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Project-Team Edelweiss

*Exchanges Documents Extraction
Languages Web Ergonomics Interaction
Semantics Servers*

Sophia Antipolis - Méditerranée

THEME COG

Activity
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Report

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2. Overall Objectives

2.1. Introduction

We would like to pay a tribute to our dear friend and colleague Rose Dieng-Kuntz who was the founder and leader of the Acacia and Edelweiss teams.

2.1.1. Context and Objectives

Actors and interaction devices are becoming more and more mobile while knowledge sources, services and their networks are becoming ubiquitous. In this context we witness the emergence of communities of interest and/or practice, very light and agile structures that can be ephemeral and virtual. To assist the life-cycle of such communities we are interested in providing tools and methodologies supporting the interactions and the memories of these focused groups. Throughout its life time, a community uses, produces, exchanges, and shares resources materializing knowledge through various types of documents (that may be structured or not, textual, multimedia, etc.). A community may also rely on some services or programs available inside the community or outside. To ensure mutual understanding between community members, the exchanges inside a community rely on a common terminology and common concepts that may evolve throughout the life of the community. These exchanges can also use various media.

The context of the emergence of such virtual communities (inside organizations, across organizations or independently of any organization) is the use of the Web not only for information sharing but also for support to cooperation, the use of new interaction channels, the evolution of Web technologies (Semantic Web, social Web, Web services, mobile Web, ubiquitous Web).

Edelweiss aims at offering models, methods and techniques for supporting ergonomic, web-based, knowledge management and collaboration in virtual communities interacting with information resources through the Web. We perform research on graph-based, ontology-based, web-based knowledge representation and inferences for interacting with or through information resources.

2.1.2. Research Topics

The support to such a virtual community can be studied according to several viewpoints:

- The activities of the community consist of structuring, searching, retrieving, reusing, and composing the community internal or external resources / services. A support to these activities can be offered through a Semantic Web based approach, by processing annotations of such resources / services;
- Conceptual modeling of the interactions and collaboration among community members mediated by tools could enable us to propose ergonomic tools adapted to support such collaboration;
- To achieve the development of such supporting tools and methodologies, basic blocks are needed to represent knowledge and to reason and perform inferences on this representation: we choose to rely on a graph-based representation.

Therefore, we will study thoroughly three complementary research directions, corresponding to these three viewpoints:

1. Semantic Annotation of Information Resources: Ontology-guided annotation process, Semi-automatic generation of annotations from texts, Contextualization, Evolution, Heterogeneity of annotations.
2. Interaction Design of Semantic Systems: Supporting human interoperability in semantic activities through articulating functionalities and in scenario management activities, Experimental evaluation of inferences for information retrieval and other tasks, Ontology-based intelligent interfaces.
3. Knowledge-Graph-based Representation of the Semantic Web Knowledge: Scaling graph representations and operations, Ontology-based model driven engineering, Inferences characteristic to graphs and distributed Web sources.

2.1.3. International and industrial relations

We collaborate or collaborated with industry in the following fields: car industry (Renault, ItalDesign), telecommunications (CSELT, T-NOVA, Telecom Valley, Orange Labs), semi-conductors (Philips Semi-Conductors, now NXP), manufacturing (Estanda) earth sciences (BRGM, IFP) and in biology (IPMC, Immunosearch). We take part in the Knowledge Web Network of Excellence, in the Integrated Project Palette and in the STREPS projects SeaLife and SevenPro.

2.2. Highlights of the year

- Fabien Gandon defended an HDR (Habilitation à Diriger les recherches) on RDF graphs for knowledge management [17].
- Isabelle Mirbel defended an HDR on modeling, Reusing and Flexibility of Information Systems [18].

3. Scientific Foundations

3.1. Foundations

Keywords: *Annotation, Artificial Intelligence, Assistance to the User, Co-operation, Community of practice, Conceptual Graphs, Corporate Memory, Distributed Services, Documents, Ergonomics, Information Retrieval, Interaction Design, Knowledge Engineering, Knowledge Management, OWL, Ontology, RDF, Scenarios, Semantic Web, Semantic Wiki, Social Web, User interfaces, Web 2.0, XML.*

Knowledge Management (KM) is one of the key progress factors in organizations. It aims at capturing explicit and tacit knowledge of an organization, in order to facilitate its access, sharing out and reuse [7]. The considered organization can be an actual enterprise or a public organization, but it may also just consist of a given department or service; it can also be a group, or a community, or a virtual enterprise (made of members possibly stemming from different companies, but sharing a common interest).

