



D 1.1.5v3 Communication Channel with Industrial Board and Industry D1.3.7 Report on OOA Activities

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Abstract

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Establishment of efficient multiple communication channels between KnowledgeWeb and Industry has been a very important aspect of the *Outreach to Industry* activity in KnowledgeWeb. This complements other activities, especially the *Industry-Research Co-operations* and the *Ontology Outreach Advisory*. These communication channels are concluded and evaluated in this deliverable. Furthermore, after KnowledgeWeb we will continue the *Outreach to Industry* activity through the newly grounded institutions OOA and STI.

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Knowledge Web Consortium

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Changes

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Executive Summary

This deliverable concludes and evaluates the activities of Knowledge Web with respect to the establishment and use of communication channels between the network and the Industry. In particular it considers how the established contacts can be sustained after the network's conclusion.

We summarize the achievements of the Industry Area's *Outreach to Industry* activity with a focus on the progress made in the final year of the network. Major outcomes include the beginning of OOA activities and the showcase event ESTC2007.

Then we introduce specific activities in two industry sectors which have been identified since the first year of the network as "low hanging fruit" for the adoption of semantic technologies: Human Resources and eHealth. These activities have been initiated within the OOA already in order to ensure their seamless continuation subsequent to the conclusion of Knowledge Web.

Sustainability of industry outreach activities is demonstrated by the sustainability actions of the Outreach to Industry workpackage, with a major outcome being the launch of ESTC, a major annual industry conference in Europe, as well as the founding and first activities of two new associations: the Ontology Outreach Advisory (OOA) and Semantic Technologies Institute International (STI).

Finally, we detail how research work and the task of promoting ontologies to enterprises will continue in order to ensure the achievement of the original goals of the Industry Area of Knowledge Web: the transfer of semantic technology from academia to industry.

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1. KnowledgeWeb Outreach to Industry

This section collects the generic activities undertaken by the KnowledgeWeb Network of Excellence in the *Outreach to Industry* activity track. It outlines the relevant aspects of KnowledgeWeb internal organization, an overview of the relationships between KnowledgeWeb and Industry including the established and new communication channels, and the relevant activities of industry-oriented organizations and events associated with KnowledgeWeb.

1.1. IB Membership

The Industrial Board (IB) membership of Knowledge Web has been stable during the last year of the project. There were neither new memberships nor withdrawals. As a result, the final status of IB is 47 members. For the sustainability of the IB, it is planned that a de facto transfer to OOA membership is proposed to each IB member. OOA is currently contacting each IB member for this purpose and promoting its membership by offering the first year for free to KnowledgeWeb IB members.

1.2. O2I Web Portal

In order to ensure the sustainability of the results of the Knowledge Web Industry area toward the industrial world, the O2I (Outreach to Industry) web portal¹ has been updated to provide links to relevant results of the Industry Area after the end of the project. Indeed, this portal will stay online, together with the general Knowledge Web portal, hosted by UPM.

The main evolutions are concerned with:

- providing a full public access to all resources (some contents were previously restricted to Industrial Board members);
- improving the look-and-feel of the portal, and so easing the navigation on the site;
- making the O2I portal referred by the popular search engines on the Web, and so making the portal more visible.

As a result, the final version of the O2I portal is organised in 6 categories, which may be independently accessed through a particular tab on the top of the screen (see the screenshot on Figure 1): “home” (home page of the portal, including useful links to semantic technology conferences, semantic technology-related initiatives such as OOA, REASE and STP², various published papers and the archive of all past Knowledge Web newsletter); “industrial application needs” (list of the business cases collected from the Industry Board members); “technology evaluation” (results of WP 1.2, including the Semantic Web Framework and the methodologies for ontology evaluation); “technology recommendation” (results of WP 1.3, including the OOA activities – see the next section), “semantic technologies” (results of WP 1.4, including the whitepaper on semantic technologies and the Semantic Technology Shows); “cross-network cooperation” (results of WP 1.5). Each category opens, in turn, specific sub-menus on the left of the screen to access the dedicated resources.

The home page additionally gives direct links to the four most interesting resources for industry people who are not familiar with the Knowledge Web project: a link to the Semantic Web Tools and Applications Information Repository (result of WP 1.4); a link to the whitepaper on Semantic Web technologies (result of WP1.4), a link to the Ontology Outreach

¹ See <http://knowledgeweb.semanticweb.org/o2i>

Advisory (OOA, see the next section) and a link to the Repository of the European Association for Semantic web Education (REASE).

The screenshot shows the home page of the KnowledgeWeb Outreach to Industry portal. At the top, it says "realizing the semantic web Outreach to Industry". The navigation menu includes: Home, Industrial Application Needs, Technology Evaluation, Technology Recommendation, Semantic Technologies, and Cross-Network cooperations. On the left, there is a vertical "KnowledgeWeb" logo and a sidebar with links: Events Conferences reports, Newsletters, Useful Links, and Papers published. The main content area contains several sections:

- Knowledge Web (KW)**: A 4 year Network of Excellence project funded by the European Commission 6th Framework Programme. Knowledge Web began on January 1st, 2004. Supporting the transition process of Ontology technology from Academia to Industry is the main and major goal of Knowledge Web. The Outreach to Industry activity of the European Network of Excellence Knowledge Web is dedicated to promoting greater awareness and faster take-up of Semantic Web technology by industry within Europe in full synergy with the research activity. This outreach will help to reduce time needed to transfer the technology to industry and to market.
- Web Semantic Tools and Applications Information Repository**: This repository provides details of software tools, applications and demonstrators employing Semantic Web technology. The repository provides access to these descriptions, indexed according to the Semantic Web Topic Hierarchy, and provides the facility to provide feedback on the use of these tools. In this way, the repository seeks to provide information on both the availability, usability and effectiveness of current Semantic Web tools and applications. Further information on Semantic Web technologies and on applications, use-cases, and research directions can be found on the Knowledge Web Technology Roadmap wiki site.
- White paper on Semantic Technologies**: The Knowledge Web Technology Roadmap (KWTR) promotes a discussion on (i) the current and future trends on semantic web theories, tools and applications, (ii) general organizational needs, social drivers and user requirements, and (iii) technology locks between organizational/user needs and research activities. Its purpose is twofold:
 - To become aware of how, practically, knowledge web or semantic web technologies could help organizations in both delivering new products and services and creating new business value
 - To understand real needs of organizations and the market society, unveiling new desiderata and trends that the Knowledge Web NoE should try to overcome.
 Further information on Semantic Web technologies and on applications, use-cases, and research directions can be found on the Knowledge Web Technology Roadmap wiki site.
- OOA Ontology Outreach Advisory**: The OOA is an international not-for-profit association that consists of industry, government, and research leaders and innovators with respect to ontology development, use, or education. The general mission of the OOA is to develop strategies for ontology recommendation and standardization, and promote the ontology technology to industry. Further information on Semantic Web technologies and on applications, use-cases, and research directions can be found on the Knowledge Web Technology Roadmap wiki site.
- Rease Repository "European Association for Semantic Web Education"**: REASE is the repository of EASE for learning units in the area of Semantic Web. REASE comprises a diverse collection of learning resources, such as slide sets from lectures, tutorials, videos, or pointers to educational activities for both Higher Education as well as for industrial education. REASE is open to any member of the academic, research, or professional community. This platform fosters collaboration among educators and researchers allowing you
 - To communicate with experts in your field
 - To exchange Learning Resources
 - To work together on the production of Educational Material: Textbooks, lecture notes, case studies, simulations, etc.
 - To deliver distributed Educational Activities: lectures, courses, workshops, case study discussions, etc.

Figure 1. Screenshot of the home page of the new O2I web portal

1.3. Ontology Outreach Advisory

One of the major sustainability activities in KnowledgeWeb has been the legal founding of the Ontology Outreach Advisory.

Bijlagen bij het Belgisch Staatsblad - 23/01/2007- Annexes du Moniteur belge

"ONTOLOGY OUTREACH ADVISORY"

Vereniging zonder Winstoogmerk
1050 Brussel, Pleinlaan 2, geb. G-10
0886 345 517

BRUSSEL
12-01-2007

07013979

The OOA is an international not-for-profit association that consists of industry, government, and research leaders and innovators with respect to ontology development, use, or education. The general mission of the OOA is to develop strategies for ontology recommendation and standardization, and promote the ontology technology to industry.

The OOA is organized as a number of domain chapters and working groups. A domain chapter is responsible for implementing the OOA mission in a vertical market sector, such as, HR, eHealth, digital libraries, legal, finance, etc. A working group focuses on a certain issue that is horizontal for several or all domain chapters; examples are Ontology Evaluation and Quality, interoperability, Domain Upper-Levels, etc.

The OOA membership is open to any individual or legal entity who subscribes to the mission of the OOA. There are two different types of membership: Active and Observer. Active members are full members of the OOA General Assembly, with all rights and responsibilities. Observer members attend the OOA meetings and activities by invitation. At the time of writing this text, the OOA has 25 officially registered members, plus an additional 11 that have expressed their interest but did not sign the membership form yet. Among these members are 16 universities, 18 companies/organizations and 2 individuals.

The OOA Activities until June 2007 have been reported in detail in deliverable D1.3.6 which is available from the standard KnowledgeWeb sources. They will not be reported here again.

Activities deployed after June 2007 are mainly:

- ❑ Organization of the scientific OnToContent Workshop in December 2007 (Section 1.9).
- ❑ Organization of the industrial OOA workshop in October 2007 (Section 3.2).
- ❑ Further development of the OOA web site (Section 1.4).
- ❑ Further contributions to the IEEE-LTSC and HR-XML standards (Section 3.1 and 3.2).
- ❑ Additional work on the OOA HR-Semantics Roadmap.²
- ❑ Elaboration on the Ontology Authoring Quality Guidelines, definition of the procedures, and setup of the automated editing system for the Guidelines.³
- ❑ Setup and maintenance of the Use Case Studio.⁴

The OOA is currently running on resources partially coming from KnowledgeWeb as part of WP1.3 and partially on efforts by registered members such as HR-XML and EifEL. Sustainability beyond the end of the KnowledgeWeb NoE is assured by a paid membership scheme. Yearly fees range from €30 for individuals to €3000 for large organizations (for 2007, the membership fees were waived for the founding members).

1.4. OOA Web Site

Quickly after the legal founding of the Ontology Outreach Advisory in January 2007, a web site got established.⁵ This site is destined to become much more than just a static brochure on the World-Wide Web. Instead, it is powered by a regular OpenSource content management system, enabling full community support.

