



## INNOVATION REPORT

# A world of easy-to-create and easy-to-use services

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*Services-for-All (S4ALL) enables any end user – professional, end user on PC or end user on mobile – to create, use and share new highly personalised services in few clicks. With the S4ALL environment, it is easier to create a new service than a web page. The environment is made up of two parts: the service-creation environment (SCE) and the service-execution environment (SEE). As a main goal, easiness is provided for both creation – the visible part of the iceberg – and execution, the hidden part, with a process based on automation and convenient interfaces. According to her/his knowledge needs and environment, the end user can choose to use a graphical tool by manipulating icons representing existing services, or directly express the requested service in natural language – automatic discovery and composition of services. Then in one click, the service can be published and shared.*

*These results were made possible through an innovative approach that promotes semantics – meaning – to describe the deployed services. An enhanced middleware layer has been implemented to provide new service-oriented architecture mechanisms that allow fast publishing, discovery, composition and deployment of services. The natural language is also used to provide the meaning part of the service to avoid use of complex semantic tools. Thanks to the end user's simple interfaces and to the enhanced middleware, anyone can create, host and manage her/his own services on a personal computer or a mobile terminal.*

### **The problem: How to allow the end user to create his/her own services?**

It is easy today to create and share Internet home pages. The worldwide web is currently used as a front end for accessing business-specific e-services – banking, traffic information, news feeds, etc. – but how can the end user be helped to use these basic blocks to build more complex customised services?

A solution to this problem enables the Internet success story to happen again with mobile services as a means to ease interpersonal communication and to facilitate everyday life by allowing the whole community to create, share and access personalised services.

### **The research approach: Inserting innovation inside new technologies**

The easiest language for the end-user is... the natural language. So, it was natural for the S4ALL teams to investigate within the scope of semantics.

The semantics approach implies the use of ontologies, which are kinds of structured dictionaries for a given purpose or domain – medicine, cars, sports .... The description and publication of services enable easier, non-ambiguous and more accurate discovery and composition of services exactly fitting the users' expectations – for example: orange, colour or fruit? The use of semantic information stored in ontologies attached to the descriptions of services improves natural-language processing and enhances service publishing, discovery and orchestration – composition and assembly of services



## INNOVATION REPORT

to create the new service required by the end user. To produce appropriate semantic descriptions easily, some specific tools have been developed to generate ontologies from texts written in natural language:

- An innovative orchestration mechanism was researched and developed to support the orchestrated composition of services. On one hand the support consists of standards to orchestrate the composition, on the other hand, it is aimed at providing tools for different uses in the creation of business processes, from the user with little technical knowledge to technical staff aware of all details of how orchestrations work.
- Specific graphical tools were developed to create orchestrations: service-creation and customisation tools enable everyone to build his/her own services from basic existing services. The service-creation process is made as simple as possible: any service creation depends on a natural-language-based request.
- An interconnection of icons – representing basic service blocks – through a graphical and interactive interface.

Elementary blocks composing a new service can be heterogeneous but each of them mapped a dedicated icon or some natural-language terms. Thus, the new service turns into a customised one precisely fitting the user's needs.

Within the scope of service-creation tool building, the search approach has been evaluated and implemented to enable easy service creation. The tool hides technical details from the service-creation process. Instead, the service functionalities and interfaces, identified as service building blocks, are represented graphically and technology independent. To create services, one only needs to relate the service building blocks needed in the desired flow or logic. The graphical representations of service logic and natural-language-described service logic are two promising ways to abstract technologies in a way from technicality, so that most users can understand service creation without any deep technical knowledge.

Using the service-creation tool, users can create new services that are customised to their specific personal needs or are suitable for a wide range of users. There are great opportunities for service providers in both cases. New service building blocks will be sold, new services will be hosted and a new selling point for mobile devices will be available.

The service-creation tool is available for the common devices of today's users, for desktop devices as well as mobile phones. Users will be able to create new services regardless of their location and to share them with other users at anytime. At the same time, professional developers can also use the tool to speed up the development process of service building blocks. Wizards and intuitive interfaces reduce the learning curve and simplify the process of service building block development for future service platforms.

A new easy way to build and use services leads to a shorter time-to-market and a greater diversity of services. Research in this field is still necessary to strengthen and consolidate the market position of European industries and to discover new market opportunities. The easy service-creation tool ideas are the first step towards a boost to the services market and yield to the successful features of mobile services, which will be not be inferior to today's Internet success.