The former Acacia project approach relied on the analogy between the resources of a corporate memory and the resources of the Web. We considered that a corporate memory can be materialized in a corporate semantic Web [7], [94], that consists of:

- resources (i.e. documents in XML, HTML or other formats, people, services, software, materials),
- ontologies (describing the conceptual vocabulary shared by the different communities of the organization),
- semantic annotations on these resources (i.e. on the document contents, on persons' skills, on the characteristics of the services/software/materials), these annotations using the conceptual vocabulary defined in ontologies.

According to [103], communities of practice (CoPs) are "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis". CoPs can be found within businesses, across business units or across company boundaries [104], still they differ from business or functional units, from teams and networks: people belong to CoPs at the same time as they belong to other organizational structures. An effective organization comprises a constellation of interconnected CoPs, as these are privileged nodes for the exchange and interpretation of information. CoPs preserve the tacit aspects of knowledge that formal systems cannot capture. CoPs can be considered as a means by which knowledge is "owned" in practice. Indeed, such groups allow the functions of creation, accumulation and diffusion of knowledge in organizations.

The Edelweiss project-team extends this hypothesis to virtual communities and considers that a support to knowledge management and cooperative work in a community can also rely on a community semantic Web.

Initially concerned with formal and technical aspects, the Semantic Web community recently acknowledged the necessity to take seriously into account uses and users of Semantic Web applications so that such applications can be accepted by users and their organizations. An indicator of this new concern is the emergence of scientific events such as the International Workshop on Interaction Design and the Semantic Web (2004), and its successors, the Workshops on End-user Semantic Web Interaction (2005, 2006, 2007). The aim of these workshops is to help Semantic Web application designers bring the power of the semantic Web to end-users, applying Interaction Design and more specifically Social Interaction Design. Interaction Design is the discipline of defining and creating the human interaction with digital, environmental or organizational

systems. Interaction design defines the behaviors or interactions of an object or system over time with its users' population. Interaction designers create systems that are typically informed by research on users and their practices. Social interaction design accounts for interactions among users as well as between users and their devices. Social interaction design is practice-oriented. It is concerned with sign and symbolic value, social behaviors, etiquette and norms, groups and communities, structured interactions, and routines, sequencing, and temporal organization.

Interaction design is critical to a number of applications: an application may use state-of-the-art algorithms; if it does not provide a usable interface, it will not be effective. For interactions to be supported efficiently in a community, supporting tools have to be designed taking into account the nature, the rules, the protocols, the context, etc. of these interactions. In particular, community-supporting tools must:

- help users to articulate their activities and the representations they handle during these activities;
- be able to assist or reproduce some of the inferences involved in the interactions and for instance involved in switching representations from some member to another;
- reduce the heterogeneity of information sources and interfaces and ease the integration of the multiple interaction channels used by community for its interactions. Assisting the cooperation within a community will raise issues of personalization, interface ergonomics, context-awareness and transversally; it will also raise the issue of the links between semantics (as in knowledge representation formalisms) and semiotics (as in representations for user interfaces).

4. Application Domains

4.1. Panorama

Keywords: *Automobile, Biology, Engineering, Health, Micro-electronics, Oncology, Telecommunications.*

There are various application domains of the project: our work on technical memory or project memory has applications in engineering (aircraft industry and car industry). Our work on the knowledge servers also has applications in engineering, in the sector of telecommunications (for corporate memory, skills management and technological watch) and in the biomedical field. Edelweiss work on virtual communities have potential applications in medical field, in pharmacological field, in engineering, in earth sciences and in telecommunications.

4.2. Telecommunications

Our work on corporate memory, in particular the use of intelligent agents, ontologies and XML technology, is of particular interest for companies of the telecommunications sector. We thus collaborated with T-NOVA (Deutsche Telekom) and CSELT (Italian Telecom) in the framework of the CoMMA IST project. T-NOVA applied this work for the assistance to insertion of new employees and CSELT for the assistance to technological monitoring. We also collaborated with Telecom Valley and the GET (ENST and ENST-Bretagne) for our work on skills management in the RNRT KmP project. We collaborated with Philips Semi-Conductors, now NXP, for an intra-firm skills management application. We finally collaborated with ENST-Bretagne for the CNRS Specific Action on "Semantic Web and E-learning". A collaboration with Orange Labs started with a PhD Thesis and will continue through an ANR project next years.