² <http://www.ontology-advisory.org/node/31>

³ <http://www.ontology-advisory.org/node/1>

⁴ <http://www.ontology-advisory.org/node/32>

⁵ <http://www.ontology-advisory.org/>

OOA Divisions
Domain Chapters
[> Human Resources](#)
[> eHealth](#)
Working Groups
[> Ontology Quality](#)
Ontology News

- Mid-Market Integration Standards
- ePortfolio & Digital Identity
- Open Applications Group, Inc. (OAG) High-Tech Council
- HR-XML and the EPM Workgroup Connecting Systems that Connect People
- Competency Model for an Outfielder

[more](#)

The OOA is an international not-for-profit association that consists of industry, government, and research leaders and innovators with respect to ontology development, use, or education. The general mission of the OOA is to develop strategies for ontology recommendation and standardization, and promote the ontology technology to industry.

Wrap-up of the Maastricht OOA Workshop 2007

The second OOA Workshop at the Human Capital Summit in Maastricht has been a great success. Nearly thirty attendees, some from academia and most from industry, followed the programme which was compiled of two sessions and a wrap-up.

The first session contained presentations of some relevant competency-oriented models and frameworks. The second session saw a managed, lively discussion centered around a 'linking ontology' which could explicitly show semantic overlaps and differences between the various competency models/frameworks. The third wrap-up session was brief and positioned the OOA workshop inside the HR-XML domain.



categories [[Activity](#)] [Login or register to post comments](#) [Read more](#)

OOA Workshop: "Ontology-Based Competency Modeling Frameworks"

At the upcoming Maastricht HCSIT Summit, on October 17, the OOA presents an industrial workshop to interactively establish common aspects between various proposed competency modeling frameworks and evolving industry standards from IMS and HR-XML. The programme is available in PDF. Update: the results of the workshop are available.

You are cordially invited to attend this workshop and enjoy the opportunity to help shape the interoperability framework for semantics-enabled HR information exchanges. These include ePortfolios, IMS and HR-XML standard(s), and related developments.

The workshop aims to bring together various approaches to competency frameworks, and compare them to existing/emerging standards from IMS and HR-XML. The speakers have been invited to briefly state the most important aspects of their framework in relation to the IMS and HR-XML standards. Subsequently a common workshop will interactively establish the overlaps between all approaches and produce a first draft of what could become a standards document. The results of the workshop will be presented at the HR-XML track which runs partially parallel.



The OOA web site is regularly updated with relevant news and offers resources for communication, discussion, repository management, and collaborative guideline editing to the OOA Community.

1.5. KnowledgeWeb Newsletter

One of the regular communication channels used by the Industry Area to report on Knowledge Web activities, results and events to the Industry Board members was a newsletter which was sent out in roughly bimonthly periods. In the last year of KnowledgeWeb, the newsletter was used to keep Industry Board members informed of the results of KnowledgeWeb and its sustainability actions, including raising awareness of the OOA.

The newsletters contained typically an editorial from the Industry Area Co-Manager, spotlights on particular activities and results in KnowledgeWeb and details of events (both calls for papers and calls for attendance).

Newsletters were sent out in 2007 in February, April, August, October and December. These newsletters have been archived on the KnowledgeWeb O2I portal.⁶

1.6. ESTC 2007

Executive Summary

The first European Semantic Technology Conference (ESTC2007 – <http://www.estc2007.com>) was held May 31st and June 1st 2007 in Vienna. This was the first edition in Europe of an event similar to the Semantic Technology Conference in America

⁶ See <http://knowledgeweb.semanticweb.org/o2i/index.php?page=Oct2007.php>.

(whose first edition, STC 2005, took place two years ago in May 2005), that is, a meeting ground for customers, developers and researchers to discuss the applicability and commercialization of Semantic Technologies in corporate settings.

The Knowledge Web Network of Excellence was actively involved both in organizing this event (chairing the workshop and tutorial tracks) and participating in it⁷ (organizing two workshops: Semantic Web Technology Showcase and Making Semantics Work For Business).

With about 210 participants, this first edition of the conference was finally very promising and its success can be considered, to some extent, comparable to the success of the first edition of its American counterpart (STC 2005 had about 300 participants). Beyond the number of participants, their repartition confirmed a definitely industry-oriented event: only 20% were from academia. In particular, large European corporations (including a lot of established telecommunication companies) as well as numerous dynamic European SMEs (including a lot of technological start-ups) were represented (see the complete list of participants in the appendix).

Moreover, a significant number of venture capitalist firms (5 European and 1 American) took part in the event, which assesses Semantic Technologies are now mature enough for investors to have a stake in. To highlight the creativity and dynamicity of the Semantic Web community in Europe, they also supported⁸ the very original Business Idea Contest and rewarded the 3 best ideas of commercializing products based on Semantic Technologies. The first prize was won by Aleph Web Services (an Austrian start-up) for a platform that facilitates on-demand usage of services over the Web by providing a search engine and a marketplace for Web Services. The second prize went to four students for their photo-based user profiler, which creates profiles by making a user choose pictures instead of boring her/him with forms to fill. The third prize was won by Adaptiva (a European start-up) for a semantic wireless sensor network platform.

Another important key factor for the success of the conference was the number and the quality of invited talks. The broad vision and the variety of semantics-related topics they embraced – ranging from semantic aggregation and integration of data and services to the convergence between the Semantic Web and Web 2.0, including the ongoing scientific research perspectives – were especially appreciated.

Finally, there were about 80 presentations given during the conference, spread over 30 presentations of business use cases with Semantic Technologies, 10 workshops and tutorials on various Semantic Web-related topics and 7 invited talks (see the complete programme and a detailed report on each invited talk in the appendix).

Overview of the current Semantic Technology trends observed at ESTC2007

The Semantic Web, and more generally Semantic Technology, is an interoperability technology, which operates at the middleware level (“under the hood”), without being explicitly visible to end-users. Essentially two kinds of applications of Semantic Technologies emerge: applications for web end-users (see the presentations of Ora Lassila, Mark Greaves and Frank van Harmelen) and applications for enterprises (see the presentations of Susie Stephens, Dave Pierson, Benjamin Grosf and Michael Brodie).

⁷ Reports on both workshops organised by Knowledge Web may be found further in this deliverable (Making Semantics Work For Business) and in the deliverable D1.4.3v3 (Semantic Web Technology Showcase).

⁸ The jury was composed by two persons from Vulcan, Inc. (Mark Greaves and Benjamin Grosf) and one person from Gamma Capital Partners (Klaus Matzka).

The first type of applications needs to be linked with Web 2.0, and the resulting “Web 3.0” will probably be some mix between the current Semantic Web (not yet very user-oriented) and the current Web 2.0. The second type of applications is more computer-oriented and aims at making intra- and inter-enterprise businesses more agile (easier, quicker and more dynamic).

In both cases however, “a little semantics goes a long way”, even if experts agree that theories and associated tools have made significant progresses for the last years and are now mature and scalable enough for many application fields. For example, in the web end-users world, semantic hyperlinks (such as micro-formats) or community-generated taxonomies (“folksonomies”), which may be seen as the first steps to semantics, should take better advantage of the available semantic tools to provide users with more advanced functionalities. In the enterprise world, although mainstream vendors integrate more and more Semantic Technologies within their products, they need to be recognized and proceed cautiously.

Things seem to go faster in the enterprise domain, and a great attention should be paid to the emerging Semantic Web Service (key enabler for Service-Oriented Computing) and Semantic Rule (key enabler for Data Governance) technologies. Businesses seem to react very positively to them (see the presentations of Michael Brodie and Benjamin Grosf). Even if Semantic Technologies establish more progressively in the Web of users domain, investors have already positioned in their favour, thus preparing the near era of Web 3.0 (see the presentation of Mark Greaves).

ESTC2007 at a glance

| | | | |
|---|---|--|--|
| <p><u>Distribution of the participants</u></p> <p>Total: ~210 participants</p> | <p><u>4 parallel tracks, with:</u></p> <ul style="list-style-type: none"> - about 30 use case presentations, - 6 workshops and 4 tutorials, - 7 invited talks <p><u>Main topics</u></p> <ul style="list-style-type: none"> - Commercialisation and profitability of Semantic Technologies - Semantic Web and related standards - Convergence between the Semantic Web and Web 2.0 - Semantic Technologies - Ontologies and ontology mapping - Semantic Rule Technology | | |
| <p><u>5 most represented countries</u> (by number of representatives)</p> <ul style="list-style-type: none"> - Austria - Germany - United Kingdom - Spain - France | <p><u>Represented venture capital firms</u> (alphabetical order)</p> <ul style="list-style-type: none"> - Amadeus Capital Partners (UK) - gamma capital partners (Austria) - GP International SA (Switzerland) - PONTIS Venture Partners (Austria) - tectnet capital (Austria) - Vulcan, Inc. (USA) | | |
| <p><u>Main represented corporations</u> (by business sector, alphabetical order)</p> <table border="0"> <tr> <td style="vertical-align: top;"> <p>Telecommunications</p> <ul style="list-style-type: none"> - British Telecom Group (UK) - Deutsch Telekom (Germany) - France Telecom (France) </td> <td style="vertical-align: top;"> <p>IT providers</p> <ul style="list-style-type: none"> - ATOS Origin (France) - SAP (Germany) <p>Telecom manufacturers</p> <ul style="list-style-type: none"> - Ericsson (Sweden) </td> </tr> </table> | | <p>Telecommunications</p> <ul style="list-style-type: none"> - British Telecom Group (UK) - Deutsch Telekom (Germany) - France Telecom (France) | <p>IT providers</p> <ul style="list-style-type: none"> - ATOS Origin (France) - SAP (Germany) <p>Telecom manufacturers</p> <ul style="list-style-type: none"> - Ericsson (Sweden) |
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|-----------------------------|------------------------------|
| - Telecom Italia (Italia) | - Siemens (Germany) |
| - Telefónica (Spain) | |
| - Telekom Austria (Austria) | Other |
| - Vodafone (UK) | - Audi AG (Germany) |
| | - Dassault Aviation (France) |

1.7. FIRST

The final industry event organized by the KnowledgeWeb Industry Area was FIRST: First Industrial Results of Semantic Technologies, which took place November 11, 2007 in Busan, South Korea as part of the International Semantic Web Conference (ISWC 2007).

The workshop agenda consisted of 6 presentations. 12 persons attended the workshop. Despite the small numbers, the workshop was very effective both in terms of content and contacts. The six presentations are summarized below. The full proceedings of the workshop are available online as CEUR Vol. 293⁹.