A dedicated middleware infrastructure hosts, runs and makes those novel services created by individuals available to others – family, friends or customers. Such infrastructures, generally operated by professionals, are now operable by the man in the street for hosting his homemade services. These user-created services can interoperate easily with professional services, and benefit from the enterprise-class middleware providing features such as scalability, performance, and availability.



## INNOVATION REPORT

This infrastructure is based on two main standard technologies, widely accepted in the industry: Java EE for server-side services support, and OSGi for mobile and device-side services support. The dedicated middleware addresses several aspects of the services-execution environment, including the runtime platform, service-mediation support, connection with the IP multimedia subsystem (IMS) world, service deployment and management, and user and service mobility support.

The OSGi dynamic service execution platform has been improved with innovative features regarding service management with contributions to the standard, and experimented on mobile devices – such as personal digital assistants (PDAs) and embedded industrial systems. In addition, some extensions have been provided to facilitate the building of services on S60 mobile phones.

Regarding services mediation – i.e. the support for services interconnection to achieve data transformation, filtering and routing – many results have been obtained on well-known ObjectWeb software components, and several mediation platforms based on these components have been developed. Added-value mechanisms were also included to deal with user mobility, allowing automatic services discovery and launch depending on location, as well as automatic data sharing between users.

This new middleware layer includes a powerful service-execution environment, mainly based on open-source components, that enables faster service deployment, reduced time to market and multi-targeted service execution, while also supporting user mobility and seamless service delivery. The service-execution platform is the hidden part of the S4ALL project; its results are however visible through their impact on relevant standards such as OSGi and Java EE, and through the improvements they brought to the well-known ObjectWeb middleware software used to deploy both the runtimes and the services themselves.

To support business-process orchestration, the standard business process execution language for web services (BPEL) was selected due to its wide acceptance by industry. The orchestration engine chosen – Orchestra – was designed to be deployed on a J2EE application server, a part of the dedicated middleware. One of the shortcomings of orchestration languages such as BPEL is that, as the language is not very rich, it needs to be enhanced to require delegating tasks to web services that are simple and could be solved at the orchestration level without any other web-service invocation. For this purpose, an innovative improvement of BPEL was implemented through BPEL for Java (BPELJ) to enable insertion of Java snippets into the orchestration code. In this way, programming orchestration parts in Java becomes possible when BPEL expressivity is insufficient.

All these new technologies embedded in S4ALL help to build a world where services are made available by and to any citizen, everywhere, at any time, on any platform, in any condition.

### **S4ALL business value**

“The market for semantic technology products and services will grow ten-fold between 2006 and 2010 to more than US\$50 billion worldwide. From 2010 to 2015, the semantic market is expected to grow nearly ten-fold again, fueling trillion-dollar economic expansions worldwide.”

(Source: Semantic Wave: Executive Guide to “Billion Dollar Markets” Market Analyses Report produced by Mills Davis. Published 2006).

S4ALL targeted and achieved innovative results in this domain in term of tools, platforms, methodology and environments for both professionals and end users. The use of natural language particularly put the focus on easiness in service creation; delivery, discovery and automated orchestration.



## INNOVATION REPORT

Key achievements included:

- Set-up of a test-bed that features all software, network and radio technologies used and improved by the project, based on the general requirement from WP2 on architecture and specific requirements from the 'technology' work packages.
- mCentric's development of completely new applications that take advantage of the functionality offered by the project, e.g. communities 'killer applications' such as Whizzper P2P Mass Market.
- Demonstration of how, using the handset, the end user can request a new service – e.g. initiating a VoIP service – and configure it as well as updating the device if needed. In the communications domain, Alcatel-Lucent implemented an advance demonstrator that automates the discovery and orchestration of both communications and IT services for on-demand new service composition. This new environment aims to be a part of the future offer for operators, services providers and communities.
- In the power distribution domain, Schneider Electric Real-Life demonstrated the provision of energy-oriented e-services, and use of the main outputs of the project: sensors – alarms delivered in P2P service.

Results worth highlighting include: launch of the P2P product to mass market in March 2007, with 3362 registered users already by June 2007; integration of IMS telecommunications and industrial platforms by Schneider; use of the P2P platform to receive industrial alarms; and further commercial value through the use of the P2P platform to advertise.

### **Success elements**

Demonstrations proved to be the most successful in the following areas: solid co-operation between the different teams in the definition and development of the demonstration scenarios; an impeccable job was done by the teams working in parallel; and there was optimum availability of different platforms in Paris, Grenoble, Helsinki, Madrid, Berlin ....