4.3. Engineering

Our work on corporate memory, in particular the use of intelligent agents, ontologies and XML technology, is also interesting for the construction industry: we thus collaborated with the CSTB (French Scientific and Technical Center for Building) within the framework of the CoMMA project for a scenario of technological watch. We continue a collaboration on the topics of technological watch. We have also a collaboration in the domain of product engineering design with Semantics, IDG and Estanda within the SevenPro european project.

4.4. Health & Biology

Our work on corporate memory, in particular our corporate semantic Web approach (ontologies and XML technology), is applied to several biomedical applications: use of linguistic techniques for building an experiment memory for transcriptome analysis (in the framework of the MEAT project in collaboration with IPMC), use of a medical ontology, viewpoints and CSCW for supporting collaborative work in a healthcare network (in the context of the ACI *Ligne de Vie* project in collaboration with the SARL Nautilus and SPIM (Service de Santé Publique et d'Informatique Médicale de la Faculté de Médecine Broussais-Hôtel Dieu). In the framework of SeaLife IST project, we work on a semantic browser for Life Sciences, with scenarios such as evidence-based medicine, or literature and patent mining. In Immunosearch project, our work on literature mining seems useful for supporting experiments aimed at studying harmlessness of the molecules used in perfumes, aromatics and cosmetics

4.5. Environment & Earth Sciences

We collaborate with IFP and BRGM on semantic portals enabling access to resources and services in Earth Sciences domain. Semantic portals will in particular assist geologists in discovering geological sites where storing carbon dioxide (CO_2) produced by power stations, so contributing to reductions in global Greenhouse Gas emissions. We also collaborate with Ademe¹ on technological and scientific monitoring as well as corporate intelligence within the ISICIL ANR project.

5. Software

5.1. Corese

Keywords: *Conceptual Graph, Information Retrieval, OWL, Ontology, RDF, RDFS, SPARQL, Semantic Web, XML.*

Participants: Olivier Corby [correspondant], Fabien Gandon.

Corese (COncEptual REsource Search Engine) is an RDF/S & SPARQL engine based on Conceptual Graphs (CG) <http://www.inria.fr/sophia/edelweiss/software/corese>. It enables us to load RDFS schemas and RDF annotations and to transform them into conceptual graph formalism. It then enables us to query the base of annotations thus created, by using the projection operator offered by the conceptual graph formalism.

Corese implements RDF, RDFS, some statements from OWL Lite and the SPARQL query language (Simple Protocol and RDF Query Language). Furthermore, Corese query language integrates original features such as approximate search, group, count, graph path. Approximate search consists of searching the best approximate answers to a query according to the ontology. Graph path enables to search the graph structure of RDF. Corese also integrates an RDF Rule Language based on the CG Rule model.

Corese is a Semantic Web Factory that enables us to design and develop Semantic Web applications; it is available for download. It is embedded in the Sewese Semantic Web Server based on Tomcat.

Corese benefited from an INRIA software development support (ODL) with two software engineers, to improve quality of the implementation in order to support its diffusion. Corese is registered at the APP and in 2007 we decided to distribute it as open source software under license CeCILL-C.

Corese has been used in more than 20 applications at the INRIA. It is used as a Semantic Factory in such projects as Palette, SevenPro and SeaLife european projects, in e-WOK, BioMarker and KmP projects and in SweetWiki and ECCO generic platforms. The work on Corese was published in [22], [92], [5], [3], [2], [4].

5.2. Sewese

Keywords: *RDF, RDFS, SPARQL, Semantic Web Server, ontology.*

¹Agence de l'Environnement et de la Maîtrise de l'Energie

Participants: Fabien Gandon [correspondant], Priscille Durville.

Sewese is a generic factory to design and develop semantic Web servers and portals. It is designed to embed Corese as semantic search engine and is based on Tomcat. We have improved the previously developed framework dedicated to the semantic layer of Web applications. This framework has two parts corresponding to two different web technologies : the first one (called Semtags) is dedicated to JSP technology and the second one (called Semservices) is dedicated to Web Services.