- **Case Study in using Semantic Grids for Satellite Mission Quality Analysis**
Reuben Wright, Deomos Space et al.

This talk focused on satellite data files, which have implicit semantics which can be made explicit by a transformation to XML and then to RDF. Given the size of the extracted data, the researchers used a Semantic Grid for handling data resources and services, providing performance and scalability in a distributed environment. To create the ontology and transform the data took some effort: 6 months to understand the data, 6 months to develop the ontology.

- **Human Resources Standards for Employment Services**
Asuncion Gomez-Perez, UPM et al.

Employment services use different languages and different schemas, and it is the aim of the European project SEEMP to enable integration between these services so that worker mobility in Europe is facilitated. Data integration is enabled through the use of a Reference Ontology, local ontologies and mappings between them.

- **Telecommunications supply chain**
Aidan Boran, Bell Labs Ireland et al.

In Alcatel-Lucent there is a great importance attached to data integration e.g. the join of revenue information between Sales and Forecasting. To enable such integration, ontologies and mappings are introduced. Concretely, D2RQ is used to transform RDMS to RDF schema and a hybrid ontology approach taken. The THALIA integration benchmark is used to measure system performance. Functions are used to determine ontology mappings with rule like functionality. Initial findings were that about one third of mappings are complex and reasoning at the OWL level is not sufficient. There is also a need for an integration process workflow.

- **Lipidomics**
Rajaraman Kanagasabai, Institute for Infocomm Research et al.

Lipids are fatty acids. In a Life Sciences scenario a challenge is how to classify them? The presented solution is to use an OWL-DL ontology. The resulting conceptualization had 560 classes, 75 properties and a 8 level depth. nRQL and Racer were used as query language and reasoner because of their ABox reasoning capabilities. A tool was presented which was called Knowledge Navigator: it provided a drag and drop interface for knowledge base exploration.

⁹ <http://sunsite.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-293/>

- **Semantic Enterprise Technologies**
Massimo Ruffolo, fourthcodex inc et al.

Semantic Enterprise Technology (SET) is presented as an alternative to Semantic Web Technology, founded on the idea of semantic models which are executable, flexible and agile representations of domain knowledge. A "Codex Language" is defined for dealing semantically with unstructured documents. A Semantic Model is a seven-tuple, including classes, instances, axioms, logic programs and descriptors for concept identification in documents. In terms of expressiveness, Semantic Enterprise Technology is the interoperability solution between Disjunctive Logics and Description Logic. An application in healthcare sector to construct electronic medical record was presented,

- **Web Widgets**
Eetu Makela, TKK Helsinki et al.

The presentation showed the use of in-browser widgets for a more intuitive access to back end semantic systems. Presented widgets were the ontology server ONKI, the annotation editor SAHA and the culture portal CultureSampo. Concept identification is made through access to an upper ontology and a domain ontology and the widgets can perform semantic mash ups (data/resource integration).

Finally an invited talk by Claudio Bergamoni from Imola Informatica explored the current uptake of semantic technologies in enterprises. He noted how semantic technology uptake must be an "evolution, not a revolution" and that semantic solutions can be well promoted to companies right now as part of the Web 2.0 hype.

This small yet representative collection of research work presented at FIRST once again demonstrates the state of the art of semantic technologies in industry: only one presentation came actually from industry but all the presentations demonstrated existing, working technology which is being applied in some industry setting albeit as part of research investigation. Results were that semantics were indeed bringing value to business activities but the cost of their use seemed still to be the major barrier; where research projects were supporting the effort the technologies were being successfully applied but a significant proportion of industry appears to be still not yet at the decision point to choose semantic technologies itself. It is clear that industry lacks the expertise of semantic Web researchers "in house" to apply the semantic technology solutions that would be desired and that the key next challenge for the semantic Web community is reducing that cost: semantic technologies are coming to a level of maturity satisfactory for industrial application "in the real" as shown in the growing list of successful use cases coming out of research activities, including the use cases of Knowledge Web (see deliverable D1.1.4v3). However, for non-expert users, learning and applying the semantic technology, which is including in most typical cases the own development of an ontology, extracting instance data from legacy documents and writing code which reasons over that data and reacts to the conclusions, is currently too costly even though the successful completion of these steps should lead to a situation of longer term benefits through semantics.

1.8. Briefing Notes

Following the Industry-Research co-operations, short briefing notes introducing the results of those co-operations were produced. These documents, which were restricted to a length of two pages, are intended for dissemination to industry in order to demonstrate achievements made in applying semantic technology to enterprise scenarios. They also refer to public documents and web content where further information can be found.

In a first phase, Industry Board members were contacted after being clustered into the categories of the Industry-Research co-operations with the relevant briefing note and a request if they would be interested in further information. From 45 contact requests, we received 19 positive responses. As further results are made available on the issues of technology transfer within the category of the given use case, we will recontact these members. Further detail can be found in Appendix 2 of D1.1.4v3.

The OOA intends to use these Briefing Notes as one of the vehicles to perform Outreach to Industry, and will make them available on or through the OOA web site.

1.9. OnToContent 2007

The OnToContent 2007 Workshop,¹⁰ in association with the OnTheMove Federated Conference in Vilamoura, Portugal, November 28 2007,¹¹ was the scientific yearly event organized by the OOA. 2007s edition has been organized by Mustafa Jarrar (VUB), Andreas Schmidt (FZI), Werner Ceusters (SUNY), and Claude Ostin.[†]

Call for Papers as published

Current trends within the Semantic Web research are mainly concerned with technological issues, such as language capabilities, inference services, etc. Yet less attention has been given to ontology content and its quality. This workshop aims to focus on content issues, such as methodologies and tools concerned with modeling good ontologies, approaches to ontology content evaluation, quality measures, ontology content management (e.g. metadata, libraries, and registration), ontology documentation, etc. The workshop also aims to give a special attention to ontology content issues in two industrial sectors: human resources and employment, and healthcare and life sciences. We welcome papers and (past/planned) project descriptions that discuss ontology modeling and evaluation aspects, particularly:

- ❑ Research papers presenting theoretical solutions, but with a clear illustration on how these solutions can be applied in industry.
- ❑ Position papers presenting opinions on some aspect of ontology practice, or describing work that is still in progress, but sufficiently mature to warrant attention.
- ❑ Business experience and case studies specifying requirements, challenges, or opportunities of modeling and applying ontologies in industry.

Actual workshop

The received papers were subjected to a rigorous review process and 62% had to be rejected due to insufficient scientific quality and impact. The remaining submissions did not cover all topics called for; especially the Human Resources were underrepresented. This led to a revised plan for OnToContent 2008 (Monterrey, Mexico) which will emphasize the Human Resources angle. Andreas Schmidt from FZI will be the main organizer to assure this focus.

The workshop consisted of three tracks: Ontology Design and Evaluation, Ontology-based Decisions and Dialogues, and Ontology-based Medical Applications.

- ❑ **Ontologies – reaching out to the real world**
Mustafa Jarrar and Andreas Schmidt
- ❑ **Evaluation Framework for Automatic Ontology Extraction Tools: An Experiment**

¹⁰ <http://www.starlab.vub.ac.be/staff/mustafa/OnToContent07>

¹¹ <http://www.cs.rmit.edu.au/fedconf>

Jinsoo Park et al.

Ontologies have become increasingly important in many areas. Building ontology, however, is a time-consuming activity which requires many resources. Consequently, the need for the automatic ontology extraction tool has been increased for the last two decades, and many tools have been developed for this purpose. Yet, there is no comprehensive framework for evaluating such tools. In this paper, we identified important tool evaluation metrics and developed a set of criteria that guide us to evaluate the quality of ontology extraction tools. We carried out experiments and assessed four popular extraction tools using our proposed evaluation framework. The proposed framework can be applied as a useful benchmark when developers want to build ontology extraction tools.

□ **Ontology Design Risk Analysis**

Carlos Ferreira et al.

Despite active work during the past ten years, Ontology Engineering still lacks standard construction methodologies. The few existing methodologies do not include risk management to predict and control the risks that emerge from the many constraints involved in the construction process. Risk management techniques can smooth the problems faced in these complex construction processes. In this paper, an ontology construction process is described, to which a risk analysis process was adapted. These results represent a step to help newcomers in ontology engineering, pinpointing common risks, and their respective triggering events and effects.

□ **On Conducting a Decision Group to Construct Semantic Decision Tables**

Yan Tang

Semantic Decision Table (SDT) was introduced to support collaborative decision making. Semantics, a group of decision makers, mutual understanding and collaborative environment(s) are at the heart of SDT. In practice, it is rather difficult to construct SDT within a decision group. We try to tackle this problem by modeling SDT within the context of information system, which is based on McGrath's Conceptual Framework for the Study of Group. Ontologies and DOGMA (Developing Ontology-Grounded Methods and Applications) approach to ontology engineering are proposed to store the semantics and mutual understanding for SDT. In this paper, we also propose a generic method of guiding a group to construct SDT, which is illustrated with an example of online customer management in the privacy domain.

□ **Ontological Modelling for Interactive Question Answering**

Roberto Basili et al.

This paper proposes a model for ontological representation supporting task-oriented dialog. The adoption of our ontology representation allows to map an interactive Question Answering (iQA) task into a knowledge based process. It supports dialog control, speech act recognition, planning and natural language generation through a unified knowledge model. A platform for developing iQA systems in specific domains, called REQUIRE (Robust Empirical Question answering for Intelligent Retrieval), has been entirely developed over this model. The first prototype developed for medical consulting in the sexual health domain has been recently deployed and is currently under testing. This will serve as a basis for exemplifying the model and discussing its benefits.

□ **Federated Ontology Search for the Medical Domain**

Vasco Pedro et al.

In this paper we describe a novel methodology for retrieving and combining information from multiple ontologies in the medical domain. In the last decades the number and diversity of available ontologies for the medical domain has grown

considerably. The variety and number of such resources available makes the cost to integrate them into an application incremental, often prohibitive for exploratory prototyping, and discouraging for larger-scale integration. Cross-ontology localized merging is proposed as a way to allow for a flexible and scalable solution. This approach also indicates a low maintenance cost and high reusability for different application types within the medical domain.

