open standards especially in education and for SME's.
- Further supporting the build-up of competence centres.
- Creating and supporting OSS networks for SME's.

OSS can take part too to the reinforcement of industry's role in software standardization by:

- Supporting the establishment of open alliances and communities to develop and maintain alliances.
- Mandating the use of open standards in public and private procurement as well as through IT governance rules.
- Participating and taking board level positions in industry consortia such as W3C, OMG<sup>50</sup>, OASIS<sup>51</sup>, WS-I<sup>52</sup>, etc...
- Promoting within these industry consortia the results of EC funded R&D projects, such as SOA4ALL.

The OW2 Europe Local Chapter, could play an important role in Europe to participate to the exploitation of SOA4ALL results, by representing the OW2 community on the European scale: a contact point for the local community, a platform for local networking, a communication and dissemination channel, a place for international cooperation opportunities in the open source middle ware field, a way to leverage ideas, investigate and implement actions, share results. The main activities of the Europe Local Chapter, focusing on leading an academic and business community, cooperating with various open source organizations (e.g. the Eclipse foundation), promoting the OW2 consortium, developing tools and services for the OSS communities, and fostering contribution to Open Source code base, could be very helpful for the OSS exploitation of SOA4ALL results.

---

<sup>50</sup> Object Management Group <http://www.omg.org>

<sup>51</sup> Open Advanced System for disaster and emergency management <http://www.oasis-fp6.org/>

<sup>52</sup> Web Services Interoperability Organization <http://www.ws-i.org/>

## 7. Individual Exploitation Plan

This section provides an overview of how the SOA4ALL work relates to partner's product or services. Each partner in SOA4ALL has a specific exploitation plan covering how they are planning to use the scientific and technical output of the project to help develop their current business or create new ones.

### 7.1 Industrial Partner Exploitation Plan

#### 7.1.1 ATOS Exploitation Plan

##### I. Motivation

Atos Origin is the SOA4ALL coordinator as well as one industrial partner involved in this project. SOA4ALL is a relevant project for ARI, the Research and Innovation Area in Atos and in particular for, the Semantics & Service Engineering Unit of ATOS intended to use the knowledge in services and semantic technologies gained in the different Work Packages of the project. In this context, main goal of Atos Origin as a consultancy and integration company is to transfer the R&D done in the project to the rest of the areas of the company or directly to its clients.

Furthermore, applications based in SOA are becoming the dominant computing paradigm by supporting new business models and providing important benefits to companies in terms of flexibility and innovation regarding product, services and business practices. In this context, Atos Origin will focus on offering consultancy services by using SOA4ALL framework, in order to provide service in customized service-based projects to Atos Origin clients.

Atos Origin participates in the “End-user Integrated Enterprise Service Delivery Platform” use case in order to come up with service-oriented technologies that will be usable across a wide-range of e-government scenarios.

##### II. Linkage to activities

SOA4ALL framework is much related to other ICT projects where Atos Origin is currently involved such as NEXOF-RA<sup>53</sup>. This project is the first step in the process of building NEXOF<sup>54</sup>, the generic open platform for creating and delivering applications enabling the creation of service based ecosystems where service providers and third parties easy collaborate.

---

<sup>53</sup> NEXOF Reference Architecture <http://www.nexof-ra.eu>

<sup>54</sup> NESSI Open Service Framework <http://www.nessi-europe.com/Nessi>

NEXOF-RA main results will be the Reference Architecture for NEXOF, a proof of concept to validate this architecture and a roadmap for the adoption of NEXOF as a whole. To build the specifications for the Open Framework Architecture, an Open Construction Process has been defined to allow the involvement of all relevant initiatives organizations concerned on building a Reference Architecture for the Future of Internet. In this context, SOA4ALL will contribute to the Open Construction Process Initiative created NEXOF-RA in order to advertise, promote, guide and consolidate the contributions of NEPs and other SSAIE European projects in NEXOF-RA.

### III. Specific plan

Atos Origin will commercialize SOA4ALL results using its disseminator role as main tool to achieve the implementation of SOA4ALL result by customers. Atos Europe is composed of thousands of customers in the European Union environment. This circumstance will allow Atos Consortium in Europe to disseminate SOA4ALL outcomes, among its main target; SME's, Industry, Academia sector, Public Administration as well as companies from other European countries where Atos Origin has business interests in relation to service oriented architecture.

To start with, Atos Origin will offer SOA4ALL results to their local portfolio of customers, especially from the Public Administration where Atos Origin has foreseen different commercial opportunities coming from other EU projects, the positive feedback of the corresponding accounts managers, and the company well-recognized positioning because provides the most important Spanish Administrative Organisms in this target market. After the first deployment, the exploitation strategy will focus on attracting new customers through Atos Origin headquarters located in other countries such as UK, Belgium, The Netherlands, France or Germany.

Atos Origin Commercial Strategy will consist of three key areas:

- **Technological Provision:** It will be based on the development of new applications, functionalities or modular solutions based on the SOA4ALL framework.
- **Service Provision:** It will consist of knowledge and technical consultancy services. In what knowledge services are concerned, ARI (Research and Innovation Area at Atos Origin) will spread the SOA4ALL framework in order to make it be known by other Business Development Units of Atos Origin in Europe. This situation will be possible thanks to the knowledge acquired though SOA4ALL project. Regarding technical consultancy services, Atos Origin is a full-service systems integration provider in consulting, systems integration, and managed operations, that will focus on aligning business process to IT solutions and architectures in order to provide solutions to customers by combining strategy, business and technology knowledge.
- **Further actions:** It will include dissemination and promotional activities. Atos Origin will spread the knowledge generated by SOA4ALL because of its active role in the NESSI ETP, devoted to define the industrial vision of European Software & Services. Moreover, Atos Origin is an active member of different

horizontal NESSI WG and the co-chair of the Semantic Technology WG intended to identify new challenges for semantic technologies. In this context, a special workshop concerning this subject has been proposed by this WG in collaboration with the Future Internet Symposium which will take place next September '08 in Vienna. In addition, Atos Origin, will be able to go beyond with SOA4ALL outcomes and get further impact in the long term, as active member of the NESSI Steering Committee. Moreover, Atos Origin is one of the founder of INES<sup>55</sup> in which Atos Origin is not only an active player in several INES WG but also the chair of the SEA<sup>56</sup>WG based on the research and implementation of Services Oriented Architecture in specific sectors. This privileged position of Atos Origin in this technology platform will enable the dissemination of SOA4ALL in different events, workshops and seminars held by INES, such as the Third General Assembly that took place in Mallorca last July'08.

So, the success in the deployment of SOA4ALL results into the market will depend on the combination of these commercial and complementary actions (both, at regional level and also around Europe).

#### IV. Long Term Goals

Atos Origin will try to use the know how obtained by SOA4ALL in next activities:

- Looking for new business opportunities for the SOA4ALL framework implementation within different application domains. This circumstance is already being explored in other semantic based projects such as:
  - **SeCSE**<sup>57</sup> is an Integrated Project which has the primary goal of creating methods, tools and techniques for system integrators and service providers to support the cost-effective development and use of dependable services and service-centric applications. Technically, SeCSE focuses on four areas: the specification, discovery, design, and management of services. The project is developing a set of tools and techniques which will be integrated to provide a SeCSE development environment which will be made available as open source software. Elements of the SeCSE open source development environment will be utilized in WP2 Service Deployment and Use within SOA4ALL.
  - **NeOn**<sup>58</sup> aims to dramatically improve support for ontology engineering, by developing both a reference architecture and a concrete toolkit supporting the ontology engineering lifecycle. Specifically, NeOn aims to be the foundational platform for the construction of very large semantic application by facilitating the creation, management and evolution of networks of

---

<sup>55</sup>“the Spanish Initiative for the promotion of Software and Services” <http://www.ines.org.es>

<sup>56</sup> Service Engineering & Service-Oriented Architectures

<sup>57</sup> Service Centric System Engineering, FP6-511680) <http://www.secse.eng.it>

<sup>58</sup> Life-cycle support for Networked Ontologies, FP6-027595 <http://www.neon-project.org>

ontologies. It is envisaged that this approach will dramatically improve the cost-effectiveness of large-scale ontology engineering, by removing the need for a complete integration of pre-existing ontologies in an application, which is always expensive and often unfeasible. NeOn has carried out some significant work in the overlap between ontologies and context and SOA4ALL will reuse this work in WP4 Service in Context. Four SOA4ALL partners participate in NeOn and this project is lead by the Open University, one of the SOA4ALL partners.

- Fostering work on technical aspects envisaged by SOA4ALL thanks to the close cooperation of SOA4ALL with other service oriented projects such as NEXOF-RA. As it has been mentioned above, SOA4ALL as NESSI Strategic Project is expected to provide closed contributions to NEXOF-RA, the NESSI Open Framework Reference Architecture project. NEXOF-RA will provide a Reference Architecture Model and Specification for Service Centric Systems, the core target of SSAIE (Service and Software Architecture, Infrastructures and Engineering) group.

## 7.1.2 BT Exploitation Plan

### I. Motivation

BT is involved in SOA4ALL since the project is addressing topics which will be of critical importance to telecommunications companies in the future. With the increasing tendency of service providers of all types to publish services via the web and the emergence of Web 2.0 technologies, traditional telecoms companies (telcos) are being forced to evolve. The key technological trends which demand telcos immediate response come from Web 2.0 developments. Webcos<sup>59</sup> are able to respond to changing demands and expectations in the marketplace by innovating at multiple levels, and exhibit several key characteristics, namely:

- *Web as Platform*: Platform is no longer a server or application, but exists on the web (“in the cloud”) and encompasses devices, networks, companies, etc. (cf. Google and Amazon APIs)
- *Architecture of Participation (Harness Collective Intelligence)*: Designed to encourage users to take part, to share, to customise, to connect and even to participate in future product design (e.g. user generated and tagged content – Flickr, YouTube, Delicious, mySpace, eBay, Amazon; Social networks, collaborative sites such as Wikis, Amazon reviews, etc.; customer self-service sites<sup>60</sup>; customer co-creation).
- *Network effects*: The more people use the service, the better it gets. (e.g. BitTorrent scales as more users share the network; Skype scales using their users’ CPU; digg gets more accurate as more users rate stories)

---

<sup>59</sup> Companies adopting Web 2.0 principles in their business models

<sup>60</sup> See, for example, <http://hubhub.labs.bt.com/>



- *Mashups*: Lightweight and rapid service/product composition in an open service eco-system. Increasingly, real impact-ful innovations are in smart and rapid assembly of services, rather than merely isolated component services. Hence rapid and lightweight service composition will be a key enabler to success of a digital service ecosystem (c.f. Yahoo Pipes, Developer mashups, Widgets, etc.)
- *Long Tail*: The theory of long tail, largely instigated by the Web 2.0, allows WebCo's to tap to monetise the demand from the large number of highly diverse potential customers with non-typical requirements, whereas traditionally Telcos focus their efforts on Short tail, where the majority of mainstream (hits) services and products are. Telcos can no longer ignore the revenues generated from the long-tail.

The changing needs of customers and users must also be considered as it is no longer sufficient to provide ICT services as basic commodity capabilities. Increasingly, customers demand QoS<sup>61</sup>, GoS<sup>62</sup> and now QoE<sup>63</sup> is a key differentiator. QoE effectively satisfy emotional needs of customers and users as they interact with ICT services and the “context” in which those ICT services are used. Hence, service offerings must take into account the “surrounding context”<sup>64</sup> of user's lives and seek to add and enhance basic ICT services, in such as way that users can seamlessly move from one ICT service to another, regardless of the provider of those services, or what technology platform they are offered. Such services are termed, “blended services” in contrast to conventional bundling of services. Increasing competition from the OTT<sup>65</sup> service providers - service and content providers who do not own the network they use - shows the danger for Telcos to become dis-intermediated from the digital supply chain; that Telcos become merely a commodity “dumb pipe” provider.

