

NESSI Semantic Technologies Working Group

Manifesto - DRAFT

Contacts: John Davies – BT (email: john.nj.davies@bt.com)
Santi Ristol – ATOS Origin (email: santi.ristol@atosorigin.com)
Juan J. Hierro – Telefonica (email: jhierro@tid.es)

Context

NESSI has identified *Semantics* as a key technology domain, specifically stating that:

Semantics will be a key element for the transformation of information to knowledge. Semantic Web technology¹ based on ontologies will enable far more effective machine to machine communication about the nature and the manipulation of data they hold and actions based upon that data. On the business process level, business modelling provides the semantics that is required for business process management, process transformation and inter-company cooperation. In a knowledge-based economy, learning and knowledge management finally will have to converge to a work place utility².

During the last half decade there has been very significant progress in the development of semantic technology worldwide, both in the standardisation of languages such as RDF and OWL by the W3C and in the creation of commercial organisations to exploit the technology. There remain significant research and implementation challenges.

Scope

This working group will:

- Identify the research and implementation challenges and opportunities in the area of semantic technologies as relevant to NESSI's strategic research agenda;
- Develop and publicise a view as to how those challenges and opportunities should be met by the European software industry;
- Create and maintain a roadmap describing the likely evolution of semantic technologies, and thereby provide a framework within which key research and implementation challenges can be identified and met.

The scope of the group is further elaborated in the next section on key areas.

Key areas

In general, semantic technology makes information more amenable to machine interpretation and processing via the use of semantic annotations (metadata), based on open standards developed by the W3C (e.g. RDF and OWL), along with formalisms

¹ In this document, we use the term “semantic technology” rather than “semantic web technology” to reflect the fact that the technology can find application in many areas beyond web-based information, as discussed in ‘Topics to be addressed’ below.

² http://www.nessi-europe.com/about_nessi/research.htm

based on these languages targeted specifically at a service-oriented environment (e.g. WSMO and OWL-S).

Areas will include, but not necessarily be restricted to, the following from the 'NESSI Strategic Research Agenda' plus, additionally, Web 2.0 Technologies.

Areas from the Strategic Research Agenda

- Semantic mediation

Semantics for web resources are typically described using ontologies which define basic concepts, relationships and axioms within a specific domain. A basic feature of any ontology is a set of terms (vocabulary) which have an agreed meaning. At least at this level, there is and will continue to be, a large number of independently produced ontologies for different sectors, purposes and objectives. Techniques for interoperability (aka *mediation*) will therefore be required.

- Automated reasoning

To support service description, discovery and composition it will be necessary to associate descriptions (metadata) with resources and to advertise appropriate subsets of these descriptions via standard query interfaces. The realisation of the full value of a semantic approach to distributed resources depends on the ability to infer implicit information for automated decision support.

- Semantic information integration

In terms of content, we need to address not only the existence of a huge amount of information (e.g. web content), but also annotations associated with this information. Crucially, a semantic layer offers the prospect of providing a unified access layer to multiple heterogeneous information sources. This is critical in information-intensive sectors, such as health care, finance, energy and pharmaceuticals. Advanced topics include semantic systems that can evolve with ontologies, infer implicit information from knowledge bases and deal with provenance, trust and proof.

- Semantic technologies relating to service description, discovery and composition

The objective of this activity is to consider semantic tools and technologies which support the description, discovery and composition of services. These topics themselves lie within the remit of the service engineering working group. The role of this working group is to take requirements from the service engineering working group, to consider how semantic technologies can support service engineering, and to make an appropriate input to the service engineering working group. As an example, one area of interest for this working group will be ontology learning. Ontology learning will facilitate automatic annotations from legacy applications and services which will allow them to exchange information without human intervention. In addition various semantic formalisms such as WSMO and OWL-S have been developed to represent and reason about services, and semantic technologies based on OWL-S and WSMO can thus support service engineering”.

Additional area not covered completely in the SRA

- Web 2.0 Technologies

In addition to the above areas from the NESSI Strategic Research Agenda, the Semantic Technologies WG will also consider Web 2.0 Technologies. Web 2.0 refers to an emerging second-generation of web-based technologies and systems that let people collaborate and share information online in new ways: examples include social networking sites, wikis, communication tools, and folksonomies. Specific examples are deli.cio.us, flickr and Technorati. Web 2.0 technology is strongly related to, and complementary to, semantic technology: although the technologies and services that make up Web 2.0 are less powerful than semantic technology (because they are in general based on informal user-based tagging rather formal ontologies), both approaches are characterised by a use of metadata. One requires more effort to produce and maintain but yields a more formal approach supporting automated reasoning and processing, while the other offers less powerful but useful functionality at lower cost. It is thus appropriate to investigate the two technologies together and to identify appropriate application spaces for each of them. Web 2.0 technologies are being increasingly applied in the corporate space: for example, the use of wikis as tools for collaborative working; the emergence of corporate blogging; and the provision of customer self-help portals which reduce cost and improve customer experience via participatory customer portals.

