



PROJECT RESULTS

Making more of middleware

Using semantics to meet the challenges of system interoperability

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The SEMEASY project has developed a semantics-based framework enabling service consumers and providers to exchange information that makes sense and makes it easier to invoke services based solely on their semantic descriptions. The framework allows the construction of large service-based systems driven by the use of semantics from design time, such as security policies or definition of orchestrations, to run time – including semantic search of services and semantic management of user context.

There is a strong tendency to concentrate on the technological mechanisms used by various systems when it comes to interoperation. However, this overlooks a larger problem: the semantics of the systems models that are being made interoperable.

While many systems may be able to interoperate with varying degrees of success, the manner in which this is achieved is, at best, piecemeal. In the worst cases, interoperability can only be achieved by manually entering data, information and models produced by one system into another – a time-consuming and error-prone process.

Ensuring a flexible interchange of data

Semantics concern the study of meanings. In service-oriented architecture (SOA), semantic interoperability ensures that service consumers and providers exchange data in a consistent and flexible way, regardless of the diverse information involved. Semantic interoperability is an important quality in an SOA because it enables service consumers and

providers to exchange information which make sense, and that then can be acted upon.

Without semantics, data is just strings of binary without any meaning. And without semantic interoperability, service consumers and providers could misinterpret and corrupt data – and ultimately bring undesirable effects to an SOA and the business concerned.

Orchestrating service composition

Web-service orchestration enables the creation of new web services by combining existing functionalities. A number of domain-specific languages have been proposed for service composition, with consensus being formed around a process-oriented language known as web-services business-process execution language (WS-BPEL or BPEL). The kernel of BPEL consists of simple communications elements that may be combined using control-flow constructs expressing sequence, branching, parallelism, synchronisation, etc.

SEMEASY has made BPEL dynamic by allowing the process designer to describe the partners of the orchestration – that is the web services that participate in the process – through semantic concepts. The actual orchestration partners are no longer known by the system at design time but resolved at runtime.

Describing BPEL elements by associating semantic concepts with their goals, inputs and outputs breaks the traditional hard-wiring connection between orchestration and the partners. Processes can be defined without requiring exact knowledge of external partner

SEMEASY (ITEA 05016)

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Partners

- AMI Software
- ATOS Origin
- BULL
- European Software Institute
- Thales Communications
- Thales Services
- Universidad Politécnica de Madrid

Countries involved

- France
- Spain

Start of the project

September 2006

End of the project

September 2008



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services by using semantic concepts that define their goals, inputs and outputs.

SEMEASY has also simplified security configuration and use of a security infrastructure taking into account an organisation's security policies in distributed SOAs. It leverages the security infrastructure with:

- A **trust model** with trust and security properties, composition rules, parameters and certification levels, formalised through an extension of service-level agreement (SLA) languages;
- A **trust control and security consistency checking module** able to evaluate the security configuration and behaviour correctness dynamically; and
- Automatic configuration of **technical security agents** based on the trust and security models.

Enhancing the user experience

SEMEASY has strongly enhanced the user experience, particularly in the case of web portals:

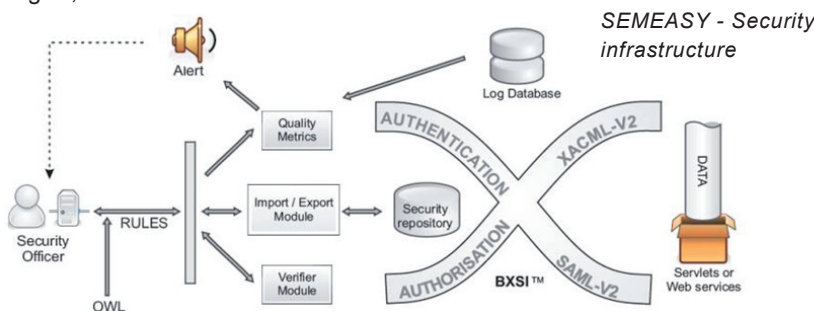
1. Semantics provide more information to support the dialogue; the user can benefit

from related ontologies to understand the data shown on the portal and navigate between all the information on the portal thanks to the available structured information; and

2. Semantics enable more context-adaptive portals in which semantics play an important role by linking the services inputs to the context of use and ease user dialogues. Different algorithms can be used to take advantage of the semantics.

Use of SEMEASY semantic technologies at a corporate level will reduce costs and improve the quality of content management, information access, systems interoperability, database integration and data quality. Several SEMEASY modules are already used for real systems and have met public success. Key applications will include:

- E-government activities such as e-procedures, e-inquiries and e-administration;
- E-ticketing systems; and
- Risk management such as natural disaster management or technological risks.



Major project outcomes

Dissemination

- Five papers
- Eight presentations at conferences/workshops

Exploitation

- The security infrastructure is going to integrate a system for car number plate identification in Germany
- The Nova Orchestra engine developed for SEMEASY is among the top ten downloads of OW2 (<http://ow2.org>).
- New offers for the BXS security suite from BULL.
- Improvements for the WS-CAF engine of the OW2 JASS project.

Standardisation

- Two contributions to OASIS – WS-CAF and BPTEL4WS.

ITEA 2 Office

High Tech Campus 69 - 3
5656 AG Eindhoven
The Netherlands
Tel : +31 88 003 6136
Fax : +31 88 003 6130
Email : itea2@itea2.org
Web : www.itea2.org

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