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D10.4.1 Constraint analysis: identification of market risks

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Glossary of Acronyms

Acronym	Definition
D	Deliverable
DSB	Distributed Serial Bus
EC	European Commission
QoS	Quality of Service
SLA	Service Level Agreement
SOA	Service-Oriented Architecture
SW	Software
VC	Venture Capitalist
WP	Work Package

Executive summary

This document analyses the risks related the market that could constraint the exploitation of SOA4ALL results.

A methodology has been based on Enterprise Risk Management and adapted to the SOA4ALL case. This methodology is based on 4 steps:

1) first establishment of the contexts, to limit the boundaries of the study and the aspects of the technology, market and stakeholders taken into account;

2) an identification of risk areas that may inhibit SOA4ALL exploitation;

3) a further analysis of these risks; and

4) an assessment of that risks, showing the probability of occurrence of the risk and the impact of this risk in case it occurs.

The risk areas that were identified are:

a) ***Market context***: different trends in SOA market may inhibit SOA4ALL result exploitability. We'll analyse the general point of view –i.e. general problems in SOA adoption- and we'll also take advantage of the project scenarios to study this particular cases.

b) ***Technology and market maturity:*** risks that appear in case the market is not ready to use the SOA4ALL technology, or because this technology is not mature enough to be used by the market or to be integrated with the existing baseline technology

c) ***User Acceptance:*** Users may find barriers to adapt to SOA4All solution (complexity, cost),

d) ***Competition and competitive technologies.*** How the current technologies and main providers which can be affect SOA4ALL results exploitation because they can be considered either competitive or alternative for the technology developed in the project.

e) ***Stakeholders:*** The risk that the different market players may bring to results exploitation.

f) **Ownership and IPR:** the risk associated to the ownership and IPR of the different components in a composite service.

After an analysis and assessment of these risk areas, a number of recommendations are provided to minimise the impact of these potential risks. We summarise them as follows:

1. Special attention is to be paid to the user interface in order to make creation of composed services easier for the user compared to current solutions. Also user experience will be an important factor of success. Therefore, it is necessary to ensure an end to end quality of service (being aware of advances on SLA in composed services and incorporate them into SOA4all). After the project, an effort to make the solution reliable is needed to transmit the feeling of maturity to the user. The semantics and technical complexities need to be hidden to end users when possible, enriching the solutions in a transparent manner for them.

2. Related to this, good training and related documentation needs to be provided to ensure that potential stakeholders know how to use it. Best practices should also be provided as examples of good usage of SOA4ALL results.

3. To comply with some legal constraints about data movement, a feature should be included that allows limiting the selection of service providers based on geographical

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location. Participation in current fora that try to influence administrations to modify current legal framework would also be highly recommendable.

4. Concentrate the effort on sectors where there is more probability of success, covering the gap of current players, mainly in SMEs. This will provide success stories to be used as commercial assets to sell the product to more difficult domains. Avoid competing with main SOA players in their favourite battlefield; it is better to find the gap in the market where SOA4ALL solutions have more or less competition. SOA4All solutions need to be versatile and configurable enough to adapt themselves to different scenarios

5. It is necessary to provide a critical mass of services initially that allow the wheel to start rolling. Then it is better to start covering a domain where there is a probability of success and provide to stakeholders the perception that it is a complete solution, with enough services to be discovered and ranked. Initial investment need to be considered to make it happen.

6. Products and services that make use of SOA4All technologies can address privacy and security issues on top of those technologies in order to make them robust enough. Build a message that transmits very well the needed trustiness to the user. A balance needs to be reached so relevant tasks can still be addressed by the solutions without compromising privacy This is one of the main barriers on user adoption.

7. Try to minimise dependencies on providers (platform, infrastructure, services…) by choosing/building the right business model.

8. Market studies need to be made prior to integrating SOA4All solutions in different areas, placing a special emphasis into the willingness of end-users to pay for these solutions. Preferably, business models should not involve end-users as a direct source of revenue.

9. Build a convincing message to overcome the risk of Ownership and IPR: the fact that the ownership is not entirely owned by an SME should not prevent Venture Capitalists to invest in them: this new model needs to be well explained to VC.

10. Promote standardisation through appropriate standards bodies and to provide case studies with supporting business models that illustrate the advantages of the approach.

1. Introduction

The introduction of new technologies, services and solutions to market faces always uncertainty and risks. Market dynamics, changing customer needs, and evolutionary and revolutionary progressing technologies make future unknown, where today's decisions may prove to be tomorrow's success or failure stories. While uncertainty and risks are inevitable part of any R&D projects the awareness of risks as well as well conducted risk analysis can help remarkably to minimise these risks regard to product development and result exploitation.

In this deliverable, we analyse the possible market constraints for SOA4ALL result exploitation, focusing especially on market related risks. This deliverable receives input from D10.1.2 Service scenarios and business models and D10.1.4 Market analysis and exploitation strategy.

1.1   Purpose and Scope

The aim of this document is to provide an overall understanding of market risks for SOA4ALL result exploitation. The aim will be achieved through following sub-objectives:

-    Risk identification and analysis

-    Risk assessment (probability of occurrence and level of impact)

The outcome of the analysis is expected to help and support partners to define their exploitation strategies, and also to help consortium to build general exploitation strategy..

1.2   Structure of the document

This deliverable consists of six main sections. Following the executive summary and introduction, section two, shows the context that defines the scope of the analysis. Section three identifies potential risks areas for SOA4ALL result exploitation; they are analysed in section four. The probability of occurrence and level of impact of these risks are asessed in the section five and, in addition, some recommendations are provided. Section six is dedicated to conclusions.

1.3   Methodology

Risk analyses are common in business. These analyses are used to provide support for strategic decision-making, and are useful in many different contexts, e.g. evaluating new projects, product development processes, and investment decisions. Moreover, in dynamic business environments, accurate analyses are useful to check whether the previously decisions made are valid in current (and future) conditions, and if changes in strategic direction are needed.

The methodologies used in constraint and risk analyses vary from qualitative analysis to very complex computer based simulations (e.g financial sector), where several variables and their

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relationships are analysed quantitatively by using specialized software. In the context of SOA4ALL project, the qualitative approach is more appropriate, where the technical and business knowledge of partners together with the guidance of commonly applied analysis methods are used to create an analytical framework.

We have used as methodology a variation of the Enterprise Risk Management[1], adapted to the characteristics of SOA4ALL. It follows the steps shown in the following figure.

Figure 1 Steps of the Risk analysis and assessment methodology

1. Establish context: Here the context of the study is shown, highlighting the aspects of technology, market and stakeholders.
2. A list of risk areas that could put barriers to SOA4ALL result exploitation is identified
3. The risk areas are analysed in more detail
4. The identified risks are assessed in terms of impact and probability of occurrence and a recommendation is given to minimise it.

This analysis is done through literature, shared understanding and partner's knowledge and experience.

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[1] Casualty Actuarial Society, Enterprise Risk Management Committee, *Overview of Enterprise Risk Management*, May 2003

2. Context and risk identification

2.1 Establishing context

In order to determine the potential risks of the project related to market we need to identify the scope of the project to discard many potential factors that are not affecting it.

