UPGRADE is the European Journal for the Informatics Professional, published bimonthly at <http://www.upgrade-cepis.org/>

UPGRADE
The European Journal for the Informatics Professional
http://www.upgrade-cepis.org
Vol. VI, issue No. 6, December 2005

UPGRADE is the anchor point for UPENET (UPGRADE European NETwork), the network of CEPIS member societies' publications, that currently includes the following ones:
• Mondo Digitale, digital journal from the Italian CEPIS society AICA
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Publisher
UPGRADE is published on behalf of CEPIS (Council of European Professional Informatics Societies, <http://www.cepis.org/>) by Novática <http://www.ati.es/novatica/>, journal of the Spanish CEPIS society ATI (*Asociación de Técnicos de Informática*, <http://www.ati.es/>)

UPGRADE monographs are also published in Spanish (full version printed; summary, abstracts and some articles online) by Novática, and in Italian (summary, abstracts and some articles online) by the Italian CEPIS society ALSI (*Associazione nazionale Laureati in Scienze dell'informazione e Informatica*, <http://www.alsi.it>) and the Italian IT portal Tecnoteca <http://www.tecnoteca.it/>

UPGRADE was created in October 2000 by CEPIS and was first published by Novática and INFORMATIK/INFORMATIQUE, bimonthly journal of SVI/FSI (Swiss Federation of Professional Informatics Societies, <http://www.svifsi.ch/>)

ISSN 1684-5285

Monograph of next issue (February 2006):
Key Success Factors in Software Engineering
(The full schedule of UPGRADE is available at our website)

Monograph: The Semantic Web
(published jointly with Novática*)
Guest Editors: *Luis Sánchez-Fernández, Michael Sintek, and Stefan Decker*

UPENET (UPGRADE European NETwork)

* This monograph will be also published in Spanish (full version printed; summary, abstracts, and some articles online) by **Novática**, journal of the Spanish CEPIS society ATI (*Asociación de Técnicos de Informática*) at <http://www.ati.es/novatica/>, and in Italian (online edition only, containing summary, abstracts, and some articles) by the Italian CEPIS society ALSI (*Associazione nazionale Laureati in Scienze dell'informazione e Informatica*) and the Italian IT portal Tecnoteca at <http://www.tecnoteca.it>.

Presentation

The Semantic Web or The Next Web Wave

Luis Sánchez-Fernández, Michael Sintek, and Stefan Decker

The Semantic Web vision – that of a Web in which software agents can access and process web page content and automatically perform tasks that today require tedious interaction – was proposed by ***Tim Berners-Lee***, the inventor of the current Web, towards the end of the last century. Since that moment, there has been a flurry of research activity in this field, and applications based on Semantic Web technologies are already beginning to appear. Interested readers are referred to "Semantic Web Challenge", <http://challenge.semanticweb.org/>.

This **UP**GRADE and ***Novática*** monograph devoted to the Semantic Web (also called the *Next-Generation Web*) is made up of articles intended to provide a broad overview of the different activities being carried out in this field. In addition to the regular article on the state-of-the-art ("*The Semantic Web: Fundamentals and A Brief State-of-the-Art*", by ***Luis Sánchez-Fernández*** and ***Norberto Fernández-García***), the monograph will cover the following key areas:

- Fundamental Semantic Web technologies: "*Leveraging Metadata Creation by Annotation for The Semantic Web*", by ***Siegfried Handschuh*** ; "*The Quest for Information Retrieval on The Semantic Web*", by ***David Vallet-Weadon***, ***Miriam Fernández-Sánchez*** and ***Pablo Castells-Azpilicueta***; and "*Functional RuIeML: From Horn Logic with Equality to Lambda Calculus*", by ***Harold Boley***.
- Systems that in some way allow us to get more out of the Web: "*Towards Semantic Desktop Wikis*", de ***Malte Kiesel*** and ***Leo Sauermann***; and "*Towards Semantically-Interlinked Online Communities*", by ***Uldis Bojars***, ***John G. Breslin***, ***Andreas Harth*** and ***Stefan Decker***.
- Specific applications based on Semantic Web tech-

The Guest Editors

Luis Sánchez-Fernández graduated as a telecommunications engineer from the *Universidad Politécnica de Madrid*, Spain, in 1992 and received his doctorate in Telecommunications Engineering, from the same university in 1997. In October 1997 he joined the *Universidad Carlos III de Madrid* where he is currently a full professor in the Dept. of Telematic Engineering, holding the post of Assistant Director. He is Director at the Web Technologies Lab, <http://www.it.uc3m.es/infoflex/techweb/es/>, which forms part of the research group *Grupo de Aplicaciones y Servicios Telemáticos* (Telematic Applications and Services Group) of the *Universidad Carlos III de Madrid*. He has participated and/or led a number of national research projects and one European project related to web technologies, including Semantic Web technologies, and has authored more than 50 publications in national and international conferences and journals as well as a number of chapters in scientific books. His current research activities are focused on the Semantic Web (semantic annotation, ontologies, semantic Web services). He is also interested in other technologies related to Web applications, such as XML. He is a member of the Spanish CEPIS society ATI (*Asociación de Técnicos de Informática*) and a frequent contributor to its journal ***Novática***. <luiss@it.uc3m.es>