As WebCo's traditionally have had different business models, collecting revenues from advertising, whereas Telcos collect revenues through usage based and billing, now when these two sectors are converging, in terms of the service they offer, the challenge for Telcos is to reconcile these two different models, finding ways to generate revenue from advertising, while continue to offer billable services. As OTT provider traffic increases at a rapid rate, monetising it is a key challenge for Telcos. Considering all these aspects, by appropriately positioning themselves in the Web 2.0 world, Telcos will continue to evolve and transform themselves from “dumb” pipe providers, to “smart” pipes (connectivity with QoS and SLAs); and furthermore by exposing service enablers (e.g. BT Web21C SDK), as well as OSS/BSS APIs, they will promote creation of an open service ecosystem. This will enable Telcos, not only to create new services to address the needs of the long tail, but also, allow 3rd

---

<sup>61</sup> Quality of Service

<sup>62</sup> Grade of Service

<sup>63</sup> Quality of Experience

<sup>64</sup> Business Process

<sup>65</sup> Over the Top



party service providers to make use of Telcos underutilised OSS/BSS capabilities to create new service offerings, and hence creating new revenue streams.

## II. Linkage to activities

As one of Europe's largest Networked IT providers, BT has many activities in the general area of SOA. The closest activity to the specific focus of SOA4ALL is the Web21C service platform initiative.

## III. Long term goals

The main project outcome for BT with respect to products and services will be a semantically enhanced and expanded version of the Web 21C platform supporting internal and external user communities. Utilizing the technology developed in the various core research areas of the project it will allow BT to provide third parties access to Virtualised IT and Network resource by exposing its common capabilities to third parties, making them easy to consume, combine and share. Currently, Web21C requires detailed technical knowledge of web service languages (e.g. WSDL) and programming languages (e.g. Java) to be able to access, combine and use web services. Using Web 2.0 principles, the new Web 21C site should encourage ease of use and a low barrier to entry in utilising SOA, whilst supporting innovation and collaboration. Use of contextual knowledge will support both the composition and provisioning of services in a customized manner. The complexity for achieving this will however remain hidden from the service user and be handled in an automated fashion. BT will also take advantage of the semantically enabled improvements in provisioning, consumption and monitoring tools that will take place during the project. The case study will also enable the inclusion of third party on the Web21C platform. In the longer term, the project will in addition address several key issues for BT's transformation into Telco 2.0, including: reducing time to market; enabling integration of third party services into BT's portfolio; increasing New Wave revenue and extending BT-wide SOA to the web. A further outcome of the project for BT will be a better understanding of likely business models for Telco 2.0.

### 7.1.3 SAP Exploitation Plan

#### I. Motivation

SAP is the world's largest inter-enterprise software company, and SAP solutions help enterprises of all sizes around the world to improve customer relationships, enhance partner collaboration and create efficiencies across their supply chains and business operations. SAP Research is the global technology research unit of SAP. The group significantly contributes to SAP's product portfolio and extends its leading position by identifying and shaping emerging IT trends through applied research and corporate venturing. SAP Research tracks technological trends, evaluates the potential impact on SAP solutions and customers, and generates breakthrough technologies. The business environment changes much more quickly today than a decade ago. In order to remain competitive, companies have to constantly evolve business strategies and operations. Thus, the technologies of Web services and enterprise service-oriented

architecture (enterprise SOA) were developed to pave the way for easy application integration, through the provisioning of Web services as integration units. SAP provides both the services themselves for different sectors as well as a services platform (SAP NetWeaver<sup>66</sup>) for integrating SAP and non-SAP applications. Despite the success of enterprise SOA, several challenges remain, e.g., how to easily and dynamically assemble new applications by composing existing software services that are hosted by different services providers so that a composite application can be developed with much less time and effort. SOA4ALL addresses this challenge by integrating several research fields (open Web principles, Semantic Web, Web 2.0, and context management and personalization) with the SOA vision to facilitate a dynamic and open service ecosystem where large numbers of services providers and consumers interact. Within SOA4ALL SAP Research will focus on the integration of such technologies with existing enterprise service delivery platforms. Thus, SOA4ALL plays an important role in facilitating the future technical leadership of SAP. The business model of SAP Research is based on co-innovation through collaborative research with leading universities, partners, customers, and SAP product groups. As an integrated European project, SOA4ALL is therefore the ideal platform for SAP to exchange ideas, build a common vision, and develop technologies for cross-organizational SOA.

## II. Linkage to activities

- **Business Activities:** SAP offers a broad range of business solutions for 26 different industries: applications for large enterprises (SAP Business Suite including ERP and CRM<sup>67</sup> (applications for Small and Midsize Enterprises (Business One, Business ByDesign), and platform technologies (SAP NetWeaver. SAP NetWeaver is the SOA-based integration and application platform of SAP, provides the development and runtime environment for SAP applications, and can be used for custom development and integration with other applications and systems. The platform incorporates business functionality – exposed as ready-to-use enterprise services and process components – through its enterprise services repository. It also provides an integrated platform of composition technologies for orchestrating business processes, and composing and deploying applications. The results of SOA4ALL will help to further improve the interoperability, scalability, and usability of NetWeaver. Moreover, the use case addressed in WP7 will contribute to the industry-specific SAP solution for the public sector.
- **Research Activities:** SAP Research is a worldwide organization that partners with universities, industrial partners, research institutes, governments, customers, as well as various development units within SAP. Following a multi-tier approach to achieve optimum research results, SAP Research coordinates its research agendas with strategic partners and is involved in a large number of joint national and international research projects. To coordinate different projects, SAP

Research is driving several international initiatives (e.g., NESSI) and advisory boards (ISTAG<sup>68</sup>, CIP<sup>69</sup>). For internal cross-project collaboration, SAP Research has an

---

<sup>66</sup> Technical foundation of SAP Business Suite solutions

<sup>67</sup> Customer Relationship Management

<sup>68</sup> Information Society Technologies Advisory Group <http://cordis.europa.eu/ist/istag.htm>

installed a global research program management. The SOA4ALL project team therefore regularly meets with researchers from related projects to guarantee the exchange of results across projects.

### III. Specific Plan

The exploitation plan of SAP Research is to transfer knowledge and results from research projects into the product development branch of SAP. Product development ranges from technical infrastructure, application infrastructure to industry solution and business consulting groups. Such transfers are carried out jointly with SAP Product Development groups. Successful transfers might then lead to new or improved products that will be available to SAP customers in the future.

With respect to SOA4ALL SAP Research will exploit the projects' results in several directions. First, we will investigate how the methodologies, technologies, tools, and standards developed in SOA4ALL may help to improve SAP's current enterprise SOA platform NetWeaver, in particular with respect to the lightweight composition of business processes for non-technical end users. Second, the use case of WP7 will implement a prototype that demonstrates the value of SOA solutions in general and SOA4ALL technologies in particular for the public sector. Together with SAP's business unit for the public sector, SAP Research plans to show this demonstrator to selected pilot end users.

### IV. Long Term Goals

SAP Research has the following goals:

- To participate in shaping the Service-Oriented Architecture of the future.
- To acquire new knowledge and technologies for improving existing or developing new SAP products.
- To demonstrate the business value of SOA (4All) technologies in the public sector.
- To maintain and extend its network of academic and industrial research partners

#### 7.1.4 TXT Exploitation Plan

##### I. Motivation

TXT e-Solutions is a private, mid-sized software vendor and system integration company, focusing on two main business areas:

- Software solutions for the extended Value Chain for industry (Fashion, Retail, Consumer Goods, Automotive, Aerospace, Media, Telco, Banking), including the areas of Demand & Supply Chain Management, with a products suite called TXTPERFORM®.
- Multi-channel Content Management for broadcasters, media and telecommunications with a full suite of software solutions and services, based

---

<sup>69</sup> Competitiveness and Innovation Framework Programme

on TXT Polymedia® platform, a complete and flexible software solution for Digital Content Management in Multi-channel mode.

A continuous monitoring of the technologies and of their evolution, a tight relationship with the academic world, through co-operation agreements with leading Italian and European, universities, and yearly investments in R&D in the range of 15% of the turnover contribute to maintain TXT at the leading edge.

TXT sees involvement in European R&D programs as an important opportunity to create know-how on both technology and application domains and to develop new kernel products and new services for its clients, therefore contributing significantly to its market success and to its business development. TXT has an outstanding track of records in coordinating international projects and in transforming R&D results into new business. Considering that both TXTPERFORM and TXT Polymedia are now evolving towards Service-oriented architectures and implementations, and aiming at a better interaction with end users TXT believes that innovative research that SOA4ALL is aiming at in the areas of SOA, Web2.0, Semantics and user-context can help to improve and strengthen the functionalities offered by such platforms, and thus help the company to achieve a more competitive position on the market. Finally, TXT is member of NESSI.

## II. Linkage to activities

TXT is currently involved in three technical work-packages in SOA4ALL. Each of them is related to a particular technology that can complement and enrich TXT product offer:

- On WP1 TXT is collaborating to the development of the Semantic Space and its relationship with Web2.0 technologies.
- On WP2 TXT is contributing to the provisioning / consuming platform with the development of a personalized service advertising mechanism, based on a consensus-driven approach.
- On WP6 TXT is contributing to process generation component thanks to process mining technologies.

In order to have a better chance to assess and evaluate such technologies, in WP9 TXT is developing a C2C use-case, based on the use of TXT Polymedia Video platform in a “Social Internet TV” scenario. More in particular, semantics is expected to bring benefits in the annotation and retrieve of multimedia content information; Web2.0 is expected to enhance users’ participation and to support users’ communities (many broadcasters are aiming at creating their own users communities); automated process generation will help in supporting the video production workflow, and finally process advertising will help end-users to find and select the best services they need to create their own customized video services

## III. Specific Plan

The **CRS TXT Division**<sup>70</sup> is in charge of medium-to-long term research activities and is / has recently been active in several collaboration projects at Regional, National

---

<sup>70</sup> Corporate Research and Innovation

and European level. Its main goal is to contribute to product/process/services innovation to TXT commercial units. The unit acts also as a validation environment for the results of R&D projects, both from a technical and commercial perspective, thanks to a tight collaboration with the commercial units.

The first exploitation step about SOA4ALL results will thus be to support an internal integration process with the TXT Polymedia and TXTPERFORM product suites. Due to the different nature of these products and their degree of maturity in the adoption of SOA technologies, TXT will firstly focus on the Polymedia Video platform, and then address the other platforms in the Polymedia suite and the TXTDEMAND product in the TXTPERFORM suite. TXT does not plan to change its core business model in the offer of such platforms, based on license fees with additional customization and integration services linked. Thanks to the adoption of the SOA4ALL results TXT products will be more competitive and better addressing end customer needs, so TXT is expecting an increase in the revenues generated by such platforms.

#### **IV. Long Term Goals**

On the longer term, TXT is aiming at a full adoption of SOA-related technologies, and to continue in R&D activities in the areas of semantics, Web2.0/3.0/4.0 evolution, context management in order to constantly maintain its products with cutting edge technology, in order to support future and innovative business scenarios and to be able to provide best solutions to customers needs.

## **7.2 SME's Exploitation Plan**

### **7.2.1 EBM Exploitation Plan**

#### **I. Motivation**

EBM WebSourcing is an open-source editor for SOA solution. We decided to participate to SOA4ALL in order to support our research and development activities. We think SOA4ALL is the right place to study next generation service platform that merge concepts coming from available service infrastructure technologies and semantic.

#### **II. Linkage to activities**

EBM WebSourcing provides PEtALS<sup>71</sup> Enterprise Service Bus and Dragon distributed semantic registry. We are also working on the 6Napse collaborative platform which is based on Web 2.0 and social network principles. These projects are supported by the following French funded ANR projects: SEMEUSE<sup>72</sup> that deals with semantic ESB<sup>73</sup> and dynamic orchestration. EBM is also involves in the SYNERGY<sup>74</sup> IST FP7 project that deals with knowledge oriented collaboration.