In summary, from the user perspective, SOA4ALL aims to provide an easy way to find, compose and execute services. From the technical perspective, the project wants to ensure that the consumers will be able to use the most suitable services for their needs by:

a) discovering a bigger number of available services;

b) by improving their description (including semantic technology) so that search engines can determine the more suitable services; and

c) making the procedure to obtain a new service as result of service composition so easy than a non-skilled user can do it by himself.

Then the context where we focus our analysis is bounded by:

- The technology used by the project, in the search, discovery, selection, composition, deployment and execution of services. Its maturity; its relationship and positioning versus other technologies; and potential competitor providers are aspects to consider impact from the market. This technology is described in the multiple technical documents of the project.

- The target market: most of the population can benefit from the services provided thanks to SOA4ALL results either directly or indirectly, being the direct ones those who have access or provide IT services. We take advantage of the scenarios developed in the project to detail the impact in the scenarios corresponding sectors

- The stakeholders we have identified and are analysed in the following categories:

    o Platform and infrastructure providers.

    o Application /Software providers

    o Consultants / System Integrators

    o Web service providers

2.2 Risk Identification

The consortium has identified the following risk areas, that will be further analysed in next section.

1 **Market context**: different trends in SOA market may inhibit SOA4ALL result exploitability. We'll analyse the general point of view –i.e. general problems in SOA adoption- and we'll also take advantage of the project scenarios to study this particular cases.

2 **Technology and market maturity:** risks that appear in case the market is not ready to use the SOA4ALL technology, or because this technology is not mature enough to be used by the market or to be integrated with the existing baseline technology

3 **User Acceptance:** Users may find barriers to adapt to SOA4All solution (complexity, cost,

4   ***Competition and competitive technologies.*** How the current technologies and main providers which can be affect SOA4ALL results exploitation because they can be considered either competitive or alternative for the technology developed in the project.

5   ***Stakeholders:*** The risk that the different market players may bring to results exploitation.

6   **Ownership and IPR:** the risk associated to the ownership and IPR of the different components in a composite service.

3. Risk analysis

This section analyses the risk areas identified in section 2.2

3.1   Market context

This following section describes the main risks of introducing the SOA4All solution in the market. First the general SOA market is analysed and then we focus in the public administration, telco and web commerce domains.

3.1.1   General industry: SOA market (ATOS)

This section discusses the SOA market in general and identifies general problems in SOA adoption and aims at revealing possible trends, legal hurdles or other issues in SOA market that may inhibit SOA4ALL result exploitability.

Currently SOA market is growing since low percentage of companies have deployed SOA in their IT systems. Normally these are large companies that can afford the cost of this implementation. Not only the cost is a barrier for general adoption; SOA is not meeting the initial expectations; the implementation is not as straightforward as foreseen. Therefore, many potential customers are waiting until good practices and technologies get stable, simpler and the implementation cost is reduced.

Because these improvements are appearing, there is a growth in SOA implementation and analysts forecast incremental adoption: more than 50% of companies involved in SOA projects in 2012 compared to 10% in 2008 according to IDC.

Then the target should be the medium-sized enterprises, since the market for large enterprises is widely addressed. This means that requirements like easy-of-use and reduced administration are a must to succeed. These are two properties that SOA4ALL must consider.

There are two important aspects of the market that may limit the use on certain applications:

a) There are more and more services available around the world that could be used. But there are legal regulations that prevent that certain kind data leaves either the organization or the country boundaries, like data about financial, medical or other personal aspects. If there is no knowledge about where the service is executed, there is the risk to break current regulations. While these regulations have these restrictions, it may be necessary to limit the available providers of a service to those who belong to the same geographic boundaries than the consumer of the service. Since the explosion of Clouds has raised this problem, there are several initiatives that try to influence the regulators to be more flexible provided that the needed degree of privacy and security of the data is ensured.

b) There are many kind applications in the market for exploiting the composition of services. One trend is that the market is being asking for better quality of service; in this case an end-to-end QoS that is the result of the individual QoS that compose the service combination. In cases of interactive services, the user expects that the latencies are reasonable. As the service gains in criticality, other non functional requirements are needed, like performance, availability, reliability, etc, which are translated to a Service Level Agreements (SLA). The technology to ensure a final SLA based on individual SLA in a context where some services can fail is not completely mature yet and still under research to improve it. Negotiation with the service providers to select the right service is needed. SOA4ALL will need to be

aware on advances on this technology to widen the range of applications it can serve and improve their exploitation capabilities.

There is also the risk that if the big SOA players see that that other competitors (like SOA4ALL) introduce some improvements -like easier user interface- that make that solutions more attractive, they incorporate that improvements to their products to keep their clients. This would reduce the number of SOA4ALL result adoptions.

3.1.2 Specific industries – scenario based market risks

This section provides examples of the market constrains/risks SOA4ALL result exploitation may face in public administration, telco domain, and web commerce market.

3.1.2.1 Public administration (WP7 scenario)

The following section describes the main risks of introducing the SOA4All solution in the Public Sector market. To use a platform like SOA4All successfully in a Public Administration it is needed to ensure that a complete solution is available that covers all business processes of each administration. To implement a process usually a variety of special services is needed. With a high number of potential end-users and a very large market size the risk of selling an incomplete solution is high. In addition, there is a risk that other service providers still not offer a sufficient number of specialized services that could be used to offer a complete solution.

The Public Sector in general is a traditional and conservative market. Long and intensive customer relations complicate the market entry and its completely new IT solution. Industry experts maintain customer relations for years and accompany them on the sale, support and maintenance. In Public Administrations compared to the private sector are often lengthy decision-making processes required until it comes to introducing new software. This problem is caused by the significant organizational structure of the government. Especially for new entrants these long decision times are risky - not only from a financial point of view. The SOA4All deployment in a Public Administration is facing a big effort, because such a software implementation would often require a fundamental organizational restructuring. Furthermore, old IT systems are often used that do not match the current state of technology, which means that staff should be trained adequately.

Another risk is the identification of potential customers, as there are many factors that characterize the Public Sector market. Some of these influences are for example the availability of funding, the interest in new technologies and the development of an investment strategy for information and communication technology.

Within the next few years a large low is expected in the market. Due to the upcoming staff development and an increasing cost pressure it probably comes to great changes in the Public Sector. Public administrations will be forced to solve new problems with new IT solutions. This opportunity will also cause the risk of missing the right time of introducing the new solution. A great competition among providers particularly in the areas of Software Hosting and Software-as-a-Service would be the result in the field of Public Administration. The economic down turn will presumably have effects on the IT market in the Public Sector and in a long term view the already difficult financial situation of the public budget will even worsen. This will probably also lead to a lower readiness of IT investments. Through this tight budget and the decreasing willingness to take high risks with new IT solutions it is questionable whether customers of the Public Sector market are actually willing to pay for a SOA4All platform.