Michael Sintek studied Computer Science and Economics at the University of Kaiserslautern, Germany, and received the Diplom (Master's degree) in 1996. Since then, he is working as a research scientist at the German Research Center for Artificial Intelligence (DFKI GmbH) Kaiserslautern. In the research department for Intelligent Engineering Systems he investigated in the VEGA project logic programming and machine learning approaches for the maintenance of knowledge-bases. In 2000 and 2001, he was project leader of the FRODO project (DFKI Knowledge Management Group) where we develop a framework for building distributed organizational memories. As a visiting researcher at the Stanford Medical Informatics department (August - October 1999 and November 2000 - February 2001) he developed various plugins for the frame-based knowledge acquisition tool Protégé-2000, including the OntoViz ontology visualization tab and the RDFS and OIL backends. In 2002, he was a visiting researcher at the Stanford Database Group and at ISI, working on the Edutella project and the Semantic Web rule language TRIPLE. Currently, he is cohead of the Competence Center Semantic Web (CCSW) at DFKI. <sintek@dfki.uni-kl.de>

Stefan Decker received his PhD at the University of Karlsruhe, Germany. He is working as a Senior Research Fellow and Adjunct Lecturer at the National University of Ireland, Galway, and is executive director of the Digital Enterprise Research Institute (DERI) and Cluster Leader of the Semantic Web Cluster within the institute. Previously he worked at ISI, University of Southern California (2 years, as Research Assistant Professor and Computer Scientist), Stanford University, Computer Science Department (Database Group) (3 Years, PostDoc and Research Fellow), and Institute AIFB, University of Karlsruhe (4 years, PhD Student and Junior Researcher). He has initiated or participated in several projects and activities regarding the Semantic Web, such as Ontobroker, Protégé, XML-based OIL, Edutella, and the Semantic Web Working Symposium at Stanford University (USA). His research interests include the Semantic Web and P2P technologies and his current and future objective is the creation and wide dissemination of the next generation collaboration and augmentation infrastructure - the Social Semantic Desktop. <Stefan.Decker@deri.org>

nologies: "*A Semantic Search Engine for The International Relation Sector*", by ***Luis Rodrigo-Aguado***, ***V. Richard Benjamins***, ***Jesús Contreras-Cino***, ***Diego-Javier Patón-Villahermosa***, ***David Navarro-Arnao***, ***Robert Salla-Figuerol***, ***Mercedes Blázquez-Cívico***, ***Pilar Tena-García*** and ***Isabel Martos-Laborde***; "*Semantic Search in Digital Image Archives: A Case Study*", by ***Julio Villena-Román***, ***José-Carlos González-Cristóbal***, ***Cristina Moreno-García*** and ***José-Luis Martínez-Fernández***; and "*Configuring e-Government Services Using Ontologies*", by ***Dimitris Apostolou***, ***Ljiljana Stojanovic***, ***Tomás Pariente-Lobo***, ***Joan Batlle-Montserrat***, and ***Andreas E. Papadakis***.

From the point of view of their origin the articles can be broken down into those from industry sources, those produced by research institutes linked (to a greater or lesser extent) to universities or coming directly from the university world, plus one from a European research project, the consortium of which includes both universities and companies. The presence of the university world is important, but there is also clear evidence of interest from industry.

As is normal in monographs published by this journal, the reader can also find a number of useful references in this presentation, complemented on this occasion by a glossary of terms commonly used in this field.

We would not like to end this presentation without thanking **UP**GRADE and ***Novática*** for their support during the editing process, and we trust that this edition will be of interest and use to the readers of both journals.

Translation by ***Steve Turpin***

Useful references on Semantic Web

This section provides a lists of some of the most important references related to the Semantic Web, which are intended to complement those appearing in the articles making up this monograph.

Websites

- W3C (*World Wide Web Consortium*): <http://www.w3.org/>.
- W3C Semantic Web: <http://www.w3.org/2001/sw/>.
- Semantic Web ORG: <http://semanticweb.org/>.
- Semantic Web Science Association: <http://www.iswsa.org/index.html>.
- AIS SIGSEMIS (*Semantic Web and Information Systems*): <ttp://www.sigsemis.org/>.
- OMWG (*Ontology Management Working Group*): <http://www.omwg.org/>.
- SWSI (*Semantic Web Services Initiative*): <http://www.swsi.org/>.

Conferences

- 1st Asian Semantic Web Conference, 2006: <http://www.aswc2006.org/>.
- European Semantic Web Conference, 2005: <http://www.eswc2005.org/>.
- International Semantic Web Conference, 2005: <http://iswc2005.semanticweb.org/>.
- International Conference on Formal Ontology in Information Systems, 2004: <http://fois2004.di.unito.it/>
- International World Wide Web Conference, 2005. <http://www2005.org/>.
- International Conference on Artificial Intelligence, ICAI, 2005: <http://www.world-academy-of-science.org/IMCSE2005/ws/ICAI>.
- IEEE/WIC/ACM International Conference on Web Intelligence, 2005: <http://www.hds.utc.fr/WI05/>.
- Atlantic Web Intelligence Conference, 2005: <http://wic.ics.p.lodz.pl/awic/>.