---

<sup>71</sup> <http://petals.objectweb.org>

<sup>72</sup> <http://ralyx.inria.fr/2007/Raweb/arles/uid118.html>

<sup>73</sup> Enterprise Service Bus

<sup>74</sup> <http://www.synergy-ist.eu>



### III. Specific Plan

According to the knowledge we have now, we plan to extend in the scope of SOA4ALL, PEtALS ESB as a JBI<sup>75</sup> compliant lightweight highly distributed service infrastructure based on a federated architecture. This solution will be provided in open-source and supported by EBM thanks to a subscription business model. The Dragon registry will also be extended in order to support different kind of semantic description (SAWSDL<sup>76</sup>, WSMO) and to address large scale distribution.

### IV. Long term goals

Our long term goals are to participate to a fruitful ecosystem that pave the way to next generation SOA technologies. This gives us competitive advantage in regards to our main competitors in both close and open source world.

#### 7.2.2 Hanival Exploitation Plan

##### I. Motivation

Hanival's chillydomains webhosting platform offers a high level of automation, modern Web service interfaces for connecting to third party providers and resellers and localized services (e.g. national payment methods, scoring services) with added value services (e.g. photo galleries, collaborative services). Hanival is steadily expanding its range of products for chillydomains customers, and strives to combine product innovation with its research activities, as the foundation of its operative business. Furthermore, Hanival has been conducting research for several years and has been active in various projects, both on the national and European level. From these projects, Hanival has gained a lot of experience with semantic technologies and web service based service oriented architectures. Previous projects of Hanival included the Six Framework Program projects ASG<sup>77</sup>, DIP<sup>78</sup> and SUPER<sup>79</sup>. These projects focused on data, process and information integration and business process management supported by semantic technologies, respectively. In SOA4ALL Hanival contributes to and drives the C2C e-Commerce use case. The chilly domains webhosting platform is seen as a suitable infrastructure to build innovative applications, which combine a large number of configurable and customizable services with Web 2.0 based approaches in order to present our end customers with flexible applications. Hanival will deploy SOA4ALL services and applications in this Information Technology landscape in order to provide a suitable environment in which to test project results, and to involve its customers and service providers for

---

<sup>75</sup> Java –business Integration

<sup>76</sup> Semantic Annotations for WSDL Working Group

<sup>77</sup> Adaptive Service Grid, <http://asg-platform.org/cgi-bin/twiki/view/Public>

<sup>78</sup> Data, Information, and Process Integration with Semantic Web Services <http://dip.semanticweb.org>

<sup>79</sup> Semantics Utilised for Process Management within and between Enterprises <http://www.ip-super.org/>



validating and evaluating SOA4ALL technology.

In addition, Hanival is interested in the objectives of the SOA4ALL project, since its activities already include plans for establishing C2C e-Commerce based on its the chillydomains webhosting platform. These plans are underway and will be synchronized with the development of SOA4ALL.

## II. Linkage to activities

Hanival is providing a use case for WP9, the C2C Service e-Commerce. This use case is based on Hanival production environment for its ISP webhosting platform. We expect to enhance our product offers for this platform and to provide a service platform to our end customers, enabling them to become providers themselves by selling services and products to other parties. Currently, Hanival is involved in the FP6 SUPER project, which provides a perfect framework for the SOA4ALL activities, as it includes many important results involving semantic technologies and business process management. These results can be combined with the development occurring in SOA4ALL as many of the order fulfillment and billing processes in our webhosting platform are orchestrated by processes and use the same services we plan to provide for the C2C e-Commerce solution. Thus, a semantic annotation of said services would directly benefit our exploitation of SUPER project results as well. Finally, Hanival is a NESSI member and also active in the OASIS SEE<sup>80</sup> technical committee.

## III. Specific Plan

During the duration of the project, Hanival will build a prototype application based on SOA4ALL technology. Results from SOA4ALL are interesting for Hanival for our product development strategy. Picking up the prototype and relevant project results, Hanival will be able to continue the development to get to a commercially viable application framework which can be sold to our customers.

## IV. Long Term Goals

The long term strategic goals for Hanival's SOA4ALL involvement are as follows:

Hanival is always expanding the product options for its chillydomains customers, including new and innovative tools and applications integrated with the customers' webspace. A new e-Commerce application is planned for the future, and this development will be conducted in accordance with the SOA4ALL project results, providing both a testing ground as well as a venue for the exploitation of SOA4ALL results. In addition further innovative product ideas might result from our involvement with the other use case scenarios, both in WP9 and the rest of the project.

### 7.2.2 iSOCO Exploitation Plan

#### I. Motivation

**iSOCO** has a well-known trajectory in the semantics and services communities, as

---

<sup>80</sup> Semantic Execution Environment

shown by our participation and investment in a large number of EU-funded projects across the successive FPs. Our motivation within these projects has always been to invest on research, anticipating current and future needs of the market, and putting a special emphasis on the transfer and exploitation of the technology and methods developed during such projects. This has been internalized in our corporate strategy as part of our product and service lifecycle.

In this regard, we at iSOCO believe that the application of semantic technology to the current web standards can have a large impact on the networked economy. Semantic technologies can further evolve the current Web 2.0 paradigm based on collaboration between people, easing the transition to a new paradigm (Web 3.0) that guarantees the scalability and functionality of such a content and collaboration intensive Web. Further on, we believe that the results of SOA4ALL will provide the basis for a new turn of the screw, incorporating services into this vision, allowing people and companies to consume and produce services using the web as a platform, beyond current organization-internal SOA architectures.

iSOCO's main interest in SOA4ALL lies on the design and development of the required infrastructure in order to support the scenario described above. Such vision includes three main dimensions: service provisioning, consumption, and analysis, supported by another one, orthogonal to the other three, which is context. In a nutshell, the upcoming economy needs means that allows supporting users in modelling and informally annotating their services and service mash-ups on the web, favouring the exploitation of such services by users themselves, and allowing users to understand the execution of such services (key in a scenario where millions of services of diverse provenance are envisaged to be available). Our work in SOA4ALL will hopefully provide iSOCO with a privileged position to fulfill such needs

## II. Linkage to activities

As a solution provider, we expect to provide our customers with both guidance and new channels that contribute to developing their businesses in a collaborative Web 2.0 (and further on) scenario with the potential of reaching and engaging millions of users in their services. We expect to enhance our solutions with better, more usable, community-oriented and context-aware interfaces, that facilitate the exposition, exploitation, and analysis of our customers' services on the web as a platform. iSOCO is currently active in the following EU projects: ACTIVE<sup>81</sup>, SUPER, NeON, and VALUE-IT<sup>82</sup>, which reflect quite clearly our interest in the world of semantics and services. While NeOn aims at consolidating the European top-notch semantic technologies in the next-generation ontology management toolkit, in ACTIVE we intend to take our expertise in that field in order to support knowledge workers' collaboration in the current economy. This is extremely in-line with the objectives of SOA4ALL, where collaboration is key. Additionally, SUPER provides many of the pillars combining semantics and services in the enterprise domain, upon which

---

<sup>81</sup> <http://www.active-project.eu>

<sup>82</sup> Establishing Dynamic links between research and business environments

<http://value-it.isoco.net/web/guest/home>

SOA4ALL is grounded. In our RTD activities, we find provenance as a key factor, also in SOA4ALL, where millions of services will be posted and exploited by users, hence requiring a guarantee of trust and compliance with their expected behaviour. iSOCO started researching in provenance in the EU FP6 project OntoGrid and is continuing this activity in SUPER, ACTIVE, and SOA4ALL

Finally, VALUE-IT deals with transferring semantic technology to the market, clearly showing our vocation for transference and innovation. iSOCO is partner and investor of initiatives like STI International, NESSI, the European Technology Platform, and its Spanish equivalent INES, where we lead the working group on evolution of the Web. iSOCO believes current RTD efforts within Europe need to be aligned towards exploitation in the mid-term, providing solutions that can be quickly transferred to the market with a high impact.

### III. Specific Plan

iSOCO is a solutions company with innovative products and services for businesses. The business model consists of a mixture of licenses on our software products and services. iSOCO will gradually incorporate SOA4ALL results into their commercial portfolio, in sectors like Finance and Telco. However, this will be done on a step by step basis, ensuring the required maturity of the different bits, that allows to build commercially-sound products and solutions. In a commercial basis, there are four different types of products and offers that iSOCO will provide to their customers:

- **Training**, explaining key issues of applying SOA4ALL technology and methods for exposing, exploiting and analyzing their and others' services on the web, as well as real experiences in customers.
- **Consultancy and technical support**
- Demonstrate track record and implement **partial solutions** based on SOA4ALL software.
- Design of **complete solutions** applying SOA4ALL methods and techniques for end users.

The four different offerings have different revenue models. Training and consultancy are based on person hours (services). Partial and complete solutions will run both on licenses and services.

### IV. Long Term Goals

As a result of this strategy, our product and solution portfolio will be endowed in the mid-term with capabilities that help our customers in developing their businesses in a collaborative service-intensive, Web scenario with the potential of reaching and engaging millions of users in their services. Our solutions shall be enhanced with better, more usable, community-oriented and context-aware interfaces, that facilitate the exposition, exploitation, and analysis of our customers' services on the web as a platform. Additionally, we will be enabled to provide our customers with consultancy on the best ways to achieve such goals.

#### 7.2.3 SEEKDA Exploitation Plan

Seekda is developing the first Web Service Search Engine based on focused crawling, allowing access to publicly available Web Services. The affiliated Seekda

Web Service Marketplace will allow to trade services usage rights in a one-stop-shopping manner across different providers. Seekda simplifies purchases across different providers and unifies the usage of services in bundles. The current Web Service market is very in transparent and centered around atomic service offering. Seekda addresses the need of solutions for real world business problems comprised of multiple services, by allowing the creation of service bundles. Interoperability issues between different providers are handled by the marketplace, which allows seamless exchange of providers and reduces integration costs for our customers.

### **Business Model**

Seekda business model is based on a per usage based sales of services. Seekda simplifies purchases across different providers and unifies the usage of multiple services within bundles. Therefore, Seekda will operate a marketplace enabling the buying and selling of services. The SOA4ALL project results will be exploited in two major ways. First, the experiences gained and technologies developed within the service annotation tasks will be applied to the market place in order to offer customers more powerful search operations. Second, Seekda will operate a global Web Service search engine, which shall become the focal point of interest for the community interested in the usage of Web Services. We plan to integrate the results obtained in this research project into the search platform in order to make it more attractive. Revenues will be generated in different ways, first all services available on the Seekda marketplace will be prominently linked, but also other revenue models including third party providers paying for a placement are possible. Seekda expects major improvements of the crawler and the annotation of web service for its search engine and market place through SOA4ALL.

## **7.2.4 SIRMA Exploitation Plan**

### **I. Motivation**

Application of Semantic Web technologies is the core vision of Ontotext Lab / Sirma. Our company is among the leading solution providers in the field, with a product portfolio comprised of a wide range of products for:

- Scalable reasoning
- Semantic annotation
- Information extraction & retrieval
- Semantic Web Services and Semantic Business Processes

The SOA4ALL project presents a unique opportunity to Ontotext / Sirma for evaluating and enhancing our existing Semantic Web Services and Semantic Business Processes tools in the context of large scale Web 2.0 based services, as well as gaining a valuable experience in applying advanced Semantic Web research & technologies in this domain.

### **II. Linkage to activities**

Ontotext / Sirma is currently involved in several EU projects, among which are:

- SUPER (FP6-IP-026850) - Application of Semantic Web Services technologies for semantically enhanced Business Process Management.
- TripCom<sup>83</sup> (FP6-STREP-027324) – Developing of semantic spaces as a new communication infrastructure for Semantic Web Services
- SemanticGov<sup>84</sup>(FP6-2004-IST-4-027517) – application of Semantic Web Services for the public administration domain.
- TAO<sup>85</sup> (FP6-IST-2004-026460) – Application of Semantic Web Services for the migration of legacy applications to SOA.

Our company is entering the SOA4ALL project with an *extensive expertise* in the area of Semantic Web Services and Business Processes, as well as a portfolio of *Open Source products* for these technologies.