Depending on the country the various public offices are characterized by individual business

processes. In some European countries, business processes are standardized at the national level. In different countries, there exists a variety of different processes for the same citizens' service request. The EU Services Directive[2] focuses on this point and aims to release the untapped growth potential of the services markets in Europe by removing legal and administrative barriers to trade. There were mainly addressed two important processes. A big advantage in terms of SOA4All would be that several administrations could share and adapt regionally, nationally and internationally processes and services. Because this prerequisite for a process-sharing is currently only partially and country-specific fulfilled in this market segment, one of the main added value of SOA4All is not yet fully exploited and therefore it is specified as a risk in this section.

3.1.2.2 Telco sector (WP8 scenario)

Considering the market context in the telecommunication sector, the overriding trend is that revenues and margins from traditional telecoms services are in decline. As a result the examination and adoption of new business models including those considered in the SOA4All project is not only an opportunity but also a necessity for telcos.

A key issue for telcos as they transform to offer their services over the web is that they face competition from existing web companies (webcos), some of which have already begun to offer telecoms services themselves. The risk is that webcos maintain their position of strength as they move to offer telecoms services (either integrated with their own products or in their own right) which leaves the telcos relegated to 'bit-pipe' or commodity providers to the webcos and without a direct relationship with the end customer. This will result further erosion in margins for telcos since they will be forced to compete on price rather than on their ability to provide value-added services.

A related risk for telcos is that their transformation is impeded by their lack of agility. This could be due to a number of factors including their culture (they are seen as slow to change), their large cost base and heavyweight processes. Webcos tend to be more agile since their costs are much lower that those of telcos and their processes are more lightweight.

In the web arena, customers have become used to getting services free at the point of usage and there is a risk that this will prevail for telecoms services offered over the web. Naturally, there are other business models e.g. based on advertising that have emerged and webcos have become successful by adopting these. Telcos need to act in a similar way and indeed the Telco 2.0 initiative identifies the way in which telcos can offer value added services to upstream customers based on the relationship they hold with the existing downstream customers – a many-sided business model. Thus, in these new models, if the major value is no longer in directly selling telecoms services this creates tension with existing business models and there is a risk that this could contribute a quickening erosion of revenue and margin for traditional services. Clearly, a position of balance needs to be found.

3.1.2.3 Web commerce market (WP 9 scenario)

Looking at the user case from a provider/ISP perspective there are, a few risks that should be mentioned. Those risks are taken by companies that will host the SOA4All service platform including the DSB and the other SOA4All components. Within the project, companies HANIVAL, TIE, SEEKDA and TXT will take those risks after project end when opening the SOA4All WP9 results to real businesses. Those risks include:

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[2] EU Service Directive: http://ec.europa.eu/internal_market/services/services-dir/index_en.htm

- Critical Mass

  It might be possible that the number of potential users is limited at the beginning of the public availability. This also means that the number of services is low at the *beginning. However, because of this, the number of users might not increase, as* most users will benefit from the services. As such, a critical amount of services is necessary in order to provide an attractive platform.

- Maintenance Costs

  One of the risks is a high cost for maintaining the platform in case that it is successful. This also includes the maintenance of standards and components in order to ensure that they are up-to-date with new specifications. SOA4All has been designed to be very flexible but as the future is unpredictable, the costs for integrating new features and maintaining the platform stays a (limited) risk.

- ROI time and initial investments

  Although SOA4All and especially the eCommerce scenario are in a very good shape, they are still far from being a system that is ready for production use. Instead of this, the goal of SOA4All is to provide a prototype implementation. As such, many small things will need to be realized before SOA4All can be used for day-to-day eCommerce. There is obviously a risk in investing the effort without reaching enough users to create a fast return on investment.

3.2 Technology and market maturity

In the next 2-3 of years, web-based service ecosystems are expected to increase in importance and visibility in the software and services market, and bring innovative solutions, supported by "XaaS" business models (SaaS, PaaS, IaaS)[3]. Major software industry actors aim at offering service marketplaces, including Internet actors (such as Amazon with AMWS and Google with their Apps Marketplace), leaders in enterprise solutions (such as SAP), main innovative companies that extend their on-demand solutions offerings (such as SalesForce, which extends its CRM Web-based solution to service marketplaces with AppExchange.com).

A first analysis of these different marketplaces shows that each of them are focusing on specific usages and applications, leveraging the existing expertise and technologies developed by these actors during the last ten years: Amazon around data exchange increasing sellers' efficiency and improving response time to customers; Google organizing an ecosystems of editors and developers of professional solutions around Google Apps; SAP offering a variety of specific internet portals that enable true collaboration among SAP, its customers and partners; SalesForce extending its well-known CRM web-based solution to the force.com service platform and developing the AppExchange service marketplace.

The SOA4ALL integrated solution, and specifically the SOA4ALL Federated Infrastructure

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[3] Ben Pring, Robert H. Brown, Andrew Frank, Simon Hayward & Lydia Leong "Forecast: Sizing the Cloud; Understanding the Opportunities in Cloud Services", Gartner Report, March 2009.

proposes a relevant and consistent set of technologies, including a distributed and secured infrastructure, a common distributed data sharing and analysis space. This technology can become mature in the next three years, depending on the adoption and usage level of this technology by service ecosystems in the next years, too. So, one main risk related to the SOA4ALL technology is based on the capacity of first the SOA4ALL partners, and secondly other partners which will be attracted by this technology, to develop an ecosystem to develop and exploit this technology.

This technology brings some benefits: its intrinsic and native service-oriented approach and consequently, its openness to any kind of application or software, provided that they are compliant with service-oriented standards (WS-*, REST); its innovative and integrated infrastructure based on a federated architecture, intrinsically designed for large-scale and distributed applications including monitoring capabilities, well-suited to inter-organizations collaborations and integrations.

Furthermore, the technological foundations of the SOA4ALL Federated Infrastructure, especially the transport layers and p2p technologies ensuring the federation of the distributed nodes are interoperable with existing infrastructures (e.g. Amazon EC2, the Elastic Cloud Computing engine powering the Amazon Web Service applications). As such there is an opportunity for the SOA4All Federated Infrastructure to promote an open and flexible approach where service ecosystems are able to interoperate. Conversely there is a risk that a small number of major players expand to provide a more general marketplace rather than focussing on their specific domain and that the open approach in not able to flourish.

With respect to the SOA4All Studio, the market to consider is one where end-users interact with services in heterogeneous manners, by providing new ones, mashing them up, consuming them, etc. The fact that end-users already consume different kinds of services and that there are advanced users creating new ones shows there is an existing market with a requirement for SOA4All technology. With respect to the provisioning or creation of new services, the service world market has traditionally disregarded the non-technical users, but it is true that lately efforts have been devoted to making that process easier through the exposition of more simple APIs. For example, many developers leverage these to create new applications and mashups which they share through Web platforms such as Facebook or iGoogle and application markets such as iTunes or the Android Market for mobile applications. The SOA4All Studio aims at bringing the non-technical users into the loop, so this will broaden the target market of our solution.

The potential risk is that the innovations that the SOA4All Studio can bring are not enough to gain space in the described market. However, we believe that by placing emphasis on ease of use and thus lowering the entrance barriers for end-users, the SOA4All Studio will be suitable for a wider audience, and therefore introduce an innovative approach into the existing market.

