The Knowledge Web Network of Excellence

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Abstract

In a nutshell, the mission of Knowledge Web is to strengthen the European industry and service providers in one of the most important areas of current computer technology: Semantic Web enabled e-work and e-commerce. We will concentrate our efforts around the outreach of this technology to industry. Naturally, this includes education and research efforts to ensure the durability of impact and support of industry. Therefore, the main objectives of Knowledge Web are: Outreach to Industry, Outreach to Education and Coordination of Research.

1 Summary of Activities

Knowledge Web (KW) is 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.

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- Outreach to Industry. The main objective of Knowledge Web's outreach to industry area is to promote greater awareness and faster take-up of Semantic Web technology 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.
- Outreach to Education. Knowledge Web aims to work towards the establishment of a Virtual Institute for Semantic Web Education (VISWE), which will act as the principal focus for educational activities on Semantic Web.
- Coordination of Research. The objective of Knowledge Web will be to ensure that the research as performed by the leading groups in this area will be sufficiently coordinated to avoid both duplication and fragmentation. Such coordination is particularly important for the Semantic Web: since it is an inter-disciplinary area, joint collaborations among and across various research communities is necessary. The objective of Knowledge Web is to coordinate the European research effort to make Semantic Web and Semantic Web Services a reality.

The Knowledge Web consortium is coordinated by the University of Innsbruck, Austria and consists of 18 leading partners in Semantic Web, Multimedia, Human Language Technology, Workflow and Agents.

At the end of its first year the Knowledge Web network is in good shape. Partners are doing integrated research on the themes defined in the JPA: scalability, heterogeneity, dynamics, web services and language extensions. The network has started an exchange program for researchers to work for a prolonged period at another institute. At this early stage there are already visible signs of impact, such as the W3C note on the semantic-web rule language SWRL. One look at the proceedings of the 2004 International Semantic Web Conference in Hiroshima (acceptance rate: 22%) makes clear that Knowledge Web partners are (the) key players in this field. Another sign is the fact that a Knowledge Web participant won the 2004 Semantic Web Challenge (a contest for semantic web applications, see http://challenge.semanticweb.org/), beating for example a large NASA project. In addition, the network is starting outreach activities, including setting up an growing industrial board. The outreach activity is focusing on realistic use cases and showcase applications. Network partners also play a key role in the new W3C Semantic Web Best Practices and Deployment Working Group, which is in the process of producing low-entry advisory notes for application developers. Finally, the network has been active in creating an educational infrastructure, such as a pool of learning modules and the organization of a highly-praised summer school in Spain. Overall, the network is in pole position to make the Semantic Web work.

2 Important Work Areas :: Industry

We are dedicated to promoting greater awareness and faster take-up of Semantic Web technology within Europe in full synergy with the research activity in order to reduce time

needed to transfer the technology to industry and so to market. We have established an industry board as an effective communication channel between industry and academia, in order to: understand industry needs and difficulties of migrating Semantic Web technologies to industry; survey and profile the existing ontologies, tools, infrastructures etc.; make recommendations, guidelines and standards to help industry organize, design and implement their migration into Semantic Web technology enabled IT systems; and promote awareness of the added value of the Semantic Web technologies in the increasingly competitive knowledge economy.

Industry Board
We have established an industrial board composed of industrial organizations that should benefit from ontology technologies (both technology push and technology pull organizations). The current board consists of 28 industry member. The members of our Industry board are given a privileged access to our network of top leading expertise and upstream technology. We aim to increase this number by 50 members every year, resulting in 200 members (at least) by the end of the project.

Understanding industrial needs
We are actively working on collecting and analyzing use and business cases from industry. Our analyses will on the one hand show how semantic web technologies have or could have solved (hypothetically) concrete business issues, on the other hand evaluate the applicability of semantic web technologies in real business cases. We are mainly focusing on testifying the utility of the current semantic web tools, interoperability of tools and services, and ontology content evaluation and usability.