### III. Specific Plan

The concrete exploitation strategy of the company includes two major activities:

- R&D services for early adopters
  - Developing of open source tools for early adopters of Semantic Web technologies, in order to reduce the time and cost associated with introducing these technologies to concrete industry solutions
  - Position itself among the leading tool providers for tools & infrastructure for Semantic technologies
- Consultancy services
  - Assisting companies that are evaluating or adopting Semantic Web technologies for their platforms and services, based on the expertise gained on SOA4ALL and other IST projects
- Development of custom components

Support the integration and adaptation of our open source tools & infrastructure for Semantic services and processes within 3<sup>rd</sup> party products

### IV Long Term Goals

As result of our participation in the project, our product portfolio will be extended with new Web2.0 based capabilities as well as applied in the context of large scale service generation and consumption. Such opportunities for improvement and application are crucial for the development of prototypes and products for a new and

---

<sup>83</sup> Triple Space Communications <http://www.tripcom.org>

<sup>84</sup> [www.semantic-gov.org](http://www.semantic-gov.org)

<sup>85</sup> Transitioning Application to Ontologies <http://www.tao-project.eu>

emerging domain, such as the Semantic Web, where the requirements of the end customers are most often not clear in advance and where the technology itself is still not mature and evolving at a rapid rate.

## 7.2.5 TIE Exploitation Plan

### I. Motivation

**Semantics.** TIE was founded by building and selling a syntactical EDI translator over 20 years ago but we quickly realized that syntaxes would come and go and in any case were not the challenging, value-added and differentiating part of the problem of linking two partners together – semantics are. Thus, since TIEs beginning we have been highly active in the semantics field including chairing the likes of CENs e-Business standardization forum, the United Nations e-Business activity - UN/CEFACT and Chairing groups which manage the creation and development of EDI and ebXML semantic based standards.

- **SOA:** In addition to semantic interest, for the past 4-5 years TIE has also been active in the wider SOA field. Firstly by keeping abreast of the SOA related technologies as they emerged starting with the classic webServices stack of HTTP<sup>86</sup>, SOAP<sup>87</sup>, WSDL<sup>88</sup>, XML<sup>89</sup>, UDDI<sup>90</sup> (which is also linked with ebXML technical activity) and lately we are in the midst of reengineering our primary product range, TIE Kinetix, to adopt SOA approaches.
- **Integration:** Bringing together different systems and connecting them in an interoperable way has always been one of TIEs main playing fields. We are highly active in several activities in this area (EU projects, IBIS Journal, etc.). TIE addresses this topic from two ways, a technical way (with the TIE Kinetix platform) and a social view (with the Digital Channel approach), allowing companies to directly interact with customers along the full product lifecycle.
- **NESSI:** TIE is a partner and investor in the European Technology Platform “NESSI” where we lead the NESSI ICT SME group. TIE has invested here because it believes current RTD efforts within European are a) Too Academic, b) Too Duplicating, c) Not “Joined Up”. These factors are particularly important for SME’s who require solution today, solutions which are straight forward and finally solutions which are part of overall frameworks which can have influence. Thus, this combination of Semantic, SOA, Integration and NESSI is a basis for TIE and correspondingly the basis for SOA4ALL which is why TIE is highly motivated to participate in this project.

## II. Linkage to activities

---

<sup>86</sup> Hypertext Transfer Protocol

<sup>87</sup> Simple Object Access Protocol

<sup>88</sup> Web Service Definition Language

<sup>89</sup> Extensible Markup Language

<sup>90</sup> Universal Description, Discovery and Integration



## Product Link

TIEs products are focused around Master Data Management, B2B interoperability and Digital Channel marketing. Until recently the products were relatively independent even if they used common functions and GUI styles. However, increasingly our customers (mainly SME-medium sized companies) have been looking for two things: Software-as-a-Service (SaaS) and Flexibility and Seamless functional integration with Workflows and Dashboards. TIE has coupled these ideas into a concept which we now call TIE Kinetix and we have started the process of service enabling and joining these applications/functions through more basic web Services. However, we also wish to explore further in terms of how we might influence and support a full SOA architecture in this and hence our participation in both SOA4ALL and NEXOF-RA (as mentioned below). Indeed Kinetix will form the basis of TIEs proof of concept activities in both projects.

## RTD Project Link

TIE is also currently active in the following EU projects: STASIS<sup>91</sup>, NEXOF-RA and the NESSI2010<sup>92</sup>. As can be imagined, there is a strong link between STASIS and SOA4ALL and initial project cooperation discussions (SOA4ALL 2nd Plenary) have already started since the projects scopes are complementary. With respect to NESSI2010/NEXOF these projects also sit in the NESSI arena and we believe that TIE involvements in all 3 can facilitate our 'joined up' goals as mentioned above.

## Standards Link

Being active in semantic and infrastructure standardization as TIE is through CEN<sup>93</sup> and UN/CEFACT<sup>94</sup>, TIE is constantly reviewing and participating in initiatives that can allow skills learning and cross fertilization. Thus we hope the link between the EDI<sup>95</sup>/ebXML<sup>96</sup> community and SOA4ALL can generate good insights in this area.

## Publication Link

As one of the founding members, TIE is participating in IBIS<sup>97</sup>, which links to the main ideas and concepts that are focused in the SOA4ALL project. We will use our knowledge in this area for SOA4ALL as well as the connections to other experts in this research area.

## III. Specific Plan

Both during, and at the end of the project, TIE will utilize the ideas, concepts and software itself in our products where appropriate. In terms of the specifics this is too

---

<sup>91</sup> Software for Ambient Semantic Interoperable Services <http://www.stasis-project.net/>

<sup>92</sup> <http://www.nessi-europe.eu/Nessi/Projects/SupportingProjects/NESSI2010/tabid/351/Default.aspx>

<sup>93</sup> Normalization European Committee

<sup>94</sup> United Nations Centre for Trade Facilitation and Electronic Business

<sup>95</sup> Electronic data Interchange

<sup>96</sup> Enabling A Global Electronic Market <http://www.ebxml.org/>

<sup>97</sup> The International Journal of Interoperability in Business Information Systems

early to say since the project has only just initialized but concepts such as the service construction or the service monitoring part can clearly be integrated. This will then enable our products (through either design or re-use) with state of the art service technology which will be appealing and vital to our customer base both as products and SaaS.

#### IV. Long Term Goals

The long term strategic goals of SOA4ALL involvement are as follows:

**Product based:** Inclusion of SOA concepts/experience/software in TIE Kinetix – as described above.

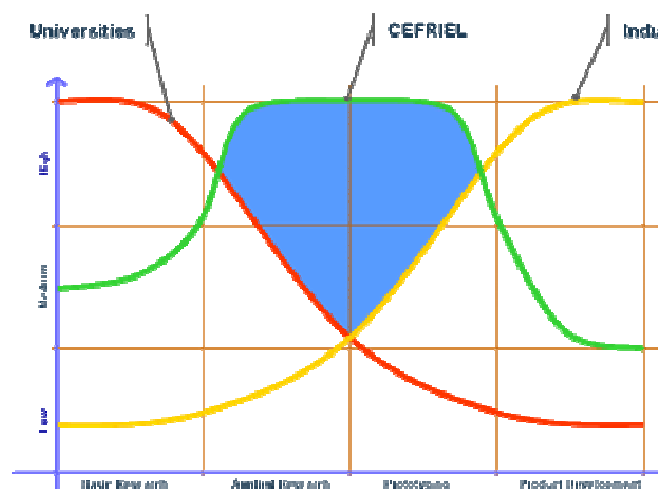
**People/Organization based:** As a typical SME, TIE finds it difficult to invest in RTD since often short term issues take the focus and in particularly the bottom line finances have a dominant role and to an accountant RTD is pure cost. This is both an organization/product development issue but also a people issue since it means existing developers/researchers can become stagnant / bored and equally it is difficult to attract inspirational new staff in a non inspirational atmosphere. Thus to counteract this, TIE staff participation in projects such as SOA4ALL checks many tick boxes since it allows new/old staff to be rotated around and work on new technologies and concepts, contribute and of course feedback into TIE. This improves TIE, our products and the individuals experience, knowledge and their CV. We consider this a very strong win-win-win situation.

### 7.3 Academia Exploitation Plan

#### 7.3.1 CEFRIEL Exploitation Plan

##### I. Motivation

To understand CEFRIEL's objectives for exploitation, it's important to know the business model of the center. CEFRIEL mission is to fill the gap between the university research activities and the innovation needs of industries and public administrations. CEFRIEL value proposition and its relationship with academic and industrial partners are illustrated in the following picture:



Universities are typically devoted to basic and applied research. Industries focus is mainly on product development and distribution. Even if there is an increasing overlapping among these phases, the distinction of roles still holds and may create a barrier to the effective industry-academia cooperation and the ability to transfer research results to the market. CEFRIEL role aims at filling the gap.

CEFRIEL mission is to be the ICT innovation enabler. Industries and public authorities need a support to inject innovative technologies into their products, services and processes. This mission is pursued for companies developing ICT (primary ICT industries), and for industries and administrations that customize, adapt, and in general exploit ICT to create new products and services (secondary ICT industries). CEFRIEL has been conceived and structured to pursue this mission. The activities carried out by the center can be summarized as follows:

- Participation to European and national research initiatives.
- Technology watching and scouting.
- Development of new innovative technological systems.
- Integration of research results and innovative technologies into existing products and services.
- Innovative education programs.

CEFRIEL innovation and education activities are carried out for private and public companies through specific contracts, with the required and agreed level of IP management and protection.

The participation of CEFRIEL in SOA4ALL project is a concrete example of the strategy previously discussed. From a first preliminary study, the major opportunities are described in the following activities:

- Consultancy activities for ICT companies in order to create concrete innovation from SOA4ALL research results.
- Training activities for professional and post-graduate students to stimulate the adoption of semantic technologies in the context of process management.

## II. Linkage to activities

Innovation can be defined as the application of research results, innovative technologies, new processes, advanced business strategies and models for the creation of novel products and services. Innovation is significantly different from research. The goal of research is to “push the envelope” and increase knowledge capital. When doing research, we invent new things. Conversely, the goal of innovation is to improve the competitiveness and effectiveness of an organization. This might require the exploitation of some inventions, but in general it is much more than just creating some new knowledge. The opportunities described in the following sections aim to create innovation.

### Opportunity 1

**Consultancy activities for ICT companies in order to create concrete innovation from SOA4All research results.**

CEFRIEL proactively support the innovation adoption process of private and public companies through the *InnoLab* initiative. This is an innovative program developed by CEFRIEL to boost innovation within organizations through a new cooperative model that enhances the cooperation between CEFRIEL and its community of clients and partner companies. In particular, the know-how and expertise acquired by CEFRIEL in the SOA4ALL research project can be exploited into innovation labs.

**Result benefit:** Through the InnoLab program, CEFRIEL demonstrates its ability to be a proactive actor in innovation process. InnoLab activities costs and risks are shared between CEFRIEL and the companies participating as partner to the program. InnoLab implements a win-win approach. CEFRIEL's risk associated with the sharing of concept development costs can be balanced by the opportunity to develop joint full-scale projects exploiting some of the identified ideas. The partner organization takes advantage of CEFRIEL background knowledge. In this way the organization can explore a number of ideas and opportunities, focusing its investment on those that are perceived as more promising and feasible.

**Result impact:** The InnoLab model is based on three kinds of activities that are iteratively and continuously carried out by CEFRIEL for the supported organization:

- Analysis and evaluation of organization's needs and requirements. This activity is carried out by interacting with a number of key managers and specialists of the supported organization.
- Technology watching and scouting. This activity aims at constantly monitoring the state of technology, the significant trends, and the most promising and effective solutions proposed on the market.
- Concepts development. This activity aims at developing new concepts and prototypes, reusing results of SOA4ALL project, that illustrate how to exploit emerging technologies and techniques to address organization's needs and requirements. The basic idea is to create visible artifacts that can concretely illustrate the ideas and concepts qualifying an innovation opportunity. The development of concepts helps the supported organization evaluate if the innovation opportunity is feasible and able to meet the identified problems and needs. It is also instrumental to define the project roadmap that will lead to the development and exploitation of the concept into a product/service.