Another particular risk is that, since the SOA4All Studio is a set of online decoupled distinct tools, some of them might be ready for exploitation before others, not only in terms of the tools themselves but also considering the kind of problems that each of them can address (e.g., annotating a service, consuming, analyzing, etc.) and the need for these that might exist. This could prevent easy integration with external systems if we consider the SOA4All Studio as a monolithic piece of software, but we believe that the decoupled approach of the Studio will make the integration of the different parts with external systems easier.

In the scope of Service Location in SOA4All the project is developing a Service Crawler and a Discovery and Ranking engine. The Service Crawler is detecting publicly available services on the Web, both WSDL-based and RESTful services. This allows us to find services that have not been registered manually on specific service portals (like e.g. ProgrammableWeb.com). The Service Crawler is a mature piece of technology and is

currently already in use on the market, being the crawler used in the back of the Seekda Web Service search engine[4].

The discovery and ranking engine allow users to find the fitting services out of a large number of services. Discovery makes use of lightweight semantic descriptions of services and offers more or less complex approaches working over real large numbers of services. Ranking allows the filtering of the discovery results based on either real-world information about the services (e.g. monitoring) or non-functional information about the services (e.g. SLA information added by the service provider). The discovery and ranking engine works over semantic services, i.e. services annotated using WSML 2.0. Currently there are almost no such annotated services available on the market, which makes that the component is not usable on real services without first the semantic annotation step. The semantic annotation can be done via the SOA4All Studio, which makes that together with the Studio the Discovery and Ranking engine can be applied to the current market. Thus there is a risk that the benefits of the SOA4All approach for discovery and ranking are predicated on semantic services being available which in turn is dependent on semantic annotation.

The discovery and ranking engine can be useful in both open and closed environments, e.g. supporting service discovery on the Web (supporting large numbers of public services) or in an enterprise intranet or on a restricted set of services. It can be beneficiary to all people/enterprises that are looking to find specific services, as they benefit from the scalable discovery abilities and from the flexible and configurable ranking.

3.3   User acceptance

This section discusses the possible barriers users may have to adapt new solution. Are they ready to pay? Are there reasons, which inhibit the adaption?

This section includes two sub-sections: general approach and WP7-9 related sections.

3.3.1   General approach

SOA4All technologies need to satisfy the expectations that the very different users which are foreseen to use these solutions may have. With the "for all" approach of these set of services and tools, which try to cover the needs of very different kinds of users, it is important to address their heterogeneous needs in suitable manners. Otherwise, the risk is that these solutions may be too generic for every kind of user, and that could be potential barrier for them adopting the SOA4All technologies.

Needless to say, user acceptance is indeed a very important matter for SOA4All solutions, especially considering that a strong emphasis has been placed on the ease of use of the different services and tools with respect to end users. The fact that the tools are indeed easily usable will significantly boost the uptake of SOA4All technologies. On the other hand, if users feel that it is complicated to deal with them, or are discouraged by other factors such as payment schemas that do not suit their expectations, this could imply a potential barrier for the exploitation of SOA4All results.

One could argue that another risk in the area of user acceptance of these technologies is the use of semantics itself. Positioning the SOA4All Studio as a set of semantic tools over semantic Web services will be convenient in some senses, but also dangerous regarding

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[4] http://webservices.seekda.com

user adoption. However, there is a clear trend in the line of semantic technologies that we need to foster in order to overcome this possible obstacle. By having more infrastructures, trained people, providers, etc. in favour of semantic Web services, and in general a better semantic culture, the SOA4All technologies will be more easily exploited.

In order to overcome these risks of user acceptance, hence ensuring that end users adopt SOA4All technologies, there is a strong need of good documentation, information online, etc., followed by a community of users from whom to bootstrap, that can give a sense of security to the new ones. Apart from the technical considerations, end users will embrace the SOA4All services and tools more likely if there is already a proven track of users dealing with these tools and participating in different ways.

Having said that the end users might come from very different sectors, we review in the following subsections the specific risks related to user acceptance for each of the areas addressed by the Case Studies of the project, namely the Public Sector market, the Telco sector and the eCommerce domain.

3.3.2 User acceptance in specific scenarios

3.3.2.1 Public Sector Market (WP7)

In this section, the risks are described which could discourage users in the Public Sector market to use an IT solution such as SOA4All.

From WP7 perspective the employees of the administration of the city X which are the end-users of SOA4All would have to accept a completely new field of activity. With the SOA4All launch their role would be the implementation of process modeling and adaptation in addition to purely execute processes. In the existing IT Enterprise Solutions of the Public Sector market this remit is being taken over by IT professionals, business and technical consultants. The affected administrative staff should be trained specifically to model processes and to search and integrate services. This task change could be criticized by the staff[5]. In addition, introducing a software solution like SOA4All would probably bring an organizational restructuring in many administrations to effectively use the new solution. Again, this impact is considered critical in relation to the employees as the future end-user group. In the WP7 specific scenario, the administration of the city of X operates the SOA4All platform and infrastructure itself. A corresponding SOA4All technical expertise in the IT sector is not yet available.

If the market in the public sector is proceeding as predicted, the areas such as software hosting and software-as-a-service will play an increasingly important role also in terms of SOA4All. Especially in public administrations, this could mean that old activities of the IT staff are outsourced and no longer required. It is also conceivable that citizens, who are taking the role of prosumer in the scenario, don't like the idea to outsource critical and sensitive administrative data to other companies due to privacy reasons.

3.3.2.2 Telco Sector (WP8)

In the telco sector as providers move to offer their services via web APIs, the biggest issues are the level of take-up and the potential revenues that can be earned. The majority of telco

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[5] Mehandjiev, N., Stoitsev, T., Grebner, O., Scheidl, S., & Riss, U. (n.d.). End-User Development for Task Management: Survey of Attitudes and Practices. *Communications.*

providers have entered the market by creating platforms that are aimed at developers where basic services are offered at cheap, flat rates or free. Whilst pricing policies will no doubt change as adoption levels increase, there is a risk that such platforms will not result in mass market adoption with revenues that could replace the decline seen in existing business models. As discussed in the Market context section 3.1, consumers on the web have become used to getting services free at the point of usage and there is a risk that this will prevail for telecoms services offered in the same way. A further risk is that existing high-profile webcos attract customers to their portals and services meaning that telcos find it hard to establish themselves with users. Furthermore, there is a risk that the perceived value in being able to offer (previously unprofitable) niche services to customer in the 'long-tail' is not as high as expected. The majority of existing platform-based applications are games or lifestyle 'apps' that attract low revenue. These must sell in large numbers and also higher value or business focussed apps need to emerge alongside these if telcos are to create significant new revenue streams.

As previously discussed the Telco 2.0 approach would result in value-added services being offered alongside basic telecoms services which has the advantage that telcos are differentiated from webcos and that revenue is gained from upstream customers rather than simply relying on the usage based revenue of downstream customers. Additionally, SOA4All technology aims to lower the entry barrier to the usage of such platforms by making them accessible to less skilful people thus enabling mass-market adoption.