Semtags and Semservices are two libraries allowing the use of Semantic Web notions and Corese software in web applications background. Semtags is a set of JSP tags dedicated to Semantic Web. This tags library provides web developers with tools like Corese administration tasks, ontologies and annotations management tasks, and tools to send SPARQL queries. This year, we have improved these functionalities and add some new ones. The main functionality that has been added is about knowledge base validation and validation results visualization. The validation is made on the knowledge base to check the validity of the ontologies and the annotations.

Sewese is used in ECCO, a cooperative ontology editor and in SweetWiki. Sewese was registered at APP and was made available to the partners of SevenPro STREPS project and of e-WOK_HUB RNTL project.

5.3. SweetWiki

Keywords: *RDF, RDFS, SPARQL, Semantic Wiki, ontology.*

Participants: Adil El Ghali, Alain Giboin, Amira Tifous, Michel Buffa, Fabien Gandon [resp.].

Sweetwiki is a Semantic Wiki, i.e. an easy to use wiki enhanced with Semantic Web technologies. It allows users to cooperate in documents and resources creation, management and publication. The published resources are annotated according to the wiki ontology and w.r.t. a collaboratively created folksonomy. In 2008, Sweetwiki was completely re-engineered, a new taglib implementing the basic operations in the wiki has been developed and optimized, and Sweetwiki has been made compatible with the latest versions of Corese and Sewese. The RDFa support was updated and allows users of the new version to annotate resources with a finest granularity. Tags organisation and management has been improved with special emphasis on the folksonomy editor ergonomoy.

- SweetWiki was distributed to several communities of practice in the framework of the Palette project.
- SweetWiki is used as wiki of the consortium of the e-WOK_HUB ANR RNTL project.
- A robotics (RoboSoft) company uses SweetWiki for parts of its intranet and parts of its public community site
- Informal tests: we have carried out experiments with children, teachers, students and secretaries asking them to use it for one of their daily tasks.

SweetWiki will be distributed as open source software under CeCILL-C license.

5.4. ECCO

Keywords: *RDF, RDFS, SPARQL, Semantic Web.*

Participants: Priscille Durville [correspondant], Fabien Gandon, Alain Giboin.

We have designed and implemented a cooperative ontology editor, named ECCO, dedicated to support end-users with different profiles (domain expert, engineer, ontologist, ...) in a cooperative process of ontology construction and evolution.

The ECCO editor was improved in different ways : - in the first one, we have included a functionality that allows users to import/export their vocabulary or ontology as a graph in the XTM Topic Map format. - the second one is about graphical user interface, we have moved to a javascript framework called ExtJS. - the third one is about Natural Language Processing: we are now able to call, from within the ECCO's user interface, two different NLP tools (ACABIT and Fastr) in order to programmatically extract terms from texts to create a vocabulary.

This work was published at IC 2008, [44]. ECCO is used in the e-WOK_HUB ANR RNTL project and in the Palette IST project. ECCO was registered at APP and is provided under the CeCILL-C license. It has been distributed to the partners of the e-WOK_HUB project.

5.5. MeatAnnot

Keywords: *Natural language Processing, Ontology, RDF, Semantic Annotation, Semantic Web, Text-Mining.*

Participants: Khaled Khelif [correspondant], Rose Dieng-Kuntz.

MeatAnnot is a software enabling the automatic generation of ontology-based semantic annotations: starting from a textual document, it allows us to generate a structured semantic annotation, based on a domain ontology, and describing the semantic content of this text. MeatAnnot relies on several Natural Language Processing (NLP) techniques (e.g. modules of GATE (General Architecture for Text Engineering), RASP (Robust Accurate Statistical Parsing) parser and a relation extraction grammar we wrote in JAPE); it extracts information from text, instantiates concepts and relationships of the reference ontology and generates RDF annotations for the document.

MeatAnnot was applied:

- on a corpus of scientific articles in biology for the MEAT project,
- on a corpus of patents in the PatAnnot system of patent mining for the SeaLife project,
- on the GeneRIF (Gene Reference Into Function) corpus in the framework of the BioMarker project,
- on the Neli (National Electronic Library of Infection) Web site in the framework of the SUPROD system aimed at user profile detection within the SeaLife project,
- for term extraction from design documents of Estanda and ItalDesign in the framework of the SevenPro project.