□ **An Ontology-Based Technique for Validation of MRI Brain Segmentation Methods**

Bruno Alfano

We propose an ontology and rules based approach as innovative instrument to improve and validate brain segmentation in Magnetic Resonance Imaging (MRI), which is a very difficult and time consuming problem. Different techniques are realized to automate segmentation and their development requires a careful evaluation of precision and accuracy. At present segmentation procedures are generally validated by comparison with brain atlas or by use of phantoms. We combine ontology and rules to formalize knowledge about normal and anomalous distribution of brain tissues. Automatic reasoning points out possible “anomalies”, imputable to segmentation procedure: in this way the detection and the subsequent solution of bugs become viable.

□ Discussion and Closing Remarks
Mustafa Jarrar and Andreas Schmidt

The author of *An Ontology-Based Technique for Validation of MRI Brain Segmentation Methods* was approached to see whether he would want to make this use case available on the OOA web site, as part of the eHealth Use Case Studio. We are appreciative of his positive response.

2. Specific eHealth Outreach Activities

eHealth has been one of the major domains of interest chosen in KnowledgeWeb and as the sustainability of the outreach to this vertical market sector shall be an activity of the Ontology Outreach Advisory, we choose to introduce a separate chapter which outlines specifically the achievements and ongoing outreach work targeted to this domain.

2.1. Ontology Authoring Quality Guidelines

Developing good quality ontologies is an important goal in ontology engineering. The importance of quality is not only to build reliable ontologies, but also good quality enables reusability, consensus, adoption, correctness in reasoning and prediction, good performance in computation, etc. However, achieving an agreed upon or a principles-based criteria set that can be generalized to assess ontologies remains a very difficult task.

These guidelines will be promoted not only to ontology engineers but also to tool developers. An ontology authoring tool can then be evaluated and scored, for example, based on how much it implements these guidelines. The idea is that enforcing these guidelines during the ontology development phases ensures a certain quality of the product, i.e. the ontology. Although the final recommendations are not intended to play a role of a gold standard for quality assessment, but as a first initiative in this regard, they are supposed to lead to better ontology content authoring.

Experienced ontologists are invited and encouraged to contribute to this recommendation, by submitting guidelines based on their best practice and research findings. A guideline is not necessarily a rigid assessment criteria or a theory, but can also be a methodological recommendation that guides ontology builders to achieve better quality, reusability and/or adoption. Not every guideline includes a formal technical specification, nor can every recommendation be embodied by support from authoring tools; each is intended to be directly comprehensible by industrial users and applicable in a wide range of industry settings. While some guidelines are interrelated, each is well-contained and can be followed independently of the others.

The collected guidelines will be refined to arrive at more agreement; where there is eventual disagreement, the differing opinions will be clearly documented. All guidelines will be reformulated where appropriate to provide a coherent approach to ontology content. Each guideline should be easy to understand and apply by normal ontology engineers or non-technical domain experts.

Guideline collection will be performed online, using the web site of the OOA as platform.¹² Specific guideline templates have been designed and provided in the content management system, and a review procedure has been set up as a work flow to allow a few cycles of comments (Delphi method) before a guideline will be released as 'formally recommended'. However this procedure will not be closed until formal release. The transient status of a not-yet-released guideline will be made clear, but since the whole idea is to get comments and feedback, even preliminary guidelines will be accessible. The process will closely follow the well-known and established RFC process of the Internet Engineering Task Force. This model calls for an open submission using quite strict format and procedure requirements, a review and revision by a small group of renowned specialists, and a cycle of publish-and-feedback. The OOA plans to have a continuous process in place, to avoid an unnecessary long interval between submission and approval/dissemination of a new guideline.

¹² <http://www.ontology-advisory.org/node/1>

2.2. eHealth Use Cases

Also part of the OOA web site¹³ is a section on eHealth Use Cases: the Use Case Studio. Chaired by Vrije Universiteit Amsterdam, this is a living place where successful use cases are collected, discussed, and promoted to industry. Research Labs are invited to submit eHealth use cases. Industrial parties are encouraged to place comments and interact with uses cases authors. The idea is to promote these use cases at the annual industrial events of the OOA. Industrial parties are encouraged to place comments and interact with uses cases authors.

At the time of writing, eight use cases were available on the OOA web site:

Use Case 1: Intensive Care

Formalized Terminologies to support tasks at Intensive Care Units of Hospitals (DICE/I-Catcher).

By: Michel Klein and Ronald Cornet. June 2007.

Use Case 2: OpenKnowledge

Using the OpenKnowledge System to Ease Re-use Algorithms in the Proteomics Domain.

By: George Anadiotis, Paolo Besana, David Dupplaw, Dietlind Geldoff, Frank van Harmelen, Spyros Kotoulas, Adrian Perreau de Pinninck, Dave Robertson and Ronny Siebes. June 2007.

Use Case 3: Drug Ontology

Drug Ontology Project for Elsevier (DOPE).

By: Anita de Waard (Elsevier), Christiaan Fluit (Aduna) and Frank van Harmelen (Vrije Universiteit Amsterdam). June 2007.

Use Case 4: Medical Guidelines and Protocols

Integrating formal methods in the development process of medical guidelines and protocols.

By: Radu Serban, Annette ten Teije, and Frank van Harmelen. June 2007.

Use Case 5: Clinical Trials

Vague modeling for Evaluating Clinical Trials

By: Stefan Schlobach, Linda Peelen, and Michel Klein. June 2007.

Use Case 6: Public Health Situation Awareness

Semantic Web Technology for Public Health Situation Awareness.

By: The School of Health Information Sciences, University of Texas, United States. June 2007.

Use Case 7: Traditional Chinese Medicine

Semantic-based Search and Query System for the Traditional Chinese Medicine Community.

By: Zhejiang University and China Academy of Chinese Medicine Sciences, China. June 2007.

Use Case 8: Radiological Procedure Orders

Using Semantic Web and Proof Technologies to Reduce Errors in Radiological Procedure Orders.

By: Helen Chen and Jos de Roo, Agfa Healthcare.

As discussed in Section 1.9, a ninth use case will shortly be added to this list.

¹³ <http://www.ontology-advisory.org/node/32>

2.3. OnToContent 2007

The OnToContent 2007 Workshop,¹⁴ in association with the OnTheMove Federated Conference in Vilamoura, Portugal, November 28 2007,¹⁵ had a specific focus on eHealth in one of her sessions *Ontology-Based Medical Applications*.

Chaired by Andreas Schmidt of FZI, the following papers were presented:

- **Federated Ontology Search for the Medical Domain**
Vasco Pedro et al.

- **An Ontology-Based Technique for Validation of MRI Brain Segmentation Methods**
Bruno Alfano

For more information, see the full description of this workshop in Section 1.9.

¹⁴ <http://www.starlab.vub.ac.be/staff/mustafa/OnToContent07>

¹⁵ <http://www.cs.rmit.edu.au/fedconf>

3. Specific Human Resources Outreach Activities

As Human Resources and Employment has been one of the major domains of interest of KnowledgeWeb and the sustainability of the outreach shall be an action of the Ontology Outreach Advisory, a separate section outlines the achievements in this domain.

3.1. Human Resources Roadmap

An ongoing activity in KnowledgeWeb is the development and delivery to Industry of the HR Roadmap, officially called *Semantic Challenges and Opportunities in the Human Resources Domain*. The current state of this Roadmap can be found on the web site of the OOA.¹⁶

Knowledge-based automation in the domain of Human Resources faces some particularly daunting challenges. Information technology scientists and practitioners involved in the Human Resources domain have to quantify and qualify the common knowledge that underlies meaningful conversations about human resources. They must also implement the operational processes and data stores that exploit and capture that knowledge to further the enterprise's strategic objectives. The common language used to describe jobs, functional roles and staff vacancies is generally well understood and formalized, at least within specific enterprise domains or regional scopes. Models and emerging standards for the description of tasks and responsibilities have been used with various degrees of success. Various standardization efforts also support capturing the combination of tasks and responsibilities that make up a typical job description or job vacancy.



The OOA Human Resources Roadmap has been put together by 19 contributors from various, mostly industrial organizations and was produced as a response to a direct request from the HR community at the OOA-HR Chapter Kickoff Meeting in Oxford, October 2006. It presents current challenges in HR, and existing solutions, existing standards, projects, initiatives, and ontologies in a concise format, directed at immediate industry uptake. As such it is a valuable addition to the KnowledgeWeb Technology Roadmap (WP1.4) which can be seen as the logical sequel for uptakers.

3.2. Human Capital and Social Innovation Technology Summit

The second OOA Workshop at the Human Capital Summit¹⁷ in Maastricht has been a great success. Nearly thirty attendees, some from academia and most from industry, followed the programme which was compiled of two sessions and a wrap-up. For more information and presentations, please visit the Workshop page at the OOA web site.¹⁸

The first session contained presentations of some relevant competency-oriented models and frameworks. The second session saw a managed, lively discussion centred around a 'linking ontology' which could



¹⁶ <http://www.ontology-advisory.org/node/31>

¹⁷ <http://events.eife-l.org/HCSIT2007>

¹⁸ <http://www.ontology-advisory.org/node/72>

explicitly show semantic overlaps and differences between the various competency models/frameworks. The third wrap-up session was brief and positioned the OOA workshop inside the HR-XML domain.

Robert Meersman opened the session with a brief introduction to the purpose and goals of the Ontology Outreach Advisory. Founded as one of the results of the KnowledgeWeb Network of Excellence, the OOA is destined to be a prime technology transfer vehicle from semantic research to industry.

Jeroen Hoppenbrouwers gave a quick introduction to the challenges of semantics and the difference between semantics and data models, or even information models.

Luk Vervenne outlined the current developments surrounding HR-XML and its movement towards a semantically annotated framework for HR-related information exchange.

Andreas Schmidt discussed how competency-oriented approaches are gaining ground in human resource development. Key technologies to cope with the complexity of these approaches are ontologies, both for defining competency frameworks and concrete competency catalogs.

Tobias Ley introduced a formal model of how to describe learning goals and prerequisite knowledge in a work-integrated learning environment. The model is based on knowledge space theory (KST) which was originally developed in cognitive psychology.