There are inherent risks associated with the Telco 2.0 approach and user acceptance of which the major one is concern about privacy. Many of the value-added services in Telco 2.0 are enabled by the knowledge that telcos have about the customers (in terms of their activities, social networks, personal data, etc.). There is a risk that customers will simply not accept that their data is used is this way either because of concerns that personal data is compromised or that the telcos are able to generate revenue through its use. There are examples of webcos (e.g. Amazon – 'users who bought this also bought this') who have largely avoided controversy as have companies in other sectors e.g. Tesco and their loyalty card. However, the recent furore over BT's trial of the Phorm behavioural-based advertising system will not have reduced the risk that the heavily brand conscious, risk averse telcos are unwilling to be seen to be using their customers' data for profit. The telcos must ensure that data is anonymous, aggregated and presented in a secure way.

Regarding SOA4All specifically, there is a risk that the technology does not do enough to reduce the complexity associated with finding and using services delivered over the web. This would mean the adoption levels are severely affected, reducing the viability of the business models. More widely, there is a risk that the value chains resulting from the service-based approach may be too long to be able to respond to user problems in a timely and meaningful way.

3.3.2.3   eCommerce Domain (WP9)

From a WP9 perspective, the following barriers can be named:

Costs

The acceptance within the eCommerce domain highly depends on the costs for using the technology. Within eCommerce solutions, it is extremely important to have a low cost-per-sale, which requires a cheap and reliable platform. As such, SOA4All will not be successful if its usage is expensive.

Trust

Trust is a main issue in eCommerce. If an eCommerce solution is not trusted by its users, it

will not be successful and not be accepted in the market. SOA4All could achieve trust by providing good and solid dissemination and by providing an open and helpful environment.

Maturity

In order to be accepted by eCommerce users, SOA4All needs to be mature. This means that it needs to provide a reliable and integrated toolset that is providing all necessary functionalities for the day-to-day business. This also includes a proper documentation and support system. Unfortunately, this is not yet the case for SOA4All at this stage of the project. However, as SOA4All will only provide a prototype solution, it cannot go that far within the project. Instead of this, commercial partners are requested to bring SOA4All to the required level of maturity after project end within the commercialization phase.

3.4 Competition and competitive technologies

This section discusses the role of current technologies and main providers which can be considered either competitive or alternative for the technology developed in SOA4ALL project. For example, in which extend they are competitive? Is the SOA4ALL technology able to provide compelling reason to switch current technology to SOA4ALL technology? Is the added value of SOA4ALL attractive enough?

This section includes two sub-sections: a first general approach and sections related to the technology developed in the different WPs.

3.4.1 General approach: Competitive technologies and main providers

The existing dominant players in the web arena such as Google, Amazon, Facebook and eBay have a reputation for offering innovative services and a very large, international user base that they would certainly leverage in offering a multidisciplinary service platform. Most have experience of multi-sided markets, already expose APIs for their services allowing others to build applications and notably Google with Google Talk is expanding into other sectors. These successful webcos can be seen as a major source of competition in the market.

The Apple App Store is an example of a device specific platform that has proved very successful in attracting both developers and consumers. Others have followed suit in setting up either device or operating system specific stores (e.g. Nokia, Samsung, Sony and Google). Similarly, mobile operators have also set up stores to offer a mixture of device specific and telecoms services. Currently the user experience is richer for device specific apps than for mobile browser-based apps that are capable of running on different devices. This richness means that the stores of the device manufacturers have been able to build up a loyal user base, which gives them a competitive advantage versus more open, device agnostic approaches.

Regarding service composition, although there is not a direct competitor that offers the same SOA4ALL features in the market yet, there are big players that offer alternative solutions like based on web services and enterprise bus, including tools for governance, design, mashup, monitoring, test&validation, BPEL process management, service registries, etc. Those big players include Hewlett-Packard, IBM, Itko, Microsoft, Oracle, Progress Software, Software AG, TIBCO and WSO2[6]

These SOA vendors mainly target large enterprises, and therefore there are few sales of

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[6] See analisys in SOA4ALL deliverable D10.2.1. "Exploitation Strategy and Plan", section 3.1

high value each. This is a barrier for SME who cannot afford this initial cost of SOA adoption.

The opportunity is then the offering of an overall solution whose cost is far less than current one and therefore opens the door to these new players. SOA4ALL software will be mostly open and therefore not locked to a specific provider. The gap is to start competing with current solutions in another market niche where there are more possibilities of success. In order to enter into large enterprises, the risk -and also the challenge- is to survive to the marketing strategies of these big players and to collect and well disseminate success stories that attract decision makers. Current big SOA providers probably are having more benefit with their current SOA portfolio than moving to a SOA4ALL approach, and therefore they will only start this movement if there is a market demand that force them to follow that trend.

3.4.2   Specific technologies developed by the project

Federated infrastructure

As described in the exploitation document related to business models and scenarios (refer to D10.1.2 deliverable), the (Web) service ecosystems are considered as an exploitation approach relevant to the SOA4ALL platform, especially from the point of view of the software proposed by the WP1 (federated Infrastructure).

The development of service marketplaces lets appear several categories of competitors, mainly major software industry and Web 2.0 players. Two of these competitors are discussed hereafter, in order to help positioning the SOA4ALL platform, and what are its innovative and specific outcomes.

Amazon Marketplace Web Service (Amazon MWS) enables sellers to easily exchange data supporting their listings and sales on Amazon.com through an integrated Web service API. Sellers can programmatically exchange data on listings, orders, payments, reports, and more. XML data integration with Amazon enables higher levels of selling automation, which helps sellers grow their business. By using Amazon MWS, sellers can increase selling efficiency, reduce labor requirements, and improve response time to customers.

Force.com (extension of the well-known CRM SalesForce platform) proposes a Cloud Platform for business applications.

The simplified programming model and cloud-based run-time environment enables building and running applications 5 times faster, at about ½ the cost of traditional software platforms. Force.com proposes:

- A development platform, including a database, security, workflow, user interface, and other tools for building powerful business applications, Web sites, and mobile applications.

- A cloud infrastructure that's secure, reliable, and fast. The cloud infrastructure beneath Force.com has been fine-tuned over the past 10 years. It powers approximately 72,500 businesses running more than 135,000 applications that 1.5+ million users count on every day

The SOA4ALL Integrated Solution is similar in terms of functionalities to those competitive solutions.

One key feature of the SOA4ALL Integrated Solution, and more specifically of the SOA4ALL Federated Infrastructure (as provided by WP1) is that its enables and powers the integration of any kind of service or data, provided that they are accessible through service-oriented standards, whatever their origin or the service marketplace they are belonging to. It means that SOA4ALL is able to federate various service ecosystems, including AMWS or Force.com, at least for standard-based services.

Another distinctive feature is that SOA4ALL is agnostic with respect to business domains or applications. While AMWS is specific to Amazon ecosystem, or Force.com is mainly dedicated to sales, marketing and customer support applications, SOA4ALL Integrated Solution aims at providing an open and business independent service-oriented development platform and infrastructure. SOAALL should bring more agility for developing applications well suited to flexible businesses.

Furthermore, SOA4ALL Federated Infrastructure is able to interoperate with some services proposed by some competitors, such as Amazon EC2 (Elastic Cloud Computing).