6. New Results

6.1. Annotation of Information Resources

Keywords: *Assistance to the User, Co-operation, Corporate Memory, Corporate Semantic Web, Evolution, Information Extraction, Knowledge Acquisition from Texts, Knowledge Engineering, Knowledge Management, Natural Language Processing, Ontology, Semantic Annotation, Semantic Web, Text-mining.*

The objective of this research direction is to propose (1) a methodological guide for collaborative, semantic-Web-based, annotation process in a community of practice; (2) an ontology-based, service-oriented annotation toolkit offering both a service of semi-automatic annotation from textual documents and a service of collaborative annotation and management of evolution of the annotations. The methodological guide and the toolkit will tackle complex contextualization of annotations, various kinds of Web-accessible external resources, reflective annotations and more complex types of heterogeneous resources and services.

6.1.1. Extraction and Exploitation of Contextual, Evolving Semantic Annotations for a Virtual Community

Keywords: *Context, NLP, Ontology, Rhetorical Relationship, Semantic Annotations, Semantic Web.*

Participants: Noureddine Mokhtari [resp.], Olivier Corby, Rose Dieng-Kuntz.

For a good exploitation of the semantics which texts want to transmit, techniques are proposed to extract semantic annotations. These annotations often represent a set of terms, that identify concepts, connected by relations. The aim of this work is to propose a system for automatic extraction and exploitation of contextual semantic annotations from the text based on Semantic Web principles. This work is carried out within the framework of Noureddine Mokhtari's PhD.

In this work, the proposed approach takes as input the texts and a domain ontology, and gives as output an XML document representing its structure as well as the semantic objects represented in the RDF formalism and linked by *contextual* relations identified by discourse markers. The proposed approach of extracting contextual annotations is summarised as follows: i) identify structure (titles, paragraphs, etc.) and semantics (classes, properties, and candidates values of properties); ii) identify discourse markers and their arguments; iii) reconstruct the structure of the document (titles, paragraphs, sentences, arguments); iv) deduce the contextual scope from text structure; v) generate "semantics objects" represented by a set of RDF triples by using a specific algorithm. We have implemented the algorithm and tested them on the SevenPro framework. This experimentation provides good scores (87,02% of precision, 84,44% of recall).

The originality of this work consists of two features: 1) the integration of semantic annotation context which gives new ways of reasoning and more information based on both structure and semantic of text [50]; 2) the use of several technologies such as NLP (GATE, JAPE, TreeTagger), semantic annotations, knowledge representation and Semantic Web (RDF/S, OWL, Ontologies, SPARQL, XQuery, Corese) to build a system of automatic extraction and exploitation of contextual annotations from texts.

6.1.2. Semantic Virtual Environment for Engineering Product Design

Participants: Gaoussou Camara, Hacène Cherfi, Olivier Corby [resp.], Rose Dieng-Kuntz, Ibrahima Diop, Fabien Gandon [resp.], Emmanuel Jamin.

The SevenPro European project lasted from January 2006 to October 2008. Based-on research activities done within this project, we presented a study on using semantic annotations extracted from texts in the so-called context definition in order to limit the scope/validity of the semantic annotation to its genuine text part origin [28]. These RDF and SPARQL extensions operate on the RDF annotations with named graphs. We also proposed new semantic metrics for approximate search in RDF stores w.r.t. domain ontologies [55]. To finish, we studied SPARQL query performance in a distributed system which consists of several RDF stores [42].

6.1.2.1. Corporate Repositories

Based on existing tools from NLP techniques (GATE [93], RASP [91], etc.), semantic search engine (Corese), Java APIs, databases and 3D design software (Catia, SolidWorks), we designed processes that can extract useful information from various sources available during a design engineering project. The information sources targeted in SevenPro are: textual documentation, CAD files, and ERP repositories. We are work-package leader and responsible for the task entitled *extracting annotations from texts* described hereafter.