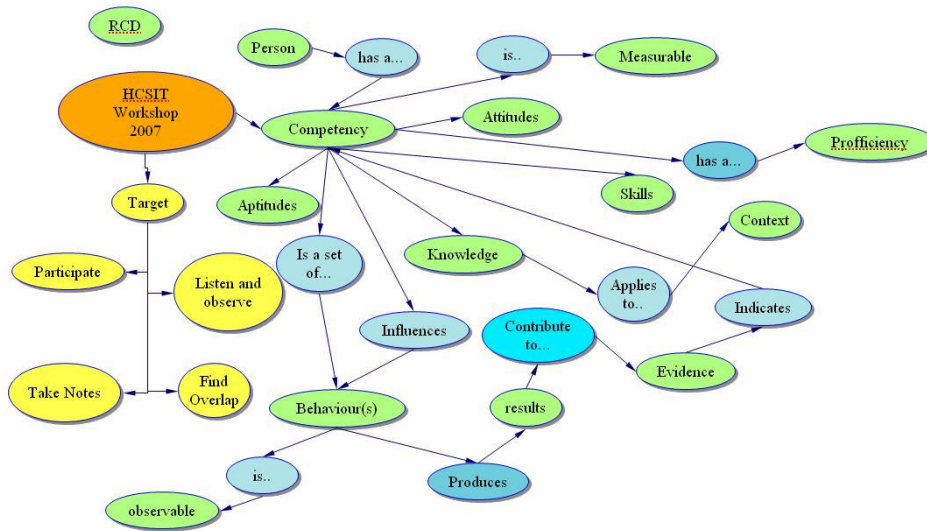
Clementina Marinoni presented several competence and job profile frameworks. In general, frameworks are necessary to achieve standardization. In this case, frameworks help build a common language, i.e they help understand and communicate the same concepts.

After the presentations of the individual models, which were for the most part geared towards a specific domain, application, or user group, the full workshop audience gathered to create the first draft of a linking ontology. Such an ontology is not intended to carry all knowledge contained in the individual models, but to convey the elements in the models that are equivalent in meaning.

After an hour of hands-on (re)modeling and discussion, several issues were raised that need attention, both in research and for the next workshops:

- ❑ It probably is more efficient to limit the discussion to (and invite people based on) only two peer models/applications/domains at the same time. This could avoid 'hot spots' in the audience while others are relatively quiet.
- ❑ Before starting the workshop discussion, a clear set of discussion rules should be made available, explained, and afterwards enforced. Although some rules were introduced and used during the Maastricht discussion, the group dynamics sometimes moved out of focus.
- ❑ The documentation tool (a standard mind map) probably can be better tuned to the particularities of such a group process.

A very brief statement of the results presented above was given at a shared wrap-up session about HR-XML in general. People were enthusiastic about the general approach and even the result obtained during the workshop, no matter its relatively small scale. The process of getting to agree on what commonly used concepts actually meant in the various competency-related models was considered helpful, practical though not yet fully mature, and certainly an approach worth further development.



3.3. OnToContent 2008

The annual OnToContent workshop will in 2008 have a specific Human Resources focus. Chaired by Andreas Schmidt (FZI) a special interest in HR frameworks and their correspondences will be voiced in the upcoming Call for Papers.

4. Sustainability Activities Assessment

KnowledgeWeb has spawned several sustainability activities. This section sums them up and puts them in context and mutual relationship.

4.1. Kweb Sustainability Actions

In conclusion of the activities of the Outreach to Industry work of Knowledge Web (WP1.1) we have taken care to ensure the sustainability of our results by establishing the following aspects:

- The Industry Portal will continue to be hosted at `semanticweb.org` and its content – updated to contain all of the Industry Area results - will be publicly accessible. We are thankful to UPM for being able to continue to provide hosting of the portal.
- Industry Board members have the opportunity to continue to participate in activities relating to semantic technology promotion as members of the OOA, particularly by being part of the Inreach to Industry working group. We expect the OOA to be an instrument through which we can continue our joint activities with the industry such as co-organization and participation in industry events. The main goal of the new working group, drawing from our experiences in Knowledge Web, will be lowering the barrier to enterprise uptake of semantic technology (see section 5.2).
- Use Cases will be publicly accessible from the portal and will be selectively migrated to the OOA in cases where there is ongoing activity and new results. For example, in the eHealth domain, the OOA has established an use case studio and selected Knowledge Web use cases will be migrated in co-operation with the providing industry partner.
- Presentations and papers resulting from industry events organized by the Knowledge Web Industry Area will be publicly accessible through the REASE portal and the CEUR proceedings website.
- The European Semantic Technology Conference (ESTC) has been founded to be an ongoing, annual Industry Event in the same mold as the Semantic Technologies Conference (STC) in the USA. The first event in 2007 (see Section 1.6) was a great success and it will be continued on an annual basis with STI as the principle organizer, with the aim to grow European industry participation and further promote and transfer semantic technology. ESTC 2008 is already being planned (see section 5.4)
- STI International has been founded by a subgroup of Knowledge Web partners to sustain their interests and activities. STI International will play a role in the technology areas around the Semantic Web research developments.

4.2. STI and OOA

The following is a JOINT STATEMENT ON COLLABORATION BETWEEN STI International AND OOA produced in collaboration by both organisations.

The *KnowledgeWeb* Network of Excellence has taught us a great deal about the theory and practice of semantic technologies. It has become clear that there still is a gap between what is theoretically achievable and what is practically useful, interesting, or

affordable at this moment in time. For this reason, it was considered a good idea to found two organizations to sustain the KnowledgeWeb efforts: STI International and the OOA.

In brief, the mission of the Semantic Technology Institute International is *to establish semantics as a core pillar of modern computer engineering*. The mission of the Ontology Outreach Advisory is *to develop strategies for ontology recommendation and standardization in industry*.

The focus of both institutions is clear and complementary. STI International aims at research, technology development and reference architectures, commercialization, and education on relevant topics. It is an ICT-oriented organization that will play an important role in the international development and dissemination of semantics technology in general.

The OOA focuses on the suitability of specific ontologies for specific purposes in actual business practice. It creates awareness of semantic issues in business domains, free from technological constraints. Collaborative development of reference ontologies and business standards such as ontology authoring quality guidelines are the core OOA activities.

The two institutions STI International and OOA intend to closely collaborate to pursue their own mission as best as they can. It is expected that research and development will mostly do business with STI International, while the non-ICT industry will be at the table with the OOA. Regularly, STI International and OOA will be present at each other's events, and they aim for mutual membership to facilitate crossovers between both interest groups.



STI · INTERNATIONAL



5. Future Work

This deliverable concludes the activities of KnowledgeWeb workpackages 1.1 and 1.3. After four years of network funding, we have summarized the final activities that were undertaken under the KnowledgeWeb umbrella and, in the previous chapter, noted how these activities have already taken care to ensure sustainability of their results. In this final chapter, we mention more broadly what work should be undertaken in the future, leaving open whether this work will ultimately be performed within STI² or the OOA or some other instrument. However, as the partners of the KnowledgeWeb activities outlined in this document – in particular FU Berlin (WP1.1 leader) and VUB (WP1.3 leader) – will continue to be involved in industry outreach activities through the new sustainability instruments (STI and OOA), it is clear that these recommendations can be integrated into the activities and charter of those organizations.

5.1. Promotion of a Semantic Web Research Agenda for Industry

As a final result of the use case collection and Industry-Research co-operations led by Knowledge Web WP1.1 we specified a research agenda for Semantic Web technologies which targets the actual needs of the potential industry users. This agenda is outlined in the Knowledge Web Technology Roadmap¹⁹. Five main areas for industry-mature research were identified there, which are summarized here with the major points of Semantic Web research:

- Ontology construction:
 - Lowering the cost of ontology building
 - Extracting an ontology from legacy data (textual and non-textual)
 - Evaluation of resulting ontologies
- Matching between heterogeneous ontologies
 - Dynamic discovery of correspondences between classes and instances
 - Support for multilingualism
- Approximation of semantics
 - Determining the reliability of knowledge
 - Taking this reliability into account during knowledge processing
- Distribution
 - Optimal distribution of knowledge in a network
 - Management of nodes that hold related knowledge
 - Reasoning over distributed knowledge
 - Ensuring global consistency of distributed knowledge
- Semantic Web Services
 - Automatic matching of business processes to autonomously perform tasks

Generally, it was recognized that significant parts of Semantic Web research are close to industry maturity – this can be seen in the growing numbers of use cases demonstrated at events such as ESTC2007. However, uptake is still largely in research departments of the companies or through projects in collaboration with academic researchers: in other words, transition to semantic technology is still the preserve of specialized researchers who understand the technology and the tools. Industry in general finds the barrier to technology transfer too high and a major goal of industry outreach activities in the next years – as semantic technology in the research continues to reach maturity – must be lowering this barrier by concentrating more on how to migrate legacy systems and data to semantic

¹⁹ Available on the Knowledge Web portal under Publications / Book. The URL is <http://knowledgeweb.semanticweb.org/semanticportal/servlet/download?ontology=Documentation+Ontology&concept=Book&instanceSet=kweb&instance=Knowledge+Web+Technology+Roadmap&attribute=On-line+PDF+Version&value=KWTR-whitepaper-44-final.pdf>

technologies, to provide more intuitive means to integrate semantic technology into business processes and to develop tools and methods which hide the aspects of logic and ontology from the non-specialist user.

It is vital that the continuing research in the Semantic Web technologies is more directed towards this agenda if semantic technologies are to be better positioned for broader industrial uptake. Hence, this research agenda should be communicated widely and effectively to the Semantic Web research community. Furthermore, research workshops are needed which are focused on research work which meets the needs of this agenda in order to raise awareness of the issues as well as promote and support those research results to industry which are vital for the future uptake of semantic technology. These aims are part of the OOA working group "Inreach to Industry" which has been founded subsequent to the end of the Knowledge Web network²⁰ (see also the next section) and one concrete intended action is to propose a workshop focusing on this research agenda at the next ESTC conference in 2008.

5.2. Promotion of Knowledge and Technology Transfer between Industry and Research

The mission of the OOA working group "Inreach to Industry" is to organize and support activities focused on lowering the barrier to entry to ontology technologies for industrial adopters. The working group will consist of both industry and research leaders, and will facilitate knowledge and technology transfer between both groups.

The current focus topics of this group include:

- collection and dissemination of business cases which demonstrate the (potential) benefit of ontology technology to enterprises
- extraction and analysis of the industry requirements, technological barriers and potential value areas of ontology technology from the business cases
- organization and promotion of events promoting the needs of industry to leading ontology technologists
- disseminating industry needs to the ontology research community through publications, white papers, technical reports etc.
- actively directing the ontology research community towards developing methodologies, tools and documentation which meets industry requirements
- disseminating mature research results to potential industry adopters
- establishing communication channels between researchers and industry to facilitate technology and knowledge transfer
- organization and promotion of events educating industrial users in the use of ontology technology

Planned Activities in 2008 include two events bringing industry and research leaders together to discuss industry requirements in ontology research and promote ontology based solutions to common business problems, one tutorial promoting ontology technology to industry and the continued use case and requirements collection through the OOA web site and Working Group dissemination activities.