Web 2.0 technologies can potentially deliver advanced sharing and learning functionality based on (European wide) social networks exploiting user-tagged content and overcoming individual and local limitations for knowledge and experience sharing. Exploiting and modelling of relationships using techniques such as social network analysis enables a new dimension for knowledge sharing and collaboration. Of particular relevance to NESSI, Web 2.0 technologies provide the capability for rapid integration of services (mash-ups) and, through folksonomies, for the informal description of services. These topics themselves are also relevant to the User/Service Interaction working group so that coordination with activities in that working group is foreseen.

An important activity will be to consider the relationship between Web 2.0 and semantic web and how to leverage both to best effect - for example, how can formally annotated content be best combined with user-tagged content to maximise the usage and value of both. Semantic Wikis are an early example of the combination of semantic and Web 2.0 technologies³.

Deliverables

The working group will run initially for a period of three years and will produce an annual report for public dissemination, e.g. through the NESSI website. This document will address the scope and topics outlined in the previous sections. In particular it will contain:

- A roadmap outlining the likely development of semantic technologies;

³ See, for example, http://wiki.ontoworld.org/index.php/Semantic_MediaWiki

- Recommendations for research and development in Europe in semantic technologies;
- Recommendations for implementation of semantic technologies within the European software industry.

The table illustrates the schedule of annual reports:

Date	Report to include
September 2007	Initial roadmap for semantic technologies Initial recommendations for R&D and uptake of semantic technologies.
September 2008	Revised roadmap, in particular taking account of feedback from initial roadmap and output from first stages of relevant FP7 projects. Overview of European semantic technology R&D and commercial uptake during previous year. Including a discussion of barriers to uptake, and how they can be overcome. Revised recommendations for R&D and uptake of semantic technologies.
September 2009	Revised roadmap Revised overview of European semantic technology R&D and commercial uptake. Further revised recommendations for R&D and uptake of semantic technologies. If appropriate, plans for working group during extension period.

The working group will also from time to time organise events, e.g. workshops at conferences, to publicise the findings of its reports, and to encourage take-up of its ideas.

Duration

The working group will initially last 3 years from its inception. Six months from the conclusion of this period the working group will consider whether it is appropriate to extend this period. If the number of members wishing to do so is sufficient to maintain a viable working group, then there will be a fixed duration extension. The same procedure may be used to agree further extensions.

Working method

The procedures and processes of the working group will conform to the requirements for working groups set out in the NESSI document 'NESSI Working Group Governance'.

In particular, the working group will meet at least twice a year. The last meeting of each year will formally approve the working group annual report discussed under 'Deliverables' above. There will be frequent interaction by audioconference and email between meetings; to manage the creation of the annual report, to organise events, and to discuss membership and any other issues which arise from time to time.

Liaison with other working groups and NESSI bodies

Semantic technology is a fundamental enabling technology relevant to many areas. Therefore, wherever appropriate the NESSI semantic technologies working group will liaise fully with other NESSI bodies. In particular, the working group will liaise with NESSI working groups, e.g. service engineering, where semantic technology is of particular relevance. Requirements will be taken from these working groups and there will be feedback to them relating to the evolution of semantic technology in support of those working groups' objectives. This will also include working groups in application areas where the use of semantic technology is particularly appropriate, e.g. in the health sector. Liaison will be undertaken both to understand the requirements of that sector, as they impact the use of semantic technologies, and to publicise the semantic technologies working group's recommendations within the sector.

Prospective members

Interest has already been expressed from:

- BT (chair, <http://www.bt.com/>)
- Atos Origin (co-chair, <http://www.atosorigin.com/>)
- Telefónica I+D (co-chair, <http://www.tid.es>)
- Alcatel (<http://www.alcatel.com>)
- Thales (<http://www.thalesgroup.com/>)
- SAP (<http://www.sap.com>)
- NEC Europe (<http://www.ccrl-nec.de/> and <http://www.deri.at/>)
- Software AG (<http://www.softwareag.com>)
- HP (<http://www.hp.com>)
- TIE (<http://www.tieglobal.com>)
- Grupo Analistas (<http://www.grupoanalistas.com/>)
- DERI (<http://www.deri.ie/>)
- DoCoMo (<http://www.docomoeurolabs.de/>)
- Optimo I+D (<http://www.optimo-imasd.com/>)
- robotiker tecnaia (<http://www.robotiker.com/>)
- XLAB (<http://www.xlab.si/>)
- University of Karlsruhe (<http://www.aifb.uni-karlsruhe.de/>)
- University of Hildesheim (<http://www.uni-hildesheim.de/>)
- University of Augsburg (<http://www.uni-augsburg.de/>)
- University of Rome, 'La Sapienza' (<http://www.dis.uniroma1.it/>)
- Tilburg University (<http://www.tilburguniversity.nl/>)
- Brunel University (<http://www.brunel.ac.uk/>)
- Technische Universitaet Muenchen (TUM) (<http://www.tum.de/>)
- University of Kassel (<http://cms.uni-kassel.de/>)

BT will act as the lead organisation and provide the chair for the working group, who will initially be Dr. John Davies.

Atos Origin and Telefonica will provide co-chairs, who will initially be Santi Ristol and Juan J. Hierro respectively. The latter will have particular responsibility for Web2.0 aspects.