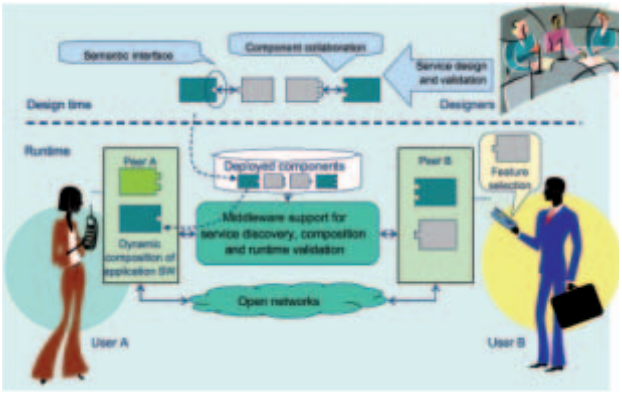
SIMS

Scope

The Service Oriented Architecture paradigm (SOA) is increasingly gaining acceptance, influencing the way people understand and define services. However, there is a fundamental limitation of SOA as it is currently understood. In SOA, services are provided by a service provider to a service consumer. This service provider is normally a "passive object" in the sense that it never takes any initiatives towards a service user. It merely awaits requests and responds to them. Collaborative services on the other hand are performed by objects that may take initiatives towards the service users. This is typical for telecom services, but also for many new services such as attentive services, context aware services, notification services and ambient intelligence. Such services in general entail a collaboration among several active objects, and therefore we call them collaborative services. Most contemporary uses of SOA fail to consider collaborative services. The Sims project addresses this gap and defines a service architecture and delivery platform that supports loosely-coupled autonomous service components. This may be seen as a generalization of contemporary SOA, allowing for a wider class of services.

Development of collaborative services has had poor support from tools and methods, which traditionally support hierarchical development of applications and components, and have poor support for the cross-cutting behaviour between components. The vision of Sims has been to improve this:



Exploiting semantic interfaces at design time and runtime

- Imagine that service components for different terminals and networks can easily by made by small innovative companies, based on open service specifications.
- Imagine that software tools can guarantee compatibility between such service components.
- Imagine that users can easily find and use service components that fulfil their service needs.

Advances

The Sims project has contributed to making this vision become a reality by providing software developers with new methods supported by robust tools with advanced but simple-to-use validation techniques that address the needs of collaborative mobile services.

The resulting middleware platform demonstrates the concept of peer-triggered self-update:

- Peer-Triggered:
  - o Devices learn from each other about new services
  - o Popular services can spontaneously spread as devices interact with each other
- Self-Update: Devices download services from a central repository if and when they need them

Sims has advanced the state-of-the-art within the engineering of collaborative services by providing:

- A method for compositional service engineering exploiting new features of UML 2
- Validation algorithms and tools that can guarantee compatibility between collaborating service components
- Methods and tools for enriching design models with semantic information (ontologies).

Positioning in global context

Sims compares well with products available on the market:

- For developers of collaborative service software, validation of behaviour at the model level is only available in very advanced tools, such as Telelogic Validator, with a high threshold for use requiring specialist skills. Sims tools lower this threshold by providing validation of the collaboration between components, working in the modelling world of the designer.
- Middleware support for peer-triggered self-update is new. Traditional update mechanisms are triggered via client-server interactions (for example, using content delivery management platforms such as Action Engine). Peer-to-peer interactions are generally limited to content sharing and tend to bypass the operator's network. Sims supports peer-to-peer interactions while keeping the operator in the loop.

Sims concerns unique research results:

- Composing composite services from semantic interfaces with validation techniques to guarantee behavioural compatibility
- The linking design models and running service components with domain concepts (ontologies) is a unique result of Sims

Contribution to standardization and interoperability issues

Within the Object Management Group OMG we are contributing to the UML metamodel and profile for Services, this metamodel is being nicknamed *SOA-pro.*

Target users / sectors in business and society

Sims provides benefits for software developers, end users and service providers within collaborative services.

For software developers, we make it easier for developers to develop correct software and services:

- Working with models rather than working with code
- One saves wasting time composing components that are incompatible
- Validation of models reduces the need for testing code

In addition, code can be generated from the models, saving time-to-market and reducing development costs while gaining quality.

For end users, we make it easier to find and use useful services:

- Lightweight semantic browsing for services from mobile devices
- Learning new services while using old
- Service composition at runtime with compatibility guarantees

In addition, only valid services are presented to the user.

For service providers, we make it easier to establish a marketplace for service components:

- A framework for a new business model, allowing composite services with components from multiple vendors
- Linking services and components with semantic information (ontologies)
- Separating specifications from specific implementation

In addition the framework supports new deployment models for software services. For instance services can be charged by operators when their usage reaches a certain threshold.

Overall benefits for business and society

Sims methods and tools reduce development costs and improve quality for collaborative service development. The benefits increase with the complexity of the collaborative behaviour. Investment in methods and tools will not pay off for simple service developers, but gains for collaborative software development can be in the range of 50% reduction in the number of signalling errors delivered to customers.

Examples of use

With Sims, there is no need to design, use and understand separate validation models and tools. Working within a single design model saves development time, improves team communication, and increases product productivity and delivered quality.

For users of collaborative services, configuring a mobile device with the correct software today is cumbersome and confusing at best. With the Sims middleware, end users can browse for service components using terms related to their needs, and be ensured that components found are validated to be compatible with those of their communication peers.

For service providers operating a service platform and for companies developing service components, there is no well-functioning marketplace for service components that allows multiple vendors to participate. The Sims approach allows service specifications to be shared openly, and components that are offered can be validated for compatibility with the specifications. A new deployment model for software services is made possible. With the addition of trusted mechanisms for monitoring component downloads and service use, new value chains can be established, opening up for new forms of revenue for operators and component providers alike.

Achievements

Tangible results from Sims include:

- The Sims tools, an Eclipse-based tool suite covering collaborative service engineering in UML 2, with validation tools and tools for adding semantic information from ontologies
- A prototype middleware implementation supporting service browsing and service discovery of collaborative services
- The Sims method guideline for collaborative service engineering
- A proof-of-concept ontology for the mobile telecoms service domain
- A total of 18 technical reports (FP6 Deliverables), 10 currently available on the web site
- Publications in academic forums, 5 currently available on the web site.

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Semantic interfaces for mobile services

contract number
027610

type of project
Specific Targeted Research Project

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