We also plan an annual "state of ontology research" report focused on communicating industry user needs to ontology researchers and an annual "state of ontology technology" report focused on promoting available mature ontology-based tools to potential industry adopters.

²⁰ <http://www.ontology-advisory.org/node/73>

5.3. Promotion of Ontologies to Industry

As clearly indicated by KnowledgeWeb research results and a large number of recent scientific publications, the availability of good quality, authoritative, and widely accepted ontologies is crucial for any industry acceptance of semantic technology.

Next to the obvious challenges in ontology elicitation, extraction, or production, an even larger challenge is to align the stakeholders sufficiently well to start using shared ontologies instead of local ones. Effort has been underway within the WP1.3 activity for a while to engage authoritative organizations such as NIST, NCOR, and ECOR, plus smaller-scale domain organizations as HR-XML and IEEE LTSC, into collaborative specification of ontology authoring quality guidelines, ontology recommendations, and ontology validations.

The OOA as a sustainability activity of Knowledge Web will pay a great deal of attention to these issues, and make sure that specific ontologies will be recommended for uptakers as soon as they emerge from the joint work with the larger standards organizations.

5.4. European Semantic Technologies Conference (ESTC)

The ESTC 2007, as reported in this deliverable, was a great success and the conference will be continued under the organization of STI with the aim of becoming the showcase annual industry event in Europe for semantic technologies. The planning for ESTC 2008 has already begun and early information is available on the website <http://www.estc2008.com/>.

Appendix – further details on ESTC 2007

Invited talks

Ora Lassila (Nokia Research Center)

From the Semantic Web to a Broader Vision of Personal Computing

Ora Lassila, Research Fellow at Nokia and Elected Member of the W3C Advisory Board, started by recalling that the initial ambition of the Semantic Web was targeted to the personal and ubiquitous computing, that is, a user-oriented range of applications.

Although the “*Semantic Web is an interoperability technology*”, aimed at exchanging “*machine-friendly*” contents, it has also to reconcile its technical computer-orientation with the user-orientation of the Web. Better, its technical computer-orientation should serve the user-orientation of the Web. In other words, “*KR [Knowledge Representation], etc. [, including Semantic Technologies,] are a means to an end, not an end to itself*”. Consequently, “*Relationship to “Web 2.0” needs to be elaborated – **complementary, not adversary**, [e.g.] how do we connect ontologies and folksonomies?*”

Promising applications of Semantic Web technologies for personal computing are:

- PIM (Personal Information Management) data and “Semantic Desktop”;
- Semantic Web services;
- Device & system interoperability for ubiquitous computing

To be useful, technologies for personal computing need to bring concrete and intuitive solutions to users’ problems, that is, “*maximize users’ freedom (e.g., to make use of data), minimize users’ need to deal with (meaningless) details*”. The related challenges for semantic-based technologies are:

- “*People will not use technology that takes too much effort to operate*”;
- “*People are not able to formalize their world in a way required by (current) automated systems*”;
- “*Life is complex and complicated: context matters*”;
- “*Not everybody needs all the layers... [of the Semantic Web cake]*”. Proper technical solutions must be tailored to each specific problem.

Mark Greaves (Vulcan, Inc.)

The Relationship Between Web 2.0 And the Semantic Web

Mark Greaves, consultant at the Vulcan Venture Capital firm, made the case for the necessary convergence between Web 2.0 and the Semantic Web, towards Web 3.0. “*Web 2.0 and the Semantic Web [show a] Sibling Rivalry*”, with “*similar birthdays*”, “*similar technical inspirations*” and “*similar goals*”, the former being user-oriented and the latter computer-oriented. Up to now, the growth of Web 2.0 (1500+ attendees at the 2006 O’Reilly Web 2.0 Conference) is a revolution, while the growth of the Semantic Web (725 attendees at the 2007 Semantic Technologies Conference) is “only” significant.

About Web 2.0, Greaves notices that the transformation of Web 1.0, “*the mostly read-only Web*”, into Web 2.0, “*the wildly read-write Web*”, is “*The first major revolution in IT that was not driven by business*”. He also argues that Web 2.0 implicitly needs semantics and uses some, even in a very light fashion (e.g. “*Web 2.0 Semantic Search via Social Tagging*”, such as Flickr or del.icio.us): “*A little semantics goes a long way*” in Web 2.0.

About the Semantic Web, he recalls that it stemmed from 40 years-old more formal research (Formal Logic, Knowledge Representation, Databases), when the Web did not yet exist. It is less visible than Web 2.0, but exists indeed (e.g. Swoogle refers more than 2 millions Semantic Web documents, the “*dark web*” and applications involving “*distributed complex data integration*”). New initiatives such as Freebase show the growth is accelerating.

“The user-oriented Web 2.0 technologies compliment the computer-oriented Sem[antic] Web”. “[The] *Semantic Web Matches Well to the Use Cases for Web 2.0*”. Promising applications of Semantic Technologies for the Web of users are: “*Better search via high-quality query expansion and result filtering*”, “*Automatic, drag-and-drop mashups*”, “*Long-tail question-answering and analytics*”.

Although “*Semantic authoring is not as easy as Web 2.0 authoring*”, “*One Promising Answer [is emerging]: Semantic Wikis*” (e.g. Semantic MediaWiki and Freebase by Metaweb). “*Semantic Wikis, Freebase provide a scalable model for Web 2.0 users to effectively create, maintain, map between, and use RDF/OWL content in a way that reinforces the ecosystem*”. From a technical point of view, the “*Semantic Web Provides the Next Level of Web 2.0 Scalability Technologies*”. Greaves adds that, from a business point of view, the “*Semantic Web [also] provides important scaling capabilities for Web 2.0 businesses*”. As a conclusion, he claimed that “*Vulcan believes that this is a significant opportunity, and is actively investing*”.

Susie Stephens (Eli Lilly and Company)

Integrating Enterprise Data with Semantic Web Technologies

Susie Stephens, Principal Research Scientist at Eli Lilly and Chair of the W3C SWEO Interest Group, highlighted the crucial role of Semantic Technologies in enterprise applications.

She defines the Semantic Web as “*an interoperability technology*”, “*An architecture for interconnected communities and vocabularies*” and “*A set of interoperable standards for knowledge exchange*”. According to her, some important drivers for the underlying Semantic Technologies are:

- “*Business models develop rapidly these days*”, and “*Organizations are increasingly forming and disbanding collaborations*”, “*so infrastructure that supports change is needed*”;
- “*Data is growing so quickly that it is no longer possible for individuals to identify patterns in their heads*”.

Although “*A little semantics goes a long way*”, there are more and more business cases where Semantic Technology is successfully and operationally deployed, in various business sectors:

- Tailored Therapeutic Workbench in Life Sciences (Eli Lilly): Semantic Technology is needed to integrate a huge amount of data to serve a tailored therapeutics (integrative data mining/query system, through a semantic integration layer of all sources);
- Public Health and Disaster Preparedness (Univ. of Texas);
- Clinical healthcare decision support (AGFA);
- B2B integration with semantic mediation (BT);
- Automotive Repair and Diagnostic Documentation (Renault);
- Natural Language Interface to Enterprise Applications (Tata Consultancy Services);
- Integration of Geographical Data (the Ordnance Survey, UK);
- Improved Reliability of Search Results (Segala);
- Content Search (Oracle), in the Oracle Technology Network through the web portal;
- Linking Relational Databases (the Traditional Chinese Medicine Community);

- Improved Information Sharing (the Food and Agriculture Organization of the United Nations);

Meanwhile, commercial tools for Semantic Technologies become available, ranging from “triple stores” (i.e. semantic, generally RDF-based, databases, e.g. Oracle), to “enterprise search and collaboration [tools]” (e.g. Siderean Navigator, MAPP and Analytics), to “reasoners”, to “[semantically enhanced] middlewares” (e.g. TopQuadrant’s TopBraid Composer; Ontoprise’s OntoBroker, OntoStudio and Ontoprise Apps; Software AG’s Centrasite and webMethods Metadata Repository; IBM’s webSphere Service Registry; Microsoft’s Connected Services Framework), to “metadata tagging [tools]”, to “[semantically-aware] development environments”.

She identifies five application patterns of Semantic Technologies in the enterprise domain:

- For Registry/Repository: “Registry and Repository services may leverage the advanced classification and taxonomic features of Semantic Technology for **automatic classification** and more **agile change management** in highly dynamic data environments”;
- For Data Governance: “IT can leverage the advanced classification and business rule features of Semantic Technology for **inferring policies** and **checking data consistency** across heterogeneous application environments”;
- For Content Management: “The Semantic Technology approach is to layer ontology metadata between the CMS’ to provide a **unified classification scheme**, then NLP or search engines **automatically organize documents by ontology keywords**”;
- For Decision Support: “Decision Support systems come in many flavors. [...] Graph data structures may also be used for analytics, which turns out to **work very well when the data structure, relations, or sources are prone to change**”;
- For Collaboration: “Collaboration Software might leverage Semantic Technology at several layers. Most frequently, it will use RDF/OWL markup to identify classes of things in the data network: People, Places, Resumes, Articles, etc. From there, **everything may be linked, navigated, and re-combined in new ways**”.

As a conclusion, Stephens highlighted that a “**Growing number of large enterprises are implementing solutions that incorporate Semantic Technologies**”, “**The Semantic Web tool environment is maturing** with many commercial offerings throughout the infrastructure stack” and “Many implementations follow similar value scenarios and patterns”.

Dave Pearson (Oracle)

Delivering Business Value with Semantic Technology

Dave Pearson, VP architect for the Global Technology Business Unit at Oracle, made the case for Semantic Technology as an enabler for new IT environments (enterprise grid and Service & Sensor Oriented Architectures towards agile, information driven enterprise).

There is a huge need for integrating data and applications **within large enterprises** and **between organization workflows**, using agile techniques that cope with the huge amounts of data and services and their quick changes (e.g. eBay has 233 million users, processes 26 billion SQL statements per day and 1 billion pages per day, runs 600 database instances and 1500 application servers). This requires transforming monolithic applications into composite applications, made of elementary independent services, along the SOA paradigm. In particular, this means new functionalities are needed for intelligent service discovery and assisted brokering & match making. Semantic Technologies provide **a disruptive way** (because **they change the way of describing and using data**) of implementing such advanced functionalities.