**IP protection:** CEFRIEL innovation and education activities are carried out for private and public companies through specific contracts, with the required and agreed level of IP management and protection.

## Opportunity 2

**Training activities for professional and post-graduate students to stimulate the adoption of semantic technologies in the context of process management.**

**Teaching graduates and professionals means to find out opportunities for matching** ideas and knowledge about innovative research and innovation topics. In its educational programs, CEFRIEL uses a methodology that matches the characteristics of the centre: operating throughout short-term research, innovating

the education contents and teaching methods, and responding by targeting the specific business needs.

**Result benefit:**

- Improvements of courses quality.
- Direct income from courses activities.

**Result impact:**

- Courses program more innovative and attractive for participant.
- Improvement of CEFRIEL's professor knowledge.

**IP protection:** Copyright on teaching materials used in CEFRIEL courses. In the next months CEFRIEL will proceed to make dissemination of SOA4ALL results. This action is fundamental to create the consciousness that enables CEFRIEL's opportunities. Concretely, these activities will be carried up through publications and participations in conferences.

**Actions planned for exploitation of results**

In order to apply all the goals previously described, the first step is to analyze the research results coming from SOA4ALL and define concrete application to CEFRIEL's customers.

**III. Long term goals**

In SOA4ALL CEFRIEL will bring its expertise in semantics, distributed systems, and security. A multidisciplinary working group, composed by people from Data Management, Middleware and Software Engineering competence centers, has been active on these topics since 2000 through a mix of research, innovation and education actions typical of CEFRIEL's mission. The group is currently involved in European and national projects related to the Semantic Web and Distributed Systems such as:

- **SUPER (FP6-IP-026850)**, which aims at extending Semantic Web Services in the direction of Business Process Modeling and Execution.
- **TripCom (FP6-STREP-027324)**, whose goal is developing a new communication infrastructure for Semantic Web Services and where CEFRIEL is leading the security activities.
- **NeP4B<sup>98</sup> (FIRB-2006)** which aims at developing a net of semantic peers to foster ICT-based business among SMEs.
- **COCOON<sup>99</sup> (FP6-IP-507126)**, which aims at setting a up semantics-based healthcare information infrastructure for Primary Care.

---

<sup>98</sup><http://dbgroup.unimo.it/nep4b/en/index.htm>

- **SEEMP<sup>100</sup> (FP6-STREP-027347)**, which aims at deploying a pan-European marketplace for the e-employment that exploits the concepts of services and semantics.
- **SECSE (IST Project 2004-511680)**, focused on service centric system engineering.
- **@Terminals<sup>101</sup> (ITEA if99030, terminated in December 2002)**, focused on adaptation of contents and applications to the end-user devices characteristics.
- **UWA<sup>102</sup> (IST Project IST-2000-25131)**, focused on requirements analysis, hypermedia design, transaction design, and adaptability design for complex and ubiquitous Web applications.
- **MOTION<sup>103</sup> (IST Project 1999-11400)**, focused on developing and validating a distributed, multi-service e-Work architecture to support collaboration and distributed working methods.
- **WIDE<sup>104</sup> (IST Project 2001-34417)**, that aims at developing a distributed, heterogeneous knowledge management system based on Semantic Web principles and focused on the industrial design application domain.
- **Future Home <sup>105</sup>(IST Project 2000-28133)** focused on making available and integrating all the devices and services available in a restricted environment (the house, the office.). In the light of the research activities mentioned above, the long term strategic goals with regard to the work CEFRIEL have been involved in during SOA4ALLare:
  - Take the opportunity for convergence of different research themes (mainly in the field of semantics and service engineering) that SOA4ALL offer.
  - Put together and to develop, in a very valuable way, different results achieved in previous research projects.
  - Foresee new research themes and to feed CEFRIEL research interests with new challenges, since research itself is a strategic asset for CEFRIEL.

---

<sup>99</sup> <http://swa.cefriel.it/Projects/COCOON>

<sup>100</sup> Simple European Employment Market-Place <http://www.seemp.org/>

<sup>101</sup> [http://symposium.itea2.org/symposium2006/main/publications/Project%20leaflets/@TERMINALS\\_results\\_oct-03.pdf](http://symposium.itea2.org/symposium2006/main/publications/Project%20leaflets/@TERMINALS_results_oct-03.pdf)

<sup>102</sup> <http://www.ist-world.org/ProjectDetails.aspx?ProjectId=5a8ceacc7cfe4f4aa29c934de642c035>

<sup>103</sup> <http://www.ist-world.org/ProjectDetails.aspx?ProjectId=5e3d0cc5b2f24294a8afab1d6fba8be2>

<sup>104</sup> <http://www.ist-world.org/ProjectDetails.aspx?ProjectId=ec5df3fbfee047dca01d82fa758b02da>

<sup>105</sup> <http://www.ist-world.org/ProjectDetails.aspx?ProjectId=3013651ff10f450e82ab028bf01f1bf>



## 7.3.2 INRIA Exploitation Plan

### I. Motivation

INRIA, as an academic partner, and innovation actor in the ICT field, participates to SOA4ALL project both for supporting research and development activities, and for valorization and transfer of technologies, through the Open Source channel.

INRIA brings expertise, skills, and technology related to open source distributed middleware, around component based software engineering, grid computing and SOA platforms and frameworks.

INRIA is member of NESSI, represents OW2 consortium within the NESSI SC, and participates to the newly created OSS WG.

INRIA is represented in SOA4ALL by three teams: the ADAM<sup>106</sup> and OASIS project-teams, and OW@INRIA development team.

### II. Linkage to activities

In relation with the SOA4ALL project, INRIA will go deeply into research works and will develop technologies related to several core middleware components and topics: the Fractal component model, and an extended version geared at Grid programming (i.e. the Grid Component Model), platforms supporting the Service Component Architecture standard (at design time and runtime), SOA-based deployment solutions built around FDF<sup>107</sup>, the component and active object based Grid environment ProActive, frameworks for service composition, and monitoring for SOA-based platforms. INRIA will too contribute to enrich and reuse open source components, promote them as well as research works to application domains as proposed by SOA4ALL.

The research works and technological developments, which will be reinforced in SOA4ALL, are supported by several French funded projects (such as SCOrWare<sup>108</sup>, SemEUsE or AGOS) and European funded projects (such as QualiPSO or CoreGRID<sup>109</sup>).

### III. Specific plan

INRIA plans to exploit developments done in SOA4ALL by consolidating and capitalizing them through an INRIA internal collaborative action (called Development Technology Action, the project being known under the internal name “galaxy”), which aims at designing and developing an open framework for agile and dynamic software

---

<sup>106</sup> <http://www.inria.fr/recherche/equipes/adam.en.html>

<sup>107</sup> Fractal Deployment Framework

<sup>108</sup> <http://www.scorware.org>

<sup>109</sup> The European Research Network on Foundations, Software Infrastructures and Applications for large scale distributed, GRID and Peer-to-Peer Technologies <http://www.coregrid.net>

architecture. “Galaxy”<sup>110</sup> will contribute to make INRIA a value-added player in the SOA arena, involves today eight project-teams (and teams), and is planned to integrate various technologies from INRIA during the two next years (2009-2010). This exploitation will be done in relation with Open Source consortia, such as OW2, Eclipse foundation, and the OW2 European Local Chapter.

#### IV. Long term goals

Our long-term strategic goals are to develop innovative scientific concepts and expertise in the field of middleware, around agile and dynamic software architectures. Fostering innovation, by firing on and contributing to creation of new start-ups and business opportunities in the SOA arena, the field of future Web applications, and Internet of things, is a main strategic goal for INRIA.

#### 7.3.3 University of Manchester Exploitation Plan

##### I. Motivation

**User-friendly computing.** University of Manchester has one of the strongest UK groups in Human Factors, with a solid approach to constructing and validating interfaces and representations using theoretical and methodological instruments from cognitive psychology.

**End User Development.** This research area aims to enable users who are not programmers to develop and modify their own software. The work here is a natural extension of the user-friendly computing area, and brings together academics with backgrounds in human-computer interaction, software engineering and socio-technical analysis to deliver and validate innovative models and techniques aiming to facilitate EUD uptake.

**SOA and context-adaptation.** Our interests in software services are traced back to 1998, when, together with two other UK Universities and BT Labs, we (then at UMIST) started to develop the academic vision of a software composed on demand out of fine-grained component services and disbanded after that. Our particular perspective on SOA is informed by this early vision and by the capabilities which can be brought in SOA by the concept of (intelligent) software agents, which can negotiate and reason over formally represented knowledge about their tasks and the context in which these tasks are executed to optimize the composition and procurement of software services.

**Service Science, Management and Engineering.** UniMan is a driving force behind the recent efforts to establish a new academic discipline based on the concept of Services. Professor Macaulay leads an EPSRC-funded Network of Excellence in the area, and has recently established a Centre for Service Research within Manchester Business School, which continues the work of the network in bringing together an interdisciplinary approach to address many challenges surrounding services such as complexity, trust and uptake, issues which are also focal for SOA4ALL.

---

<sup>110</sup>(GALs interfAce for compleX digital sYstem integration project) <http://www.galaxy-project.org>

**Knowledge Models and Problem-solving.** Professor Sutcliffe has written a book called “Domain Theory”, which presents a comprehensive set of generic problem-solving models and shows how these can be used in the development of generic software solutions which can be parametrised for use in a specific domain. The context adaptation in SOA4ALL L is organized along similar lines.

**NESSI.** UniMan is a member of “NESSI” where we participate in three NESSI groups<sup>111</sup>

UniMan participants in SOA4ALL are actively pursuing research and teaching in the areas listed above, and we are strongly motivated to participate in this project, and to exploit relevant results in terms of research, dissemination and teaching activities.

## II. Linkage to activities

**Publication Link:** The research results from SOA4ALL will be submitted for dissemination through a number of conferences and journals to which our academics are regular contributors: International Journal of Human-Computer Interaction, International Journal of Electronic Commerce, Knowledge Engineering Review, International Journal of Requirements Engineering, Communications of ACM<sup>112</sup>, IEEE<sup>113</sup> HCI<sup>114</sup>, WETICE<sup>115</sup>, VL/HCC<sup>116</sup> and the Symposium of End User Computing.

**Teaching Link:** We teach on a number of related UG and PG courses, and results and case studies from SOA4ALL will be incorporated in the delivery of these courses.

**RTD Project Link:** UniMan is currently participating in three related EC-funded projects: ServFace<sup>117</sup> Sudden<sup>118</sup> and Commius<sup>119</sup> and one EPSRC-funded Network of Excellence on Service Science, Management and Engineering. Our team of academics and researchers contributes to these projects, and this provides for a smooth flow of ideas and results between these activities.

## III. Specific Plan

Both during, and at the end of the project, University of Manchester will publish results, share results with ongoing projects if appropriate and downstream research results into teaching and other exploitation activities. The early stage of the project makes it difficult to identify which concrete results will be used in each exploitation stream, but the results from evaluating existing tools and the underlying user

---

<sup>111</sup> Services Science, BPM and Service Engineering

<sup>112</sup> Association for Computing Machinery

<sup>113</sup> Institute of Electrical and Electronics Engineers,

<sup>114</sup> Human Computer Interaction

<sup>115</sup> International workshop on enabling technologies infrastructures for collaborative enterprises

<sup>116</sup> Symposium on Visual Languages and Human-Centric Computing

<sup>117</sup> Automatic Creation of User Interfaces for Service Composition. <http://www.servface.eu>

<sup>118</sup> SMEs Undertaking Design of Dynamic Ecosystem Networks <http://www.sudden.biz/>

<sup>119</sup> SME-focused interoperability utility, <http://www.commius.eu>

interface models and representations are likely candidates for publication, whilst simplified elements of our case studies will probably find their way into our teaching, especially at Masters and MBA level.