The semantic annotations of texts require extraction of semantic relations between domain relevant terms in texts. Several studies address the problem of capturing complex relations from texts - more complex relations than subsumption relations between terms identified as domain concepts. The studies combine statistical and linguistic analysis. Basically, these approaches consist of the detection of new relations between domain terms; whereas in the semantic annotation generation, we aim at identifying existing relations, belonging to the domain ontology, with instances in texts. We also aim at completing the annotations with the description of the domain concepts related by these identified relations. In SevenPro, the text annotator is able to:

- Extract the plain text from various document formats: MS-Office (Word, Excel, Powerpoint presentations, etc.), PDF, and Open-Office documents, relying on the existing POI² and Java Tika³ libraries;

²Java API to Access proprietary document Format Files. The Apache foundation: <http://poi.apache.org>

³Content Analysis Toolkit The Apache incubator working group: <http://incubator.apache.org/tika>

- Analyse text sentences using NLP techniques: split the text into sentences, then into words (tokens), then assign a grammatical category to each token;
- Identify the grammatical constituents (subject, verb, and object) of the sentence by using the RASP parser;
- Map the constituents identified by the NLP tools: we map the identified constituents to the formalised RDFS concepts/properties of the domain ontologies;
- And finally, generate the correct RDF triple annotations by identifying the instances of RDF triples (modifiers of the subject/object in the sentence).

The text annotator may also suggest new properties (and their annotations) which are not present in the knowledge resources (ontology and/or grammar relations) [67].

6.1.2.2. *Virtual Reality Reasoning*

The Virtual Reality Reasoning Module (VR-ReasoM) is the bridge between the virtual reality module (VRM) and the SevenPro knowledge base. The semantic reasoning is based on information retrieval techniques and semantic rule applications. The VR reasoning module is used to display knowledge and to control object behaviour in the virtual reality scenario. In the presentation mode of the VRM, we display knowledge about the current scene status, i.e. labels of VR objects. In the guide mode, we control the user actions and give help to reach the next step, for example, in assembly procedure by means of reasoning. From the VR point of view, the reasoning is a background process which has a noticeable impact on the VR scene.

We implemented a bidirectional version of a Java API between the VRM and Corese semantic engine. We tested the semantic rule application where conclusion of rules can trigger VRM method (e.g., for VR object selections). Each step of the VR scenario consists of a co-action of two VR objects. The co-actions are controlled by rules which apply different tests on both engineering items (for example size fit, material compatibility, subsumption, etc.). When the test (i.e., semantic rule condition) succeeds, it triggers a VR event. We have detailed the reasoning task in a deliverable [75].

Moreover, we had research activities on the knowledge visualisation issue. When knowledge pieces, dedicated to inform the user, are integrated and rendered in a VR scene; it can be complex to control how to display these information (e.g. semantic annotation of a given VR object). To simplify this task, we use the Fresnel [99] language: an RDF vocabulary that was defined to specify the visualization of RDF graph pieces. This vocabulary enables us to define viewpoints on RDF/S data called lenses. Lenses define which semantic data should be shown for a given type of resource and how it should be displayed. The user can change the viewpoint to visualize knowledge according to his/her needs. To extend this mechanism, we defined user profiles (engineer, marketing agent, etc) as an aggregation of Fresnel lenses.

6.1.2.3. *Engineering Memory Tool*

Based on an ontological distance, Corese supports an approximate search process. It distinguishes between exact answers for which there exists a projection of the query upon their annotations and approximate answers for which there exists an approximate projection of the query upon their annotations. For example, an engineer can specify the type of mill and lifter he is working on, and the system comes up with related cases sorted by closeness. Hence, our objective is that these suggestions should be relevant enough to foster efficient reuse of engineering knowledge from past cases i.e. enable users considering a current case to use these suggested previous cases as a starting point to the new design they are doing.

There are two main families of distances: the ones using information external to the model (e.g. statistics on a corpus) or the ones relying solely on the structures of the models (e.g. a hierarchy of types). We studied how these two approaches can be applied and extended in an RDF store.

The first extension consists in considering the 'proximity of usage' of two types i.e. the frequency with which these two types are used together in descriptions. It is called distance in extension (or co-occurrence distance). Most of the distances, relying on an ontology, limit their use of the metric space to the hierarchy of classes i.e. only the graph of direct subsumption links is used in defining the metric space.

The second extension goes beyond by considering property signature and class hierarchies for a new metric space. The Corese engine extends the SPARQL language in order to offer the possibility for computing paths in RDF/S graphs. This extension also allows us to specify constraints on the types of the properties that can be used in a path and we apply it to extract paths using a subtype-aware-signature regular path expression. Finally, we have detailed this task in a deliverable [73].