There is a huge range of application for the Semantic Technology within the enterprise domain: Data Integration; Master Data Management; Collaborative User Interfaces; Content Management; Business Intelligence; Search & Navigation; Configuration Management; Web Services Management; Sensor-Based Services; Grid Infrastructure; Inter-enterprise Sharing; Real-time Business.

Benjamin Grosf (MIT Sloan School of Management)

Commercializing Semantic Web: Rules, Services, and Roadmapping

Benjamin Grosf, MIT Sloan professor, IBM Research scientist, and RuleML co-founder, mainly argued that Semantic Technologies are not restricted to description logics-based knowledge representation standards, such as RDF and OWL. They also include **semantic rule technology**. Traditional rule-based components at the commercial level are: relational databases (new forms, such as XQuery and SPARQL, being emerging); production rule systems (OPS5, CLIPS, Fair Isaac, ILOG, Haley, Jess, ...); event-condition-action rules (similar to production rules, met in business process automation and workflow tools, and in active databases with publish/subscribe mechanisms), and Prolog.

Relatively recent developments in semantic rule and Knowledge Representation theories and techniques **bring real breakthroughs** from past expert systems **towards semantic rule technology**:

- on the research side, many progresses in logic programming (declarative LP, description LP, production LP interoperability and semantics, courteous default LP, ...), while keeping the scalability equivalent to current RDBMS;
- on the industry side, a lot of emerging rule-based standards, in particular at W3C (Rule Interchange Format Working Group), OMG (production rules and rule management) and OASIS (Semantic Execution Environment standards effort);
- commercial products appear to support both sides. Examples of open source products: IBM CommonRules, HP-Jena 2, SweetRules V2. Examples of vendors of core proprietary products: Oracle, Ontoprise, OntoText, BBN Technologies, MITRE, VIS, TopQuadrant, plus many start-ups.

With respect to traditional expert systems, Semantic Rule Technology provides better maturity of theories, standards and implementations. It is scalable, interoperable (intra- and inter-enterprises) and embeddable into mainstream software development environments (Java, C++, C#).

The main drivers of semantic rule technologies are:

- *“business processes require communication between organisations/applications” (“Data and programs cross organisations/applications boundaries, both intra- and inter- enterprise”);*
- *“The world is moving towards a knowledge economy. And it’s moving towards deeper and broader automation of business processes. The first step is automating the use of structured knowledge”.*

In this context, a killer application would be to *“do better job of”* the old Electronic Data Interchange (EDI). The challenge today is to **enable a better ease of development and deployment, a better reuse of knowledge**, in order to **get shorter life cycle costs and higher business agility**. One good example of application for semantic rules in this domain is policy management, which generally involves lots of conflicts between rules: *“Rules as an important aspect of coming world of Internet e-business: rule-based business policies & business processes, for B2B & B2C”*. Other significant application domains are:

- “Rules in communicating applications, e.g., embedded intelligent agents”;
- “Rules to describe/represent service process models: [...] preconditions and postconditions, their contingent relationships [...] (e.g. exceptions, problems), [...] procedural attachments] also possible to executably specify the service process model”;
- “Rules to specify deals about services: cf. e-contracting”.

To sum up, there are driving applications in a number of areas: policy (e.g. services lifecycle, trust, contracting – shopping, ads, discovery, exceptions); information integration and mediation; social networking, combining structured and unstructured for search/navigation; business process communications and integration; verticals (financial, biomedical, military, intelligence, mobile/personal communications); event-driven architecture, and dynamic knowledge management.

Will RDBMS become SKMS (Structured Knowledge Management System) and consist of semantic rules, ontologies and databases?

Relevant further R&D agenda for rules includes: authoring/testing User Interfaces; integration/polishing of the KR advances; incremental reasoning, event-driven, justification/provenance/explanation; deeper KR integration of First Order Logic vs. Logic Programming with non-monotony and actions (needs more theory); exploring highly distributed, dynamic, expressive KB’s & reasoning (in part, needs more theory); Fulfilling much of the Web Services and SOA story considerably depends on equipping services with rule-based semantic descriptions functionality, e.g., for discovery, contracting, authorization, and monitoring.

Michael L. Brodie (Verizon)

Semantic Technologies: Realizing the SOA Vision

Michael Brodie, Chief Scientist at Verizon, made the case for Semantic Technologies as the way to implement the Service-Oriented Architecture design paradigm for new IT environments. According to him, the main opportunity for Semantic Technologies is that systems consist of more and more networked resources, accessible by computers as services: “Unimaginable growth of Information, automation ... And Opportunity”.

More specifically to SOA, **Semantic Technologies have an Opportunity to solve SOA “Critical needs”**: “Discover / search, Match, Negotiate, Adapt, Compose, Mediate”. Indeed, “SOA is [intrinsically] an integration framework”, which needs adapters and matchers.

Brodie considers that the quality of “*Semantic Technologies [is] Recognized*” (“Growth, scale, search, match, integration”). “*Mainstream Vendors on Semantic Technologies [however] need recognized and proceed cautiously*”. Thus, “*The door is just opening*” and these technologies **must mature into “Enterprise-class [products]: reliable, robust, scalable, fit enterprise architectures**”. This is a major stake (“*Making Semantic Technologies Enterprise Class*”).

More technically speaking, one key feature expected from Semantic Technologies is the “*Semantic Enablement*” of:

- “*Service of Descriptions (RDF, RDF Schema, OWL(-S), WSMO, ...)*”;
- “*Description Processing (Description tools: vocabulary, taxonomy, ontology; SOA Infrastructure: Registry, Repository, ...; Core SOA operations: discover, match, ...)*”;
- “*SOA System Development Life Cycle (Change, Connection, Control)*”.

Frank van Harmelen (Vrije Universiteit Amsterdam)

Semantic Technologies anno 2007: Done? Halfway? or Barely started?

Frank van Harmelen, professor at Vrije Universiteit Amsterdam, one of the designers of the W3C standard OWL, took stock of the current state of Semantic Technologies and made the case for a better convergence with user-oriented Web technologies (so-called Web 2.0).

He started by recalling that the Semantic Web consisted in “*Mak[ing] current web more machine accessible (currently all the intelligence is in the user)*”. Actually, two trends for the Semantic Web are emerging:

- V1 (which is like Web 2.0) would be an “*Enrichment of the current Web*” (by annotating, classifying and indexing), which would “*enable personalization, search, browse, ...*”;
- V2 (which is like W3C’s original vision of the Semantic Web) would be a “*Semantic Web as Web of Data*” (by exposing databases on the web, using RDF and integrating data), which would “*enable integration and unexpected re-use of data*”.

V1 and V2 correspond to different (complementary?) techniques and use-cases. V1 is more end-user-oriented and has been more hyped (“*often publicised, popularised*”), as an expectation for the next generation of current Web 2.0. There are “*still very few applications [however] in personalization and mobility/context awareness*”.

V2 is more enterprise-oriented, “*has most current business potential*” and “*has made most progress*”. “**Most applications [of Semantic Technologies are currently] for companies,** [there are] *few applications for the public*”.

About the necessary complementarity between Web2.0 and the Semantic Web, van Harmelen argued that “*Every folksonomy needs an ontology*”. This “*is needed for interoperability*” (“*cross borders of communities*”), “*and to enlist machine support*” (“*increase functionalities*”).

About future research, he provocatively claimed that “*Ontology research is done except for two problems: Learning and Mapping*”. Actually, he considers that open questions for future research on Semantic Technologies are: “*ontology learning and mapping (“mission critical”); emerging semantics (social and statistical), semantic web services (discovery, composition), [scaling] from semantic islands (intranets) to web-scale continents (internet)*”. The general major stake behind all these questions is a crucial “*need for approximation*”.

As a conclusion, van Harmelen made the case for **combining further Artificial Intelligence (machine-reasoning) and Collective Intelligence (users)** to solve these challenges.

ESTC 2007 Programme

| 31 May | Landtagssaal | Rittersaal | Herrensaal | Prälatensaal |
|---------------|--|---|--|---|
| 08.45 | Opening & Registration | | | |
| 09.00 – 10.00 | Invited Talk O.Lassila: “From Semantic Web to a Broader Vision of Personal Computing” Chair: John Davies, BT | | | |
| 10.00 – 10.15 | Break | | | |
| 10.15 - 11:35 | Application Presentations Public Sector Chair: York Sure, Univ Karlsruhe 10.15 – 10.40 “An Intelligent Search Engine for Online Access to Municipal Services” Jose Manuel Gomez-Perez, Mercedes Blazquez, Jesus Contreras, M ^a Jesus Fernandez, Diego Paton and Luis Rodrigo | Tutorial 10.15-13.05 Semantics applied to Business Process Management | Workshop 10.15-13.05 Business added-value of semantic technologies | Workshop 10.15-13.05 Semantic Web Technology Showcase |