SOA4ALL Studio

Regarding the SOA4All Studio, there is not such a complete Web solution in the market that covers the whole lifecycle of services from the end-user perspective, making use of lightweight annotations over services. Existing tools in the area of semantic Web services such as the WSMO Studio semantic services modeling tool, or the WSMX and IRS-III execution environments, covered the handling of semantic Web services from a desktop-based approach and making use of more heavyweight models that the ones addressed by the SOA4All Studio. Thus, it is not in this area where we have to look for competitive technologies.

On the other hand, there are indeed many well-known enterprise solutions in the SOA arena that deal with services and business processes. Major players such as SAP, Microsoft, IBM or Oracle have included semantic definitions in their architectures, which in any case are far from being semantically-focused applications. The added value of their solutions is that they already have a proven track of being reliable, scalable, and valid for the purposes they have been created for. In contrast, a risk with respect to these consolidated competitors is that semantic technologies and lightweight semantic Web services in particular still have to demonstrate in this area that they are valid for the intentions they have been conceived for, making these processes easier and more suitable for different kinds of users.

Service Annotation and Reasoning

Main results coming from WP3 is a complete set of open-source (LGPL licence) reasoning components for WSML (called WSML2Reasoner). They provide the ability to reason with ontologies and semantic Web service descriptions that use a wide variety of different logical formalisms along with compliance with W3C standards.

Some technologies already exist that are also provided as reasoning libraries:

•   The Pellet reasoner (an OWL-DL reasoner) can be set up to work in the Jena Semantic Web framework for Java (available under GNU Affero, open-source license).

•   FaCT++ is the new generation of the well-known FaCT OWL-DL reasoner (available under GPL open-source license)

•   KAON 2 is an infrastructure for managing OWL-DL, SWRL, and F-Logic ontologies (available under a close source license).

However those technologies don't provide the same level of expressiveness, complexity and performance than the WSML2Reasoner reasoning framework. Each of them has their own focus and should be used in a specific context. Main added value deals with the improved performance for companies having a lot of services.

Service Location

In the scope of Service Locatio in SOA4All we provide a Service Crawler and a Discovery and Ranking engine. The Service Crawler is built on top of an open-source state-of-the-art Web Crawler, Heritrix[7]. Heritrix as such can – same as other Web crawlers like, e.g., Nutch[8] – be used for crawling the Web for services, but the focus to Web services requires specific

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[7] http://crawler.archive.org/

[8] http://lucene.apache.org/nutch/

extensions and configurations based on large expertise and experience in the service domain. The latter is what makes the SOA4All Service Crawler outstanding, it is able to crawl the Web for both WSDL-based and RESTful services and stores corresponding meta-data in RDF. on the market there is no comparable product that could compete directly with the SOA4All Service Crawler.

The SOA4All Discovery and Ranking engine supports a hybrid discovery approach combining lightweight classification and complex functionality-based discovery, as well as ranking using a) available real-world information from the Web (e.g. QoS information), and b) non-functional properties provided by, e.g., the service provider. It is the only discovery and ranking engine that works on top of services annotated with WSML 2.0. In that sense there is no direct competitor available. There are discovery engines available for other semantic service description languages as WSML 1.0 or OWL-S for example, but we assume that our engine is a lot more scalable as it provides a hybrid discovery approach that works with lightweight annotations to be able to scale with large numbers of services.

Overall the SOA4All technology enables the location of services that fulfill users' needs on top of large numbers of publicly available services; the technology can be used both in an open Web environment and in closed enterprise settings. The added value of our approach – the fact that we locate a large number of publicly available services and provide efficient discovery and ranking on top of these – is a compelling reason to switch from other technology to SOA4All technology, provided that the customer provides the annotation of the services in WSML 2.0.

Service Construction

The SOA4All approach to the Business Process (BP) modelling and execution cannot be considered a competitive or an alternative to existing similar approaches in the market, but a complementary one. SOA4All improves BP engineering lifecycle experience by complementing existing industrial solutions based on Enterprise-SOA with assisting methodologies and tooling that makes easier to developed SOA composite services.

The modelling and execution of Business Processes can be considered one of the three main usages of SOA technologies, being the other two: a) integration of enterprise applications (EAI), b) externalization of business assets

Current SOA-based BP engineering suites offered by major industrial vendors, i.e. IBM, Oracle, SAP, etc. are heavy weighted, full-fledged BPEL4WS based composition and execution frameworks, intended to be used by large experienced service engineers and integrators. However business processes are designed by business analysts who lack of such IT background, whereby BP engineering teams are participated by both roles: business analysts and service engineers or integrators. However, existing BP engineering tools are not suitable for business analysts who use their own tooling, more marketing oriented.

SOA4All suite for service construction is easy enough to use by business analysts with non IT background. Furthermore, since SOA4ll service construction suite leverage on exiting OSS SOA technologies (including BPEL4WS) it supports the complete BP engineering lifecycle since design to run time.

SOA4All service construction suite provides additional features not present in other SOA composition frameworks, such as: a) context-aware adaptive BP modelling and execution, b) extensive reuse of domain specific pre-existing BP knowledge, c) runtime message and interface mediation, d) some self* runtime capabilities.

The fact the SOA4All service construction suite leverages on standard SOA-based service construction technologies simplifies its adoption in the context of BP modelling domain,

understanding that our approach complements the existing ones, but it doesn't replace them. That implies a relative easy and straightforward adoption of SOA4All service construction suite within the existing BP frameworks of SOA4All stakeholders.

However, SOA4All approach heavily relies on the availability of semantically described domain specific knowledge, which is used to endow with meaning the main artefacts used to automate the modelling and execution of business processes. This knowledge availability could be the main obstacle for a quick adoption of this solution in some concrete domains.

3.5 Stakeholders

This section discussed the possible risk factors different market players may bring to SOA4ALL result exploitation.

3.5.1 Platform and software infrastructure provider

The platform and infrastructure provider is an essential element of the Telco 2.0 approach and the associated 2-sided business models. The risks of this approach from the point-of-view of users have been discussed above but there are further risks associated with the infrastructure required to support it.

One such risk (which can also be seen as an opportunity) is the lack of support for complex service offerings that is currently provided by existing telecoms infrastructure. Currently Service Delivery Platforms (SDPs) within telcos are optimized to handle their own specific services and architectures and would struggle to support services that require data from outside of a particular service silo. Thus the risk means the telcos are unable to support the services that customers require.

However, there are moves to transform SDPs into frameworks that support the externalization of capabilities to third parties to build profitable services and to enable efficient service composition[9], that allow telcos to monetize the customer profile data and to stimulate service innovation by enabling mashups with Internet/Web 2.0 services and to support the B2B platform of Telco 2.0 approach allowing 2-sided business models. To support this there are standardization efforts in place to promote interoperability for such frameworks. Again, this creates an opportunity for SOA4All technology to fill this gap but there is also a risk that the dominant SDP providers such as Oracle emerge as a major competitive threat.

The key requirements for a Telco 2.0 platform are scalability (i.e. able to support millions of simultaneous users and services), resilience and proximity to users (to reduce latency). Satisfying these requirements can improve the quality of service offered which is a key differentiator for telcos (compared to say webcos without the same level of infrastructure). Latency is a key issue in the telecoms domain due to the real-time requirements of services. Thus there is a risk that the more adhoc approach of integrating many services from many providers versus the more managed approach which telcos are used to has a detrimental effect on the quality of service that telcos are able to offer.