6.1.3. Semantic Grid Browser for the Life Sciences Applied to the Study of Infectious Diseases

Participants: Martine Collard, Olivier Corby, Rose Dieng-Kuntz, Fabien Gandon, Abdoulaye Guisse, Aroua Hedhili, Khaled Khelif [resp].

This work is done in the context of the SeaLife targeted research european project. The objective of SeaLife is the design and development of a semantic Grid browser for the Life Sciences, which will link the existing Web to the currently emerging eScience infrastructure. The SeaLife browser will allow users to automatically link a host of Web servers and Web/Grid services to the Web content they are visiting. This will be accomplished using eScience's growing number of Web/Grid Services, XML-based standards and ontologies. The browser will identify terms in the pages being browsed through the background knowledge held in ontologies. Through the use of semantic hyperlinks, which link identified ontology terms to servers and services, the SeaLife browser will offer a new dimension of context-based information integration.

This SeaLife browser will be demonstrated within three application scenarios in evidence-based medicine, literature and patent mining, and molecular biology, all relating to the study of infectious diseases. The three applications vertically integrate the molecule/cell, the tissue/organ and the patient/population levels by covering the analysis of high-throughput screening data for endocytosis (the molecular entry pathway into the cell), the expression of proteins in the spatial context of tissue and organs, and a high-level library on infectious diseases designed for clinicians and their patients.

In this project, we take part in 6 among the 7 work packages and we are coordinator of the Textmining and natural language processing work package. Our main contributions for this year are:

6.1.3.1. Word sense disambiguation

In the aim to improve our term detection method [14], we proposed a technique to solve the ambiguity problem confronting MeatAnnot results. The main idea of this method is to use the ambiguous word context to decide to which semantic type we can affect it. This context consists of the set of terms which occur with the ambiguous word in the same sentence or in the same paragraph. So, if MeatAnnot affects several semantic types to the same candidate term, the disambiguation module tries to find the right semantic type. This module computes similarities between the semantic types affected to the ambiguous word and other semantic types affected to the neighbours of the ambiguous word in the text. The semantic type which has the highest similarity is then selected. The calculation of similarity between semantic types is based on Corese semantic distance. The algorithm was tested on a standard collection for evaluating disambiguation methods and had good results [34], [52], [19].

6.1.3.2. Patent Clustering

In the SeaLife use case called 'literature and patent mining', we proposed three approaches for semantic patent clustering for biomedical communities [35] :

- The standard approach: in this case, we kept the simple TF-IDF⁴ vector for each patent claims section. Clusters were computed on the base of the standard similarity function *cosine* measuring the deviation of angles between the patents vectors. A cosine value of zero means that the two patents are orthogonal.
- The hierarchical weight propagation approach: in this case, we introduced semantic concept relationship on weights. We assume for instance that: if a patent concerns *microbiology* with a weight 'n' it also concerns *biology* with a weight 'm' which is lower than 'n'. Therefore, we incremented the weight of concepts-ancestors for each concept detected in the claims text. We divided the weight

⁴Term frequency-inverse document frequency.

by 2 when passing from the concerned concept to its parent concepts. Then, we spread a decreasing weight through the ontology hierarchy.

- The semantic distance approach: in this case, we introduced a semantic similarity function between patents without modifying basic TF-IDF weights. The idea is to use the conceptual distance (defined in [3]) between concepts annotating patents. This distance relies on the subsumption path in the UMLS metathesaurus. The semantic function is defined to reinforce the similarity between patent claim documents which use close concepts.

In this work, we assumed that semantics can improve text clustering which is confirmed by the obtained results. The approaches rely on standard Semantic Web technologies (RDF, SPARQL, etc.). As further improvements, we are working on the development of a semantic clustering toolbox allowing the interpretation of the obtained results and the combination of several semantic approaches.

6.1.3.3. Semantic browsing

In the SeaLife use case called 'evidence-based medicine', we proposed the Corese-NeLI Semantic Web browser [46], [29], [30] dedicated to navigating resources in the infectious disease domain. This browser supports the navigation of a portal by the use of a structured vocabulary or a domain ontology. It supports two main functionalities:

- Semantic search of a Web portal relying on semantic annotations that are generated from Web pages using a provided knowledge artefact. The search is based on the