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|---------------|--|--|---|---|
| | <p>Intelligent Software Components S.A. /City Government of Zaragoza</p> <p>10.40 – 11.05 “Collaborative Graphical Reasoning Framework - Application to eGovernment of the French Personal Services Sector” <i>Frédéric Comte</i> Université Montpellier 2 - LIRMM</p> <p>11.05 – 11.20 “Evaluation of a Semantic Web Services enabled GIS Emergency Planning system” <i>Vlad Tanasescu, Alessio Gugliotta, Rob Davies, Sandra Stincic, Marc Richardson, Mary Rowlett and Bernhard Schreder</i> KMI - Open University / Essex County Council / British Telecom Group / Essex County Council / Hanival Internet Services</p> <p>11.20 – 11.35 “Intelligent integrated decision support for legal professionals: a user-oriented application” <i>Pompeu Casanovas, Marta Poblet, Joan-Josep Vallbe, Nuria Casellas, Mercedes Blazquez Cívico, Francisco Javier García Moreno, Luis Rodrigo Aguado and Jose-Manuel Lopez-Cobo.</i> IDT/UAB, Intelligent Software Components</p> | | | |
| 11.35 – 12.00 | Break | | | |
| 12.00 – 13.05 | <p>Application Presentations</p> <p>Telecommunications I <i>Chair: Elena Simperl, DERI Innsbruck</i></p> <p>12.00 – 12.25 “Usage of semantic web technologies in a future M2M communication system” <i>Vincent Huang and Mattias Johansson</i> IP Mobility Lab, IP Networks</p> <p>12.25 – 12.50 “On The Application of Semantic Technologies in Model-Driven Telecommunications OSS Systems” <i>Martin Roberts, Leo Zancani and Benedict Enweani</i> British Telecom plc / Ontology Partners</p> <p>12.50 – 13.05 “Cooperative Access to Structured Knowledge” <i>Florence Duclaye</i> France Télécom R&D</p> | <p>Tutorial 10.15-13.05</p> <p>Semantics applied to Business Process Management</p> | <p>Workshop 10.15-13.05</p> <p>Business added-value of semantic technologies</p> | <p>Workshop 10.15-13.05</p> <p>Semantic Web Technology Showcase</p> |
| 13.05 – 14.30 | Lunch | | | |
| 14.30 – 15.30 | <p>Invited Talk D. Pearson : “The business value of semantic technology” <i>Chair: Hans-Peter Schnurr, Ontoprise</i></p> | | | |
| 15.30 – 16.30 | <p>15.30 – 15.50 <i>Chair: Alexander Wahler, Hanival</i> Invited Impulse Statement: Dr. Emmanuel Glenck (FFG) Research Programs</p> <p>15.50 – 16.30 Presentation of Business Idea Contest Nominees</p> | <p>Workshop 15.30 – 18.30</p> <p>Space Based Computing as Semantic Middleware for Enterprise Application Integration</p> | <p>Tutorial 15.30 – 18.30</p> <p>Cognitive aspects of practical ontology design</p> | <p>Workshop 15.30 – 18.30</p> <p>Making Semantics Work For Business</p> |
| 16.30 – 16.45 | Break | | | |
| 16.45 – 17.30 | <p>Application Presentations</p> <p>Telecommunications II <i>Chair: Kono Kim, Saltlux</i></p> <p>16.45 – 17.00 “Heterogeneous and Distributed Data Integration: The SWID Project” <i>Alain Bidault and François Paulus</i> France Télécom</p> <p>17.00 – 17.15 “WEASEL: Vodafone R&D Corporate Semantic Web” <i>Juan Jose Valverde, Carlos Buil and Jose Manuel Gomez-Perez</i> Intelligent Software Components S.A. / Vodafone</p> <p>17.15 – 17.30 “Meube, a software catalyst for a services exchange based economy” <i>Patrick Grohan and Nanni Marco</i> France Télécom</p> | <p>Workshop 15.30 – 18.30</p> <p>Space Based Computing as Semantic Middleware for Enterprise Application Integration</p> | <p>Tutorial 15.30 – 18.30</p> <p>Cognitive aspects of practical ontology design</p> | <p>Workshop 15.30 – 18.30</p> <p>Making Semantics Work For Business</p> |
| 17.30 – 18.30 | <p>Invited Talk M. Greaves: “The relationship between Web 2.0 and the Semantic Web” <i>Chair: Richard Benjamins, iSOCO</i></p> | | | |
| 1 June | Landtagsaal | Rittersaal | Herrensaal | Prälatensaal |
| 08.30 – 09.30 | <p>Invited Talk B. Groszof: “Commercializing Semantic Web: Rules, Services, and Roadmapping”</p> | | | |

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|---------------|---|--|--|---|
| | <i>Chair: Alex Wahler, Hanival</i> | | | |
| 09.30 – 10.30 | Invited Talk S. Stephens: “Integrating Enterprise Data with Semantic Web Technologies” <i>Chair: York Sure, Univ Karlsruhe</i> | | | |
| 10.30 – 10.45 | Break | | | |
| 10.45 – 12.45 | <p>Application Presentations</p> <p>Automotive <i>Chair: Jesús Contreras, iSOCO</i></p> <p>10.45 – 11.10 “Testing Electronic Control Units with Support of Ontologies and Rules” <i>Willy Chen and Thomas Syltadke</i> Audi AG</p> <p>11.10 – 11.35 “Ontology Based Knowledge Management in Automotive Engineering Scenarios” <i>Jürgen Angele, Michael Erdmann, Hans Peter Schnurr and Dirke Wenke</i> Audi AG, Ontoprise GmbH</p> <p>11.35 – 11.50 “Semantic FAQ System at ThyssenKruppPresta AG” <i>Robert Schlieder, Eddie Mönch, Henrik Oppermann, Hans-Peter Schnurr and Lutz Thielmann</i> ThyssenKruppPresta AG, Ontoprise</p> <p>eBusiness <i>Chair: Holger Lausen, DERI Innsbruck</i></p> <p>11.50 – 12.15 “Dynamic Semantic Synchronization in E-Business” <i>Heiko Paulheim, Michael Rebstock and Janina Fengel</i> Hochschule Darmstadt</p> <p>12.15 – 12.30 “Enabling Semantic Web ready E-Commerce Solutions” <i>Bernhard Schreder, Alexander Wahler, Markus Linder, Martin Schlieffrig and Svetlana Hollerer</i> Hanival Internet Services, Smart Information Systems</p> <p>12.30 – 12.45 “Semantic Navigation and Digesting for Information Portals” <i>Daniel Hladky and Vladimir Khoroshevsky</i> Ontos International AG</p> | <p>Application Presentations</p> <p>Aerospace <i>Chair: Jasmin Franz, Empolis</i></p> <p>10.45 – 11.10 “Extracting and Searching Knowledge for the Aerospace Industry” <i>Vitaveska Lanfranchi, Ravish Bhagdev, Sam Chapman, Fabio Ciravegna, Daniela Petrelli and Colin Cadas</i> Department of Computer Science, University of Sheffield</p> <p>11.10 – 11.35 “Improving the Reuse of Root Cause Analysis Using Semantic Annotation” <i>Sanghee Kim, Rob Bracewell and Ken Wallace</i> Engineering Design Centre, Department of Engineering, University of Cambridge</p> <p>11.35 – 12.00 “Building Highly Structured Semantic Repositories through Reuse and Formalisation of Business Standards” <i>F. Cerbah and Bernard Vatant</i> Dassault Aviation / Mondeca</p> <p>Media <i>Chair: Pompeu Casanovas, IDT, UAB</i></p> <p>12.00 – 12.15 “Powersearch – semantic technologies for media host retrieval” <i>Manfred Mitterholzer,</i> Austrian Press Agency</p> <p>Cultural Heritage</p> <p>12.15 – 12.30 “Semantic Approach on Cultural Heritage Domain: A Real Case Study” <i>Francisca Hernandez Carrascal, Luis Rodrigo, Jesus Contreras and Laura Vogt-Schilb</i> Funcación Marcelino Botín</p> <p>Scientific</p> <p>12.30 – 12.45 “Push_Semantics: A Real Experience In Exploiting Semantic Annotation Of Scientific Data” <i>Marta Gonzalez, Gianni Viano and Stefano Bianchi</i> Fundacion Robotiker / Softeco Sismat</p> | <p>Tutorial <i>10.30 – 13.30</i></p> <p>Rule Modeling And Interchange</p> | <p>Workshop <i>10.30 – 13.30</i></p> <p>Semantic Technologies Adoption in Business</p> |
| 12.45 – 14.00 | Lunch | | | |
| 14.00 – 15.00 | Invited Talk Frank van Harmelen: “Semantic Technologies - solved, halfway, or still in the starting blocks?” <i>Chair: Vincent Louis, Orange</i> | Workshop <i>13.30 – 17.00</i> | | |
| 15.00 – 15.40 | Invited Talk Michael L. Brodie: “Semantic Technologies: Realizing the SOA Vision” <i>Chair: Robert Tolksdorf, Freie Universität Berlin</i> | Commercializing New Technologies | | Tutorial <i>15.00 – 17.40</i> Answer-Set Programming for the SemanticWeb |
| 15.40 – 15.55 | Break | | | |
| 15.55 – 17.40 | <p>Application Presentations</p> <p>Technologies <i>Chair: Martin Dzbor, The Open University</i></p> <p>15.55 – 16.20 “Ylvi - Wiki-based Semantic Multimedia Content Management” <i>Ross King, Niko Popitsch and Arash Amiri</i> Austrian Research Centers</p> <p>16.20 – 16.45 “Semantically Enabled Service Oriented Architectures (SESA)” <i>Michal Zaremba and Omair Shafiq</i> DERI, University of Innsbruck.</p> <p>16.45 – 17.10 “Finding Web Services” <i>Holger Lausen, Thomas Haselwanter</i> Aleph Web Services, DERI, University of Innsbruck</p> | <p>Workshop <i>13.30 – 17.00</i></p> <p>Commercializing New Technologies</p> | | <p>Tutorial <i>15.00 – 17.40</i></p> <p>Answer-Set Programming for the SemanticWeb</p> |

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| | <p>17.10 – 17.25 “Technical Documentation – a Roundtrip from Data to Meaning?” <i>Tanja Sieber, László Kovács and Matthias Kammerer</i> University of Miskolc / SAP AG</p> <p>17.25 – 17.40 “Introducing Semantic Technologies into the product portfolio of an Industry” <i>Werner Merlingen</i> Siemens</p> | | | |
| 17.40 – 18.00 | Closing | | | |

List of participants

Represented large corporations

- ATOS Origin (France)
- Audi AG (Germany)
- Bankinter (Spain)
- British Telecom Group (UK)
- Dassault Aviation (France)
- Deutsch Telekom (Germany)
- Eli Lilly (USA)
- Ericsson (Sweden)
- eTel/Telekom Austria (Austria)
- First Data International (USA)
- France Telecom (France)
- Nokia (Finland)
- Oracle Corporation (USA)
- SAP (Germany)
- Siemens (Germany)
- Telecom Italia (Italia)
- Telefónica (Spain)
- Telekom Austria (Austria)
- Verizon (USA)
- Vodafone (UK)

Represented Small and Medium Enterprises (SME)

- ALCiiP (France)
- Aleph Web Services (Austria)
- be informed! (The Netherlands)
- Bouvet (Norway)
- Empolis (Germany)
- Hanival Internet Services (Austria)
- Intelligent Thinks (The Netherlands)
- iSOCO (Spain)
- Knowledge Concepts (The Netherlands)
- metatomix (USA)
- Ontology-Partners Ltd. (UK)
- ontoprise (Germany)
- Ontos (Switzerland)
- Saltlux (Korea, UK)
- Semantic Systems (Spain)
- smart information systems (Austria)
- Softeco Sismat S.p.A. (Italy)

Represented venture capital firms (VC)

- Amadeus Capital Partners (UK)
- gamma capital partners (Austria)
- GP International SA (Switzerland)
- PONTIS Venture Partners (Austria)
- tecnet capital (Austria)
- Vulcan, Inc. (USA)