We are currently busy capturing best practices of the best applications using empirical evidence given by the Industry partners on the board and from our own objective evaluations.

Promotion of ontology technologies
Several technology show events have been organized (and planned) with the aim of promoting the main achievements to public and private institutions. These events take the form of international forums where speakers from both industry and academia are invited to present their view on the topics addressed by Knowledge Web.

3 Important Work Areas :: Research

The network is actively working in the important research areas required to make the Semantic Web a reality for European and global commercial enterprises and for the benefit of European society. Work on making the tools and infrastructure has been actively tackled by X number of institutions from Y different countries in Z meetings involving W researchers to: scale the semantic web to the size of the web; able to deal with the diversity and heterogeneity of the semantic web; able to embrace the dynamic and changing nature of the semantic web; and able to support a distributed communitys development and maintenance of the semantic content necessary to populate a semantic web. In-depth and wide-spread analysis of the state of the art for all these research areas have been completed and published.

Development of standards
Building on the success of the W3C Web Ontology Language OWL, standardized chiefly through the efforts of the OntoWeb thematic network, a unified framework has been developed and published by Knowledge Web in which the existing (and future) proposals of integrating different sorts of rule based language with OWL can be compared. This will feed the W3Cs Semantic Web activity standardisation efforts, and is directly linked with the work of the FP6 REWERSE NoE.

A virtual research community
As part of its activity to sustain a vibrant pan-organisation research environment we have established a topic-oriented researcher exchange (T-REX) program to enable long-term impact.

The short-term goal of T-REX is to encourage, support and manage primarily the exchange of researchers across all Knowledge Web members, but also to encourage exchanges with external parties. The long-term goal of T-REX is to strengthen the European research area by establishing strong and lasting links across research organizations.

4 Important Work Areas :: Education

A conventional learning unit repository is now available at L3S (`http://ubp.learninglab.uni-hannover.de/EducaNext/ubp`). In order to collect existing learning units about the Semantic Web and related topics, a questionnaire was prepared and distributed among all KnowledgeWeb partners. Based on the feedback to the questionnaire, a first set of educational metadata has been selected, which has to be specified by each provider of learning units. A first set of over 30 learning units has already been inserted into the delivery platform and can be booked by interested users.

As a pilot implementation of semantic add-ons to the conventional learning unit repository we deployed Magpie, `http://kmi.open.ac.uk/projects/magpie`, a tool which supports no-cost semantic web browsing and helps a user to make sense of material on the web. Magpie operates by making use of domain ontologies to dynamically annotate texts. Starting with the published materials in the repository, Magpie supports the user in interpreting complex scientific materials by extracting key aspects and dynamically linking them to resources outside the repository and to semantic web services. These resources capture declarative knowledge agreed to be of significance by the particular knowledge community - in this case that of Semantic Web Studies (SWS).

First experiments using Magpie in the learning and teaching context have been conducted in the domain of climatology. We expect that lessons learned in this pilot will provide further data to shape the design and implementation of the advanced semantic platform for learning, which is the main focal point of our work in the upcoming months.

Virtual Institute for Semantic Web Education (VISWE)
VISWE is intended as an umbrella for all education area activities within Knowledge Web, i.e. it is intended to be the organizational umbrella for the summer school and also to

be responsible for the learning unit repository. It has been agreed that VISWE shall be founded as an association according to German civil law which ensures endurability of the Knowledge Web educational activities even after the end of the project. VISWE will, however, not take responsibilities for the content being stored in the platform, as the copyright for these materials will remain with the authors of the learning units.

5 User Involvement, Promotion and Awareness

The industry board of Knowledge Web comprises 28 highly dedicated members. Several meetings are planned to strenghten the links between these members and the Knowledge Web project.