Finally, there is a risk that a managed platform-based infrastructure proves to be too

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[9] Kimbler, K., "Evolving Service Delivery Platforms: Essential Plumbing For Smart Pipes", tmforum Insights Report, 2009

expensive when compared to an ad-hoc 'mashup' approach supported by existing Internet architecture. This is tied up with the quality of service that can be offered and for which users are willing to pay and, more generally, the value-add that infrastructure providers can offer.

3.5.2 Application/software provider

The following section provides an analysis of potential risk factors from the perspective of the application provider. This view is detached from real existing companies and products.

For the application provider there is a large technical dependency on the platform manufacturer. Technological changes, add-ons and upgrades on the manufacturers' side could result adaptations and new developments of the proposed applications. These factors are often not foreseen and carry a high risk. In addition, the staff of the Applications Service Provider, such as developers and consultants should be kept at current level of knowledge which generates costs.

There is also a financial dependency on the platform manufacturer and infrastructure provider. This risk is highly reliant on the chosen business model. Thus, it is conceivable that the SOA4All platform manufacturer sells a matching application development platform and environment to the application provider that makes it possible to develop SOA4All platform optimized applications. Price changes in the appropriate business model would directly impact on the application provider. Furthermore, the infrastructure could require a commission from the application provider to use the infrastructure.

Depending on the realization of the respective application, the service-oriented architecture platform SOA4All makes the possibility to integrate external in addition to individually developed services and processes in the application. This option results a dependency on the service and process providers. This can be lead to services or processes changed or removed from the market, so that the application provider needs to adapt the application. As a consequence, services or processes could need to be changed or to be taken off the market, so the application needs to be adapted by the application provider.

Presumably, future application providers act mainly as business specialists what makes them limited to one or a few industries. This causes on the one hand a strong relation to each market segment and on the other hand a natural restriction on the growth potential of the business when the market is saturated. If there are further successful platform providers beside the SOA4All manufacturer in the relevant market segment the SOA4All specialized application provider can only offer its application to a limited group of customers. A customer who has opted for an application of one application provider can easily reverse this decision. Due to the structure of the SOA platform it is relatively simple to replace the chosen solution by the solution of another application provider.

3.5.3 Consultant/system integrator

Consultants and systems integrators are two supporting roles in the SOA4ALL exploitation scenario.

Basically, on one hand consultants will help the prosumers/end users to get familiar with how to use the Studio tool; to understand the basic model and how to use/create applications with this new paradigm; and get more expertise on using in different domain scenarios.

On the other hand, system integrators will provide consultancy and integration services at three different levels of the integrated solution (studio, platform services, bus) for the solution provider.

They have them a new opportunity to make business: organizations may need consultancy

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to help them to analyse the impact and viability of adopting the SOA4all approach in their case, and education and training in case they adopt it. In this case, system integrators will have new business opportunities in applications adaptation to SOA4ALL.

However, one of the key points of SOA4ALL solution –the easiness of composing services- is a double-edge sword for for these two supporting roles.

- On one hand, since the cost to create and maintain and application should decrease, more organizations may have the opportunity to afford some applications that would have not been possible with current costs. In addition, since it is expected to use more available services or reuse existing internal services for the composition of the application, the time to market will decrease in a stable state; the associated cost reduction could improve the margin of the system integrator.

- On the negative side, more organizations can have staff skilled enough to develop their own applications without the need of external help and therefore the income for these two roles can decrease (this can also oblige them to reduce the rates because more competitors could be able to provide user support or because the threshold in the decision of asking for this support will decrease).

Another barrier is that both consultants and system integrators will need to improve their staff skills in SOA4All technologies related to their role: education about web services and composition, legal and technical barriers, ownership and IPR of applications and data, security and privacy issues, cost of adoption and related ROI. This can be important in big players and there is the risk that many of them find more comfortable current status where their staff is already skilled, there is less competition and even can have more economic margin in their business activities.

The risk is then that consultants and system integration firms be more interested in keeping current situation and that therefore they block or delay the clients adoption of SOA4ALL technology and only go for it if obliged by the market demand, in case other smaller players create this market need through well disseminated success stories.

To overcome this risk, a very well planned dissemination of the added value of SOA4ALL strategy, about its benefits and real success examples with attractive ROI will be needed to improve adoption, as well as a good training strategy focused on the needs of the different roles. There will be some customers whose strategy is to outsource any new development, and this is the opportunity for solution providers and system integrators; but most of them that plan to use SOA4ALL technology will use consultancy or training services to some extend.

3.5.4 Web service provider

WebService providers may strongly benefit from SOA4All due to their higher visibility and the large number of potential users.

In addition to this, SAO4All will also allow them to put their services in context and use them in a holistic process instead of providing services as isolated islands.

However, there is a risk that not enough service providers will use SOA4All. This might happen because of missing revenue and income models, which need to be described and identified in order to allow service providers to generate additional income from SOA4All.

Within 10.2.1, potential income models are analysed and described that could help to minimize this risk.

3.6 Ownership and IPR

In D8.5 it was stated the fact that the lack of ownership of the component services was perceived as a major risk for the successful uptake of the SOA4All vision to SME context. This is linked with the model of funding through Venture Capital (VC) which many SMEs use. The traditional view of VC funding is that the product should contain protectable IPR and that the SME to be funded should own this. Both would be difficult to demonstrate in the value-added composite service world underpinning SOA4All. Indeed, it would be difficult to explain that the protectable IPR lays in the way in which component services (which the SME does not own) are connected in the composite service.

The way to address these concerns is for the SME to have a track record of successful innovations using the service composition model, failing this a number of success stories can be pointed out to the VC funders. This can be supported by establishing a library of success stories as well as the library of service components.

Another area where the discussions highlighted the need for further education and dissemination work was the way in which inter-component relationships are governed by licenses, and how using a service component does not mean having access to the software and IPR underpinning it.

The lack of ownership may also create problems when one of the service suppliers disappears overnight. An example with a telecoms service provider in Burnley was pointed out, which went into liquidation in February 2009. This highlights the importance of the black-box model of service compositions, where any of the service components can be replaced with a minimum of adaptation costs if a particular service instance is withdrawn.

The issue of ownership was felt even more strongly in relation to the data ownership and location in the Service-Oriented model. Uptake of business applications on iPhone was felt to be impeded by the remote data model of some Apps, which requires connectivity for access.

It was not only the SMEs which were felt difficult to convince of the benefits from the service-oriented software, many of the banks and other big institutions were felt to be reluctant to embrace change when they may have 30 or more years of own legacy software.

4. Risk assessment

This section assesses the probability of occurrence of each of the risks detected in the analysis carried out in previous section and its level of impact.

The values are set based on the experience and opinion of the consortium, since they are related to SOA4ALL.

At the end of this chapter a set of recommendations is given to minimise the risks.

4.1 Probability of occurrence and level of impact of risks

The following table summarises the risks identified in our analysis.