Journals

- Journal of Web Semantics, Elsevier: <http://www.elsevier.com/wps/find/journaldescription.cws_home/671322/description>.
- IEEE Intelligent Systems, IEEE: <http://www.computer.org/portal/site/intelligent/>.
- Applied Ontology, IOS Press: <http://www.iospress.nl/html/15705838.php>.
- International Journal of Knowledge and Learning, Inderscience: <https://www.inderscience.com/browse/index.php?journalID=42>.

Books

- John Davies, Dieter Fensel, Frank van Harmelen. Towards the Semantic Web: Ontology-Driven Knowledge Management, John Wiley & Son, 2003. ISBN 0-470-84867-7.
- Dieter Fensel, Wolfgang Wahlster, Henry Lieberman, James Hendler. Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential. The MIT Press, 2002. ISBN 0-262-06232-1.
- Grigoris Antoniou, Frank van Harmelen. A Semantic Web Primer, The MIT Press, 2004. ISBN 0-262-01210-3.
- Siegfried Handschuh, Steffen Staab. Annotation for the Semantic Web. IOS Press, 2004. ISBN 158603345X.
- Asunción Gómez-Pérez, Mariano Fernández-López, Oscar Corcho. Ontological engineering: with examples from the areas of knowledge management, e-commerce and the semantic web, Springer Verlag, 2004. ISBN 1852335513.

■ Steffen Staab, Rudi Studer. Handbook on Ontologies. Heidelberg: Springer Verlag, 2004. ISBN 3-540-40834-7.

■ Franz Baader, Peter Patel-Schneider, Diego Calvanese, Deborah L. McGuinness, Daniele Nardi. The Description Logic Handbook: Theory, Implementation, and Applications, Cambridge University Press, 2003. ISBN 0521781760.

Research Projects, Excellence Networks

■ KnowledgeWeb: <http://knowledgeweb.semanticweb.org/>.

■ SEKT (Semantically Enabled Knowledge Technologies): <http://www.sekt-project.com/>.

■ DIP (DIP-Data, Information, and Process Integration with Semantic Web Services): <http://dip.semanticweb.org/>.

■ SWAP (Semantic Web and Peer to peer): <http://swap.semanticweb.org/public/index.htm>.

■ AceMedia: <http://www.acemedia.org/aceMedia>.

■ REWERSE (Reasoning on the Web with Rules and Semantics): <http://rewerse.net/>.

■ OntoWeb: <http://ontoweb.aifb.uni-karlsruhe.de/>.

■ SEWASIE (SEmantic Webs and AgentS in Integrated Economies): <http://www.sewasie.org/index.html>.

■ SWWS (Semantic Web Enabled Web Services): <http://swws.semanticweb.org/>.

■ WonderWeb: <http://wonderweb.semanticweb.org/index.shtml>.

■ NEWS: <http://www.news-project.com>

Ontologies

■ SUMO (Suggested Upper Merged Ontology): <http://www.ontologyportal.org/>.

■ MILO (MId Level Ontology): <http://www. ontology portal.org/>.

■ KIMO (Knowledge and Information Management Ontology): <http://www.ontotext.com/kim/kimo.rdfs

■ PROTON (PROTO ONtology): <http://proton.semanticweb.org/>.

■ OpenCyC: <http://www.cyc.com/opencyc>.

■ TAP Knowlege Base: <http://tap.stanford.edu/>.

■ WordNet: <http://wordnet.princeton.edu/>.

■ EuroWordNet: <http://www.illc.uva.nl/EuroWordNet/>.

Glossary of Terms

Annotation: the process of associating metadata to a resource in order to describe it fully or partially.

Semantic annotation: annotation in which the metadata are formally defined and machine readable.

Metadata: data that describes other data. In the field of Semantic Web, metadata are used to describe resources.

Ontology: a formal vocabulary of relevant concepts in a domain, the properties that relate them and perhaps also the rules that govern the functioning of that domain. A more detailed definition of what an ontology is can be found in the "state-of-the-art" article.

OWL: Ontology Web Language. An ontology definition language for W3C Semantic Web standards (see below).

RDF: Resource Description Framework. It is a W3C standard language for formally describing resources. Formal resource descriptions form the basis of the Semantic Web.

RDF Schema: the ontology definition language for W3C Semantic Web standards. It has less expressiveness than OWL.

Resource: anything that may be interesting to describe in a Semantic Web application. A Web page, an e-mail, a file, ... are all resources, but so might be a person, a car, even an idea. Resources are identified by URIs.

RDF Triple: this is the basic element of an RDF model. It is also called an RDF statement. It comprises a subject, a predicate, and an object. An RDF triple indicates that the resource identified by the subject has a property indicated by the predicate whose value is the object.

URI: Uniform Resource Identifier. It is the format used in the Semantic Web to assign identifiers to resources.

W3C: World Wide Web Consortium. It is the organization responsible for developing Web standards.