Among the very successful events which contribute to the notoriety of Knowledge Web are the summer school organized last summer. The participation of Knowledge Web members in various programme committees, W3C working groups and its organization of events (like next ISWC in Galway) contribute to the visibility of the network.

FP6 integrated projects SEKT, DIP, and Knowledge web have created the SDK cluster for facilitating the coordination between these projects and promoting them. This cluster revolve around two interest groups dedicated to Ontologies and Semantic web services. It also organizes the two first European Semantic Web Conference. Knowledge Web cooperates with the Rewerse NoE on industry, research and education activities. It also has cooperations with FP6 projects AgentLink III and Ontogrid and FP5 projects Ontoweb, Esperonto and SWWS.

Summer School 04

The SSSW-04 took place in July in Cercedilla (Spain) under the direction of Prof Enrico Motta (Open University, UK) and Prof. Asun Gomez-Perez (UPM, Spain). The SSSW series of summer schools has established itself as the key educational event in the area of semantic technologies and it is no surprise that we have received many testimonials from students, tutors and invited speakers. As an example, Prof. Jim Hendler, head of the W3C working group on ontology languages and one of the invited speakers to SSSW-04, pointed out that the week he spent at the summer school was the "most fun I've had in a long time (academically speaking)" One of the key reasons for the success of the school is its constructivist approach, which is in contrast with most other summer schools. Hands-on sessions allow the students to familiarize themselves with key technologies, while team-based work on a week-long project gives them the possibility to explore research ideas in collaboration with other students and with the support of the tutors. At the end of the school the students present their work and prizes are awarded for the best efforts.

The Knowledge Web Semantic Portal

Since March 1st 2004, the public version of the KW portal has been running at `http://knowledgeweb.semanticweb.org/`. The portal includes a public area with public information to be used by anybody interested in knowledge technologies, and also a restricted area to be used by KW partners. The portal has highly visibility and it is in the second position in Google at the time of writing this report. The first prototype of the Knowledge Web Semantic Portal has the following functionalities:

- Knowledge Presentation. This is done by means of user-defined visualizations of ontology classes, relations and instances with different browsing permissions for portal users. The knowledge stored in the portal can be accessed with menus generated automatically from ontologies that are synchronized, and can be viewed differently according to the various types of information stored in them.
- Knowledge Editing. This portal allows inserting, updating and removing class instances, their attributes and relation instances, in multiple inter-linked ontologies and with different edition permissions for the portal users.
- Knowledge Search and Querying based either on keywords or on the structured information provided by the ontologies inside the system.
- Administration Services, which allow managing the semantic portal users, the editing and visualization permissions, and some other portal needs.

The Knowledge Web Semantic Portal is able to manage multiple ontologies. To use this semantic portal as a tool for monitoring the Knowledge Web NoE, the first draft of the ontologies includes information about the project (milestones, workpackages, etc.), the organizations participating, the people involved in the project, the documents related to the project (deliverables, minutes, etc.), and the events associated with such project. That is, currently, five domain-specific ontologies (Documentation, Event, Organization, Person and Project) have been developed to be included in the Knowledge Web Semantic Portal.

6 Future Work

The network is currently performing a self-assessment which will lead to a new JPA. At this stage it is safe to say that we do not foresee major changes in the network. There will however be some natural focus changes. Whereas the research work packages have mainly worked internally in the first year, we expect to see more cross fertilization between work packages in the second year. Also, the exchange program is expected to grow significantly, possibly also including visits from employees of industry board members to network partners as well as exchanges with other IST networks. With respect to outreach, the network is expected to focus even more on showcase applications to demonstrate clearly the added value of semantic-web technology to foster uptake by newcomers. We expect more organizations to join the industry board, including nonprofit organizations. There will also be a steady flow of Knowledge Web output to the various standards bodies. The summer school will be continued but the network will consider organizing also educational activities for members of the industry board. In addition, educational modules will become available, supported by semantic-web technology. We are looking forward to the second year of the network.