#### IV. Long Term Goals

UniMan's strategic goals in relation to our SOA4ALL involvement are as follows:

**Research results based:** Establishing our team as a leading specialist in Service Interfaces and methodologies for constructing and validating service interfaces and representations, and in end user development of software services.

**Other academic goals:** Establishing our team as a leading UK centre for service science and education, with an up-to-date portfolio of courses and industry-relevant teaching materials.

## 8. SOA4ALL as NESSI Strategic Project

At present, Information and Communication Technology is crucial to European competitiveness and industrial development. In addition, ICT plays a key role as important tool for sustainable development and cohesion as well as "enables technology", because of its responsibility to produce growth in modern economies. ICT drives improved efficiency and better services and products across the entirety of the private and the public sectors.

Software towards to services, and that is why new European Technological Platforms such as NESSI<sup>120</sup>, has been set up in order to support stakeholders involved in IT industry, for the development of one strategy based on software and services. In this context, SOA4ALL<sup>121</sup> has been selected by the European Technology Platform NESSI as one of its Strategic Projects to contribute to the NESSI Open Framework, referred to as NEXOF, which is an integrated, consistent and coherent set of technologies and associated methods and tools intended to:

- Provide European Industry and the Public Sector with efficient services and software infrastructures to improve flexibility, interoperability and quality; master complex software systems and their provision as service-oriented utilities.
- Establish the technological basis, the strategies and deployment policies to speed up the dynamics of the services eco-system.
- Develop novel technologies, strategies and deployment policies that foster openness, through the increased adoption of open standards and open source software as well as the provision of open services.
- Fostering safety, security and the well-being of citizens by means of new societal applications.

---

<sup>120</sup> Today, NESSI is composed of at least 327 members and 22 partners and is represented not only by SME's but also industry, academia and users. NESSI initiative will help to deploy resulted obtained from research in software industry

<sup>121</sup> All partners in SOA4ALL are members of NESSI, and 5 of them are members of the NESSI Steering Committee (ensuring therefore a balanced representation): ATOS ORIGIN, BT, IBM, SAP, and TIE.

## 9. IPR

Concerning exploitation of the Intellectual Property arising from the project, it is the understanding of the SOA4ALL Consortium that:

1. Background Knowledge will be available to the Consortium members free of charge if it is necessary to perform the research in this project. In the following table, you could appreciate:

Reference	Background IPR	Owner (partner)	Access (Public or Confidential)	Brief description about the Background IPR
<u>Included</u>	PICTURE Lightweight Process Modelling and Analysis Tool, Version 0.9 and 1.0	SAP	No comments	PICTURE Lightweight Process Modelling and Analysis Tool is an approach and tool for time-efficient capturing of processes using pre-defined, domain-specific process building blocks and performing automated process analysis.
No comments	SAP Research Rooftop Prototype:	SAP	No comments	The SAP Research Rooftop prototype is a Web application based on AJAX (Asynchronous JavaScript and XML). Users create mash-up widgets – the name derives from “window” and “gadget” – from Web services, without any programming.
No comments	DeployWare/FDF	INRIA	LGPL license	A framework for deployment of distributed and heterogeneous software systems
No comments	Fractal	INRIA	LGPL license	A component model and its Java-based reference implementation
No comments	ProActive-GCM	INRIA	GPL license	A Grid component model and its ProActive java-based reference implementation
No comments	FraSCAti	INRIA	LGPL license	The SCA platform to be integrated into PETALS 3.0 Service Platform.
No comments	Eclipse STP-IM	INRIA, Engineering	EPL license	Bridge of SOA editors and representations (BPMN, BPEL, SCA, JBI, JAX-WS)
<a href="http://www.tiekinetix.com">http://www.tiekinetix.com</a>	TIE Kinetix Infrastructure	TIE	No comments	TIE Kinetix is a next generation platform from TIE. It is focused on the eCommerce domain involving elements from e.g. e-Invoicing, messaging or mapping. It contains many subprojects and libraries that might be removed in e.g. the service monitoring or data exchange part of SOA4ALL.



No comments	WSMO	UIBK	Public	Web Service Modeling Ontology is the framework for modeling web services using standard ontology languages. WSMO will be used as basis for development of lightweight ontologies for web services, i.e. WSMO-Lite and MicroWSMO.
No comments	WSML	UIBK	Public	WSML is the ontology language used to describe semantic web services. WSML will be used as one of the languages used to describe services encoded in WSMO-Lite and MicroWSMO service ontologies.
No comments	WSML2Reasoner Framework	UIBK	Public	The WSML2Reasoner Framework is a highly modular architecture which combines various validation, normalization, and transformation functionalities essential to the translation of ontology descriptions in WSML to the appropriate syntax of several underlying reasoning engines.
No comments	WSMX	UIBK	Public	Web Services Execution Environment is a prototype implementation for WSMO and a middleware system that facilitates automation of the service integration processes (i.e. discovery, selection, mediation and invocation of services).
	WSMT	UIBK	Public	Web Service Modeling Toolkit is an Integrated Development Environment (IDE) used for semantic service lifecycle support.
<a href="http://kmi.open.ac.uk/technologies/irs/">http://kmi.open.ac.uk/technologies/irs/</a>	Internet Reasoning Service	OU	KMi Public LICENCE v.2	This is the 6 clause version of a simple standard licence requiring acknowledgement of the originator of the Software. It does not restrict future use, it allows commercial exploitation and does not impose this licence on future developments, merely the terms of this licence. It is drawn from the BSD model with additional material based on Loom licence

*Table 5 Intellectual Property Rights*

2. Foreground is owned by the partner generating such information or result. That is, the results, materials and knowledge that are generated in the project whether or not are protected.
3. Each partner shall make available its foreground, on a royalty free basis whenever applicable or under the terms and conditions established in the Consortium Agreement, to other contractors to extent that such information is necessary for the production of their own foreground within SOA4ALL.
4. The foreground includes the tangible (e.g. prototypes, source code) and intangible (IPR) results of SOA4ALL. The results generated before or outside our project or in parallel and that are not listed in the table above, will not be considered as foreground.
5. Background and foreground will be made available to the other project partners for exploitation purposes at favourable conditions, with respect to the normal commercial conditions applied by granting partner.
6. Research partners will be entitled to freely reuse internally their foreground, and will be entitled to disseminate<sup>122</sup> such foreground only under the terms and conditions of the Consortium Agreement. Research partners will be entitled to create spin-offs for the commercialization of their foreground, in which case the same conditions

<sup>122</sup> Dissemination activities including but not restricted to publications and presentations are governed by Article II.30 of the Grant Agreement.

would apply as to any other partner of the SOA4ALL project.

## 10. Conclusions

The relevance of exploitation activities for a project like SOA4ALL is very high. This will be proof of the real impact of the project in both the scientific and industrial environments. Even if SOA4ALL is a research-oriented project, it will have the challenge of introducing semantic Web services in the real market by transforming the Web into a Web of billions of services through its impact in terms of new framework, platforms and infrastructures that will enable this transformation. SOA4ALL will use as far as possible the Case Studies as a proof of concept of the technologies envisaged within the project.

From the business point of view, SOA4ALL addresses important environments for the future exploitation of results:

- **The enterprise/ corporate environment**, which will be merged as far as possible with user-centric technologies based on Web paradigms.
- **The telecommunications environment** as a representative example of a business domain where value chains have been changing in a dramatic and dynamic way for some time (it is expected that this will also happen with other business domains)
- **The user-centric environment of C2C service e-Commerce** as a clear representation of future trend.

### 10.1 Future work

In this document, we have summarized the preliminary version of the exploitation plan of the consortium. We have addressed both the individual exploitation strategies of each partner and the exploitation strategy of the consortium as a whole. The present deliverable, as a preliminary version, it does not cover all aspects that usually are part of a consolidated plan. The next version of the deliverable will be extended to cover in greater detail what has been outlined in the current version and some topics not addressed until now. This update will cover at least the following topics:

- The definition of the services scenarios.
- The first version of the SOA4ALL Business model.
- Updated versions of both Common and Individual Exploitation Plan.
- If necessary, update on the analysis of the SOA, Semantic and Context market.

## 11. References

1. [SW Roadmap] <http://www.w3.org/DesignIssues/Semantic.html>
2. [Service Component Architecture Building Systems using a Service Oriented Architecture]  
[http://www.oracle.com/technology/tech/webservices/standards/sca/pdf/SCA\\_White\\_Paper1\\_09.pdf](http://www.oracle.com/technology/tech/webservices/standards/sca/pdf/SCA_White_Paper1_09.pdf)
3. [Forrester 2001] How The X Internet Will Communicate:
4. <http://www.forrester.com/ER/Research/Report/Summary/0,1338,13387,00.htm>
5. [HALO2]  
[http://www.projecthalo.com/content/docs/halopilot\\_vulcan\\_finalreport.pdf](http://www.projecthalo.com/content/docs/halopilot_vulcan_finalreport.pdf)
6. [Gartner 2002] [http://www.gartner.com/DisplayDocument?doc\\_cd=109295](http://www.gartner.com/DisplayDocument?doc_cd=109295)
7. [Gartner 2005,ID:G001130331] Learn the Key Success Factors for SOA Deployments.
8. [Gartner 2006,ID:G00138046] Achieving agility : SOA will build Organizational Agility , but Watch the Hype
9. [Gartner 2007,ID:G00153828] The Business Impact of Service Oriented Architecture.
10. [Butler Group 2007]. SOA Platforms. Software Infrastructures Requirements for Successful SOA deployments.
11. [WonderWeb] <http://wonderweb.semanticweb.org>
12. [TopQuadrant] WonderWeb D2.5 Deliverable
13. [NeOn Requirements & Vision] NeOn Requirements and Vision Deliverable June 2006
14. [Gruber] T. R. Gruber. A translation approach to portable ontology specifications.
15. Knowledge Acquisition, 5:199–220, 1993.
16. [Competency Questions] M. Uschold and M. Gruninger. Ontologies: principles, methods, and applications.
17. Knowledge Engineering Review, 11(2):93–155, 1996.
18. [Diligent] <http://www.aifb.uni-karlsruhe.de/WBS/cte/ontologyengineering/diligent.htm>
19. [OntoCom] <http://www.aifb.uni-karlsruhe.de/WBS/cte/ontologyengineering/ontocom/ontocom.htm>
20. [Methontology] Fernandez M, Gomez-Perez A. et al. METHONTOLOGY: From ontological Art towards ontological
21. Engineering. Proc AAAI-97 Spring Symposium Series on Ontological Engineering, Stanford, USA, pages 33-40.

22. [Swoogle] <http://swoogle.umbc.edu/>
23. [Web 2.0] <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
24. [Forrester 2006] March 2006, Tech Choices “Oracle Versus SAP In Enterprise Applications: Let The Battle Of Architectures Begin!”
25. [Crossing the Chasm] Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers by Geoffrey A. Moore, 1991, SBN 0060517123.
26. [Ontology Engineering] <http://www.aifb.unikarlsruhe.de/WBS/cte/ontologyengineering/>
27. [Web 2.0 Wikipedia] [http://en.wikipedia.org/wiki/Web\\_2.0](http://en.wikipedia.org/wiki/Web_2.0)
28. [Cusumano Cusumano, M.A., *The Changing Software Business: Moving from*
29. *Products to Services*. Computer, 2008. 41(1): p. 20-27
30. [Anderson] Anderson, C (2006). *The Long Tail: Why the Future of Business Is*
31. *Selling Less of More*. New York:
32. Hyperion. ISBN 1-4013-0237-8.
33. [Open Source Initiative] [www.opensource.org](http://www.opensource.org)
34. [Apache Software Foundation] [www.apache.org](http://www.apache.org)
35. [BSD License Wikipedia] [http://en.wikipedia.org/ BSD\\_license/](http://en.wikipedia.org/ BSD_license/) apache 2.0
36. [Apache License] [http://en.wikipedia.org/wiki/Apache\\_License](http://en.wikipedia.org/wiki/Apache_License)
37. [ASPIRE project's official repository] <http://fp7-aspire.eu/public/deliverables/>

## Annex A. Open Source considerations

### Open Source Basic Considerations

The main argument for the term “open source software” is that “free software” makes some people uneasy. The word "free" has many different meanings, and these different meanings often make it harder to understand OSS/FS. The term "Free software" (as used in OSS/FS literature) is based on the word "freedom" (the word "libre" is used in some other languages). However, "free" can also mean "no cost", and sometimes "no cost" products come with a "catch" that in fact is the opposite of freedom.