Table 1: Risks: Probability of occurrence and impact level

RISK AREA	PROBABILITY OF OCCURRENCE (Low–Medium-High)	LEVEL OF IMPACT . (Low–Medium-High)
1. Market context		
SOA4ALL is not capable of providing a solution which is easier to use and less costly than big SOA players'	Low	High
Legal regulations do not improve restrictions about geographic data execution and SOA4ALL cannot limit providers geographically	Medium	Medium
SOA4ALL cannot ensure and end to end SLA /QoS from individual service SLA ina composition	Medium	Medium
Sell an incomplete solution for Public Administration	High	Medium
Public Administration does not have enough budget to move to a SOA4ALL platform	High	Medium
Not all business processes of Public Administration are standardised among different countries	Medium/High	Medium
Transformation in Telcos is impeded by their lack of agility	Medium	Medium

RISK AREA	PROBABILITY OF OCCURRENCE (Low–Medium-High)	LEVEL OF IMPACT . (Low–Medium-High)
Critical Mass: a critical amount of services is necessary in order to provide an attractive platform.	Medium	Medium
Maintenance costs of the platform is too high	Low	High
ROI time and initial investments	Medium	High
2. Technology and market maturity		
SOA4All and external partners do not have capacity to develop and exploit the technology in service ecosystems	Medium	High
Major players expand to provide general service ecosystem negating need for open approach	High	High
Innovation in SOA4All Studio does not differentiate enough to build market share vs. established application market places	Medium	High
Decoupled nature of SOA4All studio means differing component maturity affects take-up of technology	Low	Medium
A lack of semantically described services mean that the advantages of SOA4All discovery and ranking can not be shown	Low	Medium
3. User acceptance		
Solutions too generic to satisfy different user needs	Medium	Medium
Use of semantics discourages end users	Low	Medium
Need for training and changes in large structures	High	High
Reluctance to outsource tasks due to privacy reasons	Medium	High

RISK AREA	PROBABILITY OF OCCURRENCE (Low–Medium-High)	LEVEL OF IMPACT . (Low–Medium-High)
Privacy concerns and security	High	High
Technologies do not reduce complexity enough	Low	Medium
Costs discourage end users	Medium	High
End users do not trust the solutions	Medium	High
End users perceive the solutions are not mature	Low	Medium
4. Competition and competitive technologies		
Dominant players offer innovative services and API for development that compete directly to SOA4ALL	High	Medium
SOA4ALL Studio: Semantics and lightweight semantic Web services not able to make processes easier and more suitable for different kind of users	Low	Medium
Service Construction: Availability of semantically described domain specific knowledge is not enough	Medium	Medium
Less QoS of composed services	Medium	Low
5. Stakeholders		
Platform & SW infrastructure providers: Lack of support for complex service offerings provided by telco infrastructures and competition from big players	Medium	Medium
Higher Cost of infrastructure	Medium	Medium
Application provider dependency on the platform manufacturer	High	High
App provider financial dependency on the platform manufacturer and infrastructure provider	High	Medium

RISK AREA	PROBABILITY OF OCCURRENCE (Low–Medium-High)	LEVEL OF IMPACT . (Low–Medium-High)
App provider dependency on service&process providers	High	Medium
Consultants/service Integrators could reduce their income because more organisations do not need their support	Medium	Low
Consultants/System integrators block access of their clients to SOA4ALL technology	Low	Medium
Not enough Web service providers use SOA4ALL because missing revenue and income models	Low	High
6. Ownership and IPRs	High	High

4.2   Recommendations to minimise risks

This section proposes some recommendations to minimise risks assessed in section 4.1

1. A special attention is to be paid to the user interface in order to make creation of composed services easier for the user compared to current solutions. Also user experience will be an important factor of success. Therefore it is needed to ensure an end to end quality of service (being aware on advances on SLA in composed services and incorporate them into SOA4all). After the project, an effort to make the solution reliable is needed to transmit the feeling of matureness to the user. The semantics and technical complexities need to be hidden to end users when possible, enriching the solutions in a transparent manner for them.

2. Related to this, good training and related documentation need to be providedto ensure that potential stakeholders know how to use it. Best practices should also be provided as examples of good usage of SOA4ALL results.

3. To comply with some legal constraints about data movement, Include a feature that allows limiting the selection of service providers based on geographical location. Participate in current fora that try to influence administrations to modify current legal framework.

4. Concentrate the effort on sectors where there is more probability of success, covering the gap of current players, mainly in SME. This will provide success stories to be used as commercial asset to sell the product to more difficult domains. Avoid competing with main SOA players in their favourite battlefield; it is better to find the gap in the market where SOA4ALL solution has no or less competition. SOA4All solutions need to be versatile and configurable enough to adapt themselves to

different scenarios

5. It is needed to provide a critical mass of services initially that allow the wheel to start rolling. Then it is better to start covering a domain where there is a probability of success and provide to stakeholders the perception that it is a complete solution, with enough services to be discovered and ranked. Initial investment need to be considered to make it happen.

6. Products and services that make use of SOA4All technologies can address privacy and security issues on top of those technologies in order to make them robust enough. Build a message that transmits very well the needed trustiness to the user. A balance needs to be reached so relevant tasks can still be addressed by the solutions without compromising privacy This is one of the main barriers on user adoption.

7. Try to minimise dependencies on providers (platform, infrastructure, services…) bu choosing/building the right business model.

8. Market studies need to be made prior to integrating SOA4All solutions in different areas, placing a special emphasis into the willingness of end-users to pay for these. Preferably, business models should not involve end-users as a direct source of revenue.

9. Build a convincing message to overcome the risk of Ownership and IPR: the fact that the ownership is not entirely owned by and SME ahould not prevent Venture Capitalists to invest on them: this new model need to be well explained to VC.

10. Promote standardisation through appropriate standards bodies and to provide case studies with supporting business models that illustrate the advantages of the approach.

5. Conclusions

SOA4ALL will benefit the SOA market and will provide a set of features not included by any other current product.

However there are some risks that can potentially act as a barrier for the proper exploitation of SOA4ALL results. This makes this exploitation more difficult and a number of actions should be taken to reduce the probability and impact of these risks and are summarised below

An special effort will need to be devoted to build an easy-to-use user interface, attractive to the user, that hides technical complexity, joined with a good effort for disseminating SOA4ALL advantages and for training activities and documentation. As in all projects that deal with SOA technology, security and privacy need to be addressed to achieve the necessary trustiness from the user. Further, instruments to overcome the regulation contraints about geographical data storage and processing are also recommended.

Exploitation should start by allowing the provision of a critical mass of semantically-aware services that allow the consortium to reach a critical mass of satisfied users that could be use as reference of SOA4ALL benefits. This requires a initial investment to reach this status.

Since there are important competitors in for part of the market target market SOA4ALL can address, it is advised to spend initial efforts to sectors where there is a gap in the market that could be covered by SOA4ALL. Well planned dissemination actions including use cases in these market sectors to convince both users and providers about the benefits of SOA4ALL and foster its adoption.

If this critical mass of both users and services is not get initially, if there is not enough trust, and if a good perception of its mode of operation and reliability is not achieved, it will be difficult that SOA4ALL succeeds.

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