Open Source has been around for decades, but it became popular with Linux and BSD software communities. Open source allows for the sharing and expansion of ideas and concepts between many software developers. By allowing other software authors to use, modify or redistribute an application (or piece of source code) the application has a chance to evolve at a faster rate and possibly produce new technology altogether.

Main features of Open Source Software are: Non-proprietary software which may or may not be used commercial; Licensed under an open source licence (licence terms differ from proprietary software licence terms), licence terms are not standard. Licenses which define the privileges and restrictions a licensor must follow in order to use, modify or redistribute the open source software; Source code is generally made available (legal restriction on reverse engineering do not apply).

Open source seems to become the most important alternative to proprietary software in several fields. The creator of the original Open Source Software allows others to benefit from the product. In turn, the creator can also benefit from the improvements and modifications that others may bring to the software. What open source consumer is concerned, because a lot of the software is spread via free downloads off the Internet, nobody has any data on total sales figures available. Many users in corporate settings also hide the fact for political reason.

### Corporate use of Open Source Software

The 21st century web technology market, the open source company is that has the greatest long-term strategic advantage. The growth and development of open Source Software has led to the start –up of many new companies. Because open source products are typically released for free, open source companies that can produce quality products and generate a good reputation can almost immediately grab huge shares of any market based on the complex and far-reaching global referral networks generated by users. These companies distribute Open Source software products and make their business selling services and support. Open Source vendors play a key role in the market place because they make open Source software products “business ready”. SIBM has been the first, tier one hardware and software vendor to support Open Source Initiative on a large scale. From the start, IBM has been a supporter of the Linux operating system, which led to many other companies embracing Linux as a sustainable alternative Unix operating system. Other hardware and software vendors such as HP has reluctantly responded to the Open Source model, however HP is active in supporting new business initiatives.



## **Open standard and Open Source**

Open Standards enable companies to distinguish themselves from competitors by offering new capabilities and services first in fast-paced, technology-driven markets in order to compete in a structured way. When open source is concerned, it enables people or companies to collaborate in a structured way although most “business viable” open source software products are based on open Standards.

Anyway, both, Open standard and Open source software products may not be as open as they seem. Each new challenge requires its own careful evaluation of Open Source or commercial (Open Standard) software. However, a good ICT strategy and architecture should ensure long-term robustness and interoperability.

## **Annex B. Current situation of Open Source. Business implications**

### **Open Source Benefits**

The Open Source software (sometimes referred to as OSS) model is very different from the “commercial off the shelf” (sometimes referred to as COTS) software model. Open Source software brings several compelling benefits to the ICT manager.

### **Software license & upgrade savings**

The most obvious cost savings are found in the absence of right to use licenses. In theory, this applies to upgrades as well. One of the benefits seen by Open Source users is that they are not forced to upgrade and can stay with the same software version, having it maintained by ICT service providers such as IBM, HP and other companies, like IT integrators. But, just as with commercial closed-source software, maintaining too many older versions becomes cost prohibitive, and therefore price prohibitive to the end customer. It is certainly possible for each customer to have a service provider maintain their own special version of the software, but this is not only uneconomical but also dangerous for operating systems and middleware. This is because application software must run atop these, and the proliferation of unique versions of operating systems and middleware create testing impossibilities for the application vendors (and/or risk for the end customer). The terms, delivery schedules and mechanisms of Open Source software products are certainly more flexible, but the basic premise of economy of scale of a common code base applies to both open and closed source software.

### **Hardware savings**

Virtually all Open Source software, including Linux, is developed on open commodity computing. This means that there is no need for vendor specific hardware when using Open Source software. For example, the cost of Linux on Intel-compatible technology is in most cases more compelling than equivalent Unix/RISC configurations, enabling the IT department to optimize cost/performance. However, the choice of hardware is dependent on the application context and the required performances. Also, the sheer number of servers required might adversely impact the total cost of ownership (TCO) in comparison to more powerful high-end servers or mainframes. Here, a thorough business case calculation including the cost of migration is absolutely necessary.

### **More interoperability**

The trend towards integration through a service-oriented architecture (SOA) and modular software is an important driver for the adoption of Open Standards. If you modularize your processes and software, you untangle complex business processes into differentiable functionality and commodity functionality. All these (software) modules need to work together flexibly. In many cases, Open Source software is based on Open Standards or it supports Open Standards, which can boost the ease of integration of each module<sup>1</sup>.

On top of that, access to the source and the ability to customize Open Source for individual needs enables you to build your own interfaces wherever necessary.

### **Reusability and repurposing**

When considering “make or buy” software investments, the Open Source alternative can be a best of both worlds solution - not as expensive as custom application development and not as rigid as packaged software. It is also possible to modify the Open Source software and give the modifications back to the organization you work with or directly to the community in order to secure further future support. Since the source code will always remain available, both horizontal and vertical integration with other software will be relatively easy. This enables enterprises to reuse or “repurpose” the software components where necessary.

### **Easier recruitment**

As many people leave college or university having been educated with open source tools, it is easier to attract good personnel.

### **Open Source implications**

Despite the benefits, the use of Open Source software has some distinct disadvantages. Whether the equation turns out to be positive depends on the specific Open Source application and business environment of the ICT user.

### **Cost of technical migration**

Some Open Source applications require a substantial migration effort compared to established solutions. This is especially the case when established solutions have proprietary interfaces, as opposed to open standards. The return on investment (ROI) for Open Source is also decreased by the initial cost of migration when organizations have strong commitments to established technology providers. This means that Open Source growth tends to slow in some established markets (such as client desk top operating systems) as depreciation cycles determine new investments. However, Open Source growth is rapid in emerging markets (for example, Web infrastructure and mobile and embedded devices) because of the large number of new projects being started.

### **Increasing number of maintenance and support staff**

If you adopt Open Source in your own IT operations, you will need additional staff for maintaining links with the Open Source community. And as the Open Source community does not guarantee response times for solving problems, you will need to attract additional staff for self-maintenance as well (though in practice, the Open Source community is often quick to ship fixes, and they tend to be rigorously tested). Alternatively, customers that use commercial-ready Open Source based solutions and get service/support from a commercial provider should need no additional personnel for dealing with the open source community. The provider does this for you and is able to guarantee the response time for problems, even though the Open

Source community does not. Outsourcing can thus be an economically viable option for Open Source software products.

### **Cost of training existing staff**

The working environment changes for your existing developers, purchasing and ICT management especially when migrating from proprietary to Open Standards. The required training effort can then be significant although these training costs are partially offset by the ease of recruitment. Also, the education of Unix specialists in Linux is considered to be easily achieved.

### **Cost of organizing change**

The use of Open Source software for ICT solutions requires an enterprise to implement Open Source policies and a government board. You will need to decide what you want to support in your own organization (with the help of peer-based community support) and what service and support contracts with Open Source vendors you want to establish.

### **Cost of legal department**

Using Open Source software comes with a legal risk. The effort and expenses of the legal department need to be considered when considering Open Source software

### **Vendor Dependence and Vendor Lock in**

A common argument in favour of Open Source is that the model is vendor independent. But the most important reduction of vendor dependence that Open

Source software brings is based on Open Standards, reducing vendor lock-in. Open Standards are supported by many commercial software vendors and where they are not the software provider generally promises that the software offers superior value. An example is Microsoft Sharepoint. This is a good product with low total cost of ownership, but it has proprietary interfaces and only integrates well with Microsoft's SQL database and Windows Server operating system.

In some aspects, the Open Source license model itself does reduce vendor dependence. Users of commercial software often need to purchase upgrades and support contracts as prescribed by their supplier whereas Open Source software does not have such an obligation. However, as stated earlier, it may not be beneficial to refrain from updates and, with the market maturing more and more, many Open Source software bodies have become commercial software suppliers.

Apache is a good example of a completely Open Source project that is beholden to no particular commercial enterprise and therefore exhibits all the advantages listed in the previous paragraph. On the other end of the spectrum, JBoss and MySQL are commercial ventures that have been building a business based on their value added support for Open Source software products. These companies control the evolution of the software and do not increase vendor independence.

With regard to end user operating systems, striving for vendor independence is even trickier. If you want to make an “all or none” decision on a client OS or an office suite, you will find that the most logical decision is to stay with Microsoft. Managing large volumes of Windows Desktops is still less expensive than managing large volumes of Linux Desktops. On top of that, the large quantity of Office documents and Windows applications in our organizations today means that at least some users will continue to require Windows and Office, even if Linux and Open Office are good enough for many users in the organization.

### **Business Constraint**

The essential rights of Open Source software - to use, copy, modify and distribute - are formally published by the non-profit organization OSI (the Open Source Initiative). These rights are called the OSD (the Open Source Definition) and many Open Source software licenses comply with it.

In many instances, Open Source software comes with a reciprocity obligation. This obligation requires you to license back under an equivalent Open Source license - to the licensor and everyone else - all derivative work you create from the original software. The most widely used version of this type of license is called the General Public License (GPL). The term used to describe this type of licensing is “copyleft”. To copyleft a software product, the program is first copyrighted and then distributed under a license, for example the GPL. In this way, the source code becomes legally inseparable from the freedoms.

It is important to mention that the GPL only comes into play if you distribute your derivative work outside of your company. There is no reason to avoid modification of Open Source software in applications that create a competitive advantage, unless you plan to distribute these applications and make a profit out of them. Reciprocity obligations do not arise from just modifying the Open Source software, but from modifying and distributing it. If you pass on Open Source software, you must pass on the OSD rights as well, including the reciprocity obligation in any modifications that you might have applied to the Open Source software itself.

Finally, there is no obligation to publish the code of commercial software codes when packaged with Open Source software. For example, if SAP wants to package their software with a Linux copy there is no legal objection. SAP would only need to license the SAP specific Linux patches under the Linux GPL. This combination of Open Source and commercial software licensing is called “dual licensing” which is likely to become an increasingly common practice

## Annex C. Typology of most used Open Source Licenses

The Open Source definition functions in much the same way as a technical specification by establishing a set of criteria that allow for multiple implementations that all meet the specification. The breadth of the criteria described has allowed a wide variety of licenses to be classified as « open source », often classified in two categories: historical and classical.

To date there are nearly 70 different open source licenses approved by the OSI<sup>123</sup> as meeting the Open Source Definition. Some of the more well-known of these licenses include the GPL<sup>124</sup>, LGPL<sup>125</sup>, MIT<sup>126</sup>, BSD<sup>127</sup>, MPL<sup>128</sup> and APACHE<sup>129</sup>. In addition, other open source licenses exist and have not been approved by OSI. Nevertheless, some of these licenses appear to contain terms that comply with the Open Source Definition. Among them we can identify the CeCILL family Licenses (CeCILL<sup>130</sup>, CeCILL-A<sup>131</sup>, CeCILL-B<sup>132</sup>) compatible with GNU GPL, aims to be better suited for French laws. Others, however, contain terms that diverge significantly from the requirements of the Open Source Definition. Given the variety of open source licenses, the potential implications of using, modifying and distributing open source software varies greatly from license to license. While a detailed examination of the variety of open source licenses is needed, an illustrative example is the distinction between copyleft and non-copyleft open source licenses.

One of the main issues to achieve when it is decided to develop some project or code under Open Source, it is the choice of the license to establish the legal terms of the use, distribution and contribution of the software. To be considered as “Free / Open Source”, a license must comply to a series of conditions that will basically grant four freedoms:

- Run the program, for any users or purpose (e.g. commercial or not);
- Access to source code to study how it works, and adapt it according to any need;
- Freedom to redistribute copies;

---

<sup>123</sup> Open Source Initiative

<sup>124</sup> General Public license <http://www.gnu.org/licenses/gpl.html>

<sup>125</sup> Lesser General Public license <http://www.gnu.org/copyleft/lesser.html>

<sup>126</sup> <http://www.bellevuelinux.org/mitlicense.html>

<sup>127</sup> <http://www.opensource.org/licenses/bsd-license.php>

<sup>128</sup> <http://www.opensource.org/licenses/mozilla1.1.php>

<sup>129</sup> <http://www.apache.org/licenses/LICENSE-2.0.txt>.

<sup>130</sup> <http://www.cecill.info/index.en.html>

<sup>131</sup> <http://www.inria.fr/presse/pre153.en.html>

<sup>132</sup> [http://www.cecill.info/licences/Licence\\_CeCILL-B\\_V1-fr.html](http://www.cecill.info/licences/Licence_CeCILL-B_V1-fr.html)



- Freedom to improve the program, and release improvements if wished.

An open source software license is a software license that fulfills the conditions of the definition of open source code promoted by OSI. These conditions are:

- Free re-distribution: the license must not restrict the selling or grant of the software without any type of royalty.
- Inclusion of source code: the software must include all the source code and letting the re-distribution both source code as compiled code. The source code has to be clear and clean to let the easy modifications.
- Derived works: the license must let the modifications of the software and the evolutions from it. The re-distributions of these derived works must be delivered under the same license as the original software.
- Integrity of the author's source code: the reputation and ownership of the original software's author must be always preserved. The modifications to the original software must versioned.
- The license must not discriminate to anyone.
- The license must not restrict its use of the software in specific environment or sector.
- The license must not be specific of a product.
- The license must not restrict the use of other software.
- The license must be neutral from a technological point of view.

The licenses that fulfill the OSI conditions normally also fulfill the Open Source Foundation requirements as well. It is important to understand that each version of software is considered as a new piece of work in terms of licensing. That is, different versions of some code may be distributed under different licenses if all involved parts are agreed.

One controversy aspect is the acceptance of external contributions. Patches from external developers should come at least with the same license as the original software to avoid problems in the future about re-licensing, since it can mean to need the permission from all contributors to apply a new license and it may make difficult to sell future proprietary versions of the project. Some licenses use to ask for the total transfer of copyrights following the recommendation of Open Source Foundation.

Considering the license to apply to the derived software, the OS licenses can be mainly classified in two big groups: robust/ copyleft licenses and permissive licenses.

### **Robust / Copyleft Licenses**

- **The GNU General Public License (GPL):** Every derived work from the original code licensed under this type of license must be distributed under the original license. In this group, another narrower classification may be done: strong copyleft licenses and weak copyleft licenses. Strong copyleft means that a license demand that the entire larger work must meet the criteria of the original license. Weak copyleft usually means only part of the derived work

must meet the original criteria. For instance, GPL is a strong copyleft license and LGPL, MPL and EPL are weak copyleft licenses.

- **GNU GPLv2:** It is the most extended, used and recommended license that exists. GPL has been approved by some courts and it has been deeply studied to avoid that successive re-distributions may not fulfil all of its conditions. (The basic principle of the license is that every derived code from the original GPL code must be re-distributed under GPL as well (called viral clause). If you release the modified version to the public in some way, GPL obliges you to make the modified source code available under GPL as well. But if you use the modified code internally, the re-distribution of modifications is not mandatory. It protects the acknowledgement and credit of the originator of the source code (attribution protection), but you cannot ask for any type of warranty of the code (disclaimer of warranty). The use of change log is mandatory as well. GPL also permits to sell or charge a fee to a GPL licensed code, although it does not imply to avoid the responsibilities or rights described in the license. Licenses that only allow non-commercial distribution are GPL incompatible.
- **GNU GPL v3 (scheduled for release in mid-2007):** This next version of the GPL introduces new provisions to control not only the distribution of the source code, but also to limit its use depending on certain characteristics of the hardware platform on which the software is intended to be executed. It also provides new details about the distribution methods that are allowed to be used. The GPL v3 also prevents *tivoization*<sup>133</sup>.
- **The GNU Lesser General Public license (LGPL):** The LGPL is a derivative of the GPL that was designed for software libraries. Unlike the GPL, a LGPL-ed program can be incorporated into a proprietary program. The C-language library provided with Linux systems is an example of LGPL-ed software--it can be used to build proprietary programs, otherwise Linux would only be useful for free software authors. An instance of an LGPL-ed program can be converted into a GPL-ed one at any time. Once that happens, you can't convert that instance, or anything derived from it, back into an LGPL-ed program. The rest of the provisions of the LGPL are similar to those in the GPL--in fact, it includes the GPL by reference.
- **MPL:** This is a weak copyleft license where the modified code must be re-distributed under MPL, but it is possible to combine it with other code under different licenses if this derived work does not come from MPL code. This makes this license incompatible with GPL. It is considered as a hybrid between GPL and BSD. It includes the clauses of attribution protection, disclaimer of warranty and

---

<sup>133</sup> The legal use of GPLv2 software which however limits some of the user's rights to use modified versions of that software

re-distribution of modifications. A different aspect that this license includes is that the initial developer has exclusive right to produce new versions of license and code may be used under the license at which it came or newer version.

## Permissive Licenses

- BSD Apache 2.0 and MIT licenses:** What BSD license is concerned, few restrictions may be taken into consideration with respect to other free software licenses such as the GNU Public License. Apache 2.0 is a free software license authored by the ASF<sup>134</sup> It is not a copyleft license- It allows use of the source code for the development of free and open source software as well as proprietary software. This license is intended to do the license easier from non- ASF projects to use, improving compatibility with GPL –based software. MIT has similar properties than BSD. Both of them are more liberal than GNU Public License (GPL) which is by far the most frequently used open source license. The main difference between BSD and MIT license is that BSD license sometimes contain a clause prohibiting the use of the name of the copyright holder in promotions without permissions.

The following table<sup>135</sup> shows a summary of the main characteristics of the described licenses.

License	Can be mixed with non-free software	Attribution Protection	Modifications can be taken private and not returned to you	Permissive	Disclaimer of warranty	Mandatory Change Log	Enable Commercialization	Copyright
GPLv2	No	Yes	No	No	Yes	Yes	Yes	Yes
LGPL	Yes	Yes	No	No	Yes	Yes	Yes	Yes
BSD	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
MPL	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
MIT	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
APACHE version 2.0	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

*Table 6 Characteristics of the main Open Source Licenses*

## Dual Licensing

There exist situations where the best choice is not to use just one type of license, but

<sup>134</sup> Apache Software Foundation

<sup>135</sup> Atos Origin and INRIA partner.

some of them in combination. A work may be licensed under different licenses at the same time and depending on the use conditions one license or another one will be applied. The most common case is to have the combination of a commercial license and an Open Source license. In this way some users may get the software for exploitation purposes through a commercial license and others may get it free just for personal use. Another situation can be to get the basic version of the code freely and the advanced version under a commercial licenses. In this way, the owner company of the code gets to disseminate its software to the community in an extensive way to attract clients, that after to test the basic version want to buy the advance version. On the other hand, the company may improve its image since it offers its knowledge free to the community.

Besides the community may test the basic version and give feedback to the company (improvements suggestions, error detection, etc) for the advanced version. Thus, the advance version will be highly tested and depurated of errors, improving the quality of the commercial software produced.

The main drawback of this type of licensing model is the management of the external contributions. The contributors need to grant the copyright of their contributions if the company want to use them in the commercial version of the software. And this is not always acceptable for the contributors since they do it altruistically and probably they do not want the company to obtain economic benefits using their knowledge and code without any compensation. In spite of the drawback, clearly this type of licensing model is needed if Open Source wants to approach to the enterprises world.

### **Selection of the Open Source License**

What is the most convenient to the exploitation of the SOA4ALL Project – to concrete SOA4ALL as global framework .A software license affects the use and distribution of the software, both in source and object form.

- When to use a proprietary license: If you want or need to have the total control and rights over your software. In this case there are two major efforts: to create a proprietary license to cover all the restrictions you want to impose; to carry out with all the efforts required for testing, maintenance and improvement of the code. The promotion task is also more costly. There also exists the risk of software piracy.
- When to use an Open Source license: If you want to control your code but you want to share with the software community the knowledge and the maintenance/modification efforts. This does not mean giving up economic benefits, keeping copyright, controlling modifications or merging with proprietary software. The legal terms to consider will depend on the type of license chosen.

## Annex D. Legal Analysis of F/OSS<sup>136</sup>

License	GPL /LGPL	BSD	MPL	MIT	APACHE Version 2.0
<b>1 INTERNATIONAL DIMENSION</b> Applicable law clause	No clause No legal reference Rome Convention	No clause No legal reference Rome convention "law of the licensor's country"		No clause No legal reference	No clause No legal reference
<b>2 INTELLECTUAL PROPERTY</b> 2.1 Rights granted by the license	Copy Modify Distribute	Modify Redistribute	Use, Reproduce, Modify , Distribute Display, Perform, Sublicense	Deal without restriction, including, without limitation, the rights to: Use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies, permit sublicense to do all the above	Use, reproduce, prepare derivative works, publicly display, publicly perform, sublicense, distribute the work or/and derivative works. Patent license expressly provided. No permission to use trademarks, service marks, product names, except for the customary use in describing the origin of the work and reproducing the content of the license notice file.
2.2 Chain of authorship					
<ul style="list-style-type: none"> <li>▪ Initial Author licensor system</li> </ul>	Expressly provided	Implicit	Implicit	Implicit	Explicit (both of the original work copyright holder and all the contributors) Explicit right of the contributors to copyright their contributions
<ul style="list-style-type: none"> <li>▪ Sublicense system</li> </ul>	Not explicit	No	Yes	Yes	Yes
2.3 Conditions					
<ul style="list-style-type: none"> <li>▪ Attributions, copyright, disclaimer notices</li> </ul>	Yes	Yes	Yes	Yes	Yes
<ul style="list-style-type: none"> <li>▪ Copyleft</li> </ul>	Yes	No	Yes	No	No
<ul style="list-style-type: none"> <li>▪ Virality</li> </ul>	Yes	No	No	No	No But: Contributions intentionally submitted for inclusion in the covered work are also covered by the same license, unless the contributor explicitly states otherwise

<sup>136</sup> GPL / LGPL ,BSD,MPL. Advise –report. EC.Enterprise Directorate.

Encouraging good practice in the use o OSS in the Public Administrations.

Author; Crid and Unisys Belgium. December 2004.

Mit and Apache legal characteristics have been provided by INRIA partner

<b>3 LIABILITY AND WARRANTY</b> ▪ Warranty clause	No/ Yes	No/Yes	No/Yes	No/Yes	
▪ Disclaimer ( liability exoneration clause)	Yes ( to what applicable law permits)	Yes	Yes (to what application law permits)	Yes	Yes (to what application law permits)
<b>4. CONTRACT LAW</b> 4.1 Acceptance of the contract	Nothing but the license grants the permission to modify and distribute	Nothing provided	Nothing provided	Nothing provided	Nothing provided
4.2 Enforceability ▪ Severability clause	Yes	No	Yes	No	No
▪ Enforceable( in general)	Yes	Yes	Yes	Yes	Yes
4.3 Duration ▪ Defined period	No	No	No	No	No
▪ Termination Clause	Yes. In case of violation of the license	No	Yes, termination in case of violation of the license, after a 30 days period consequent to a contract breach notice	No	No, but for the patent license in case of filing a patent infringement litigation by the licensee
<b>5 NEW VERSIONS</b> 5.1 New version clause	If GPL number specified , license may choose between this version and any subsequent version	Nothing provided	License may redistribute the program under: the same version, or a subsequent version	Nothing provided	Nothing provided

*Table 7 Legal Characteristics of the main Open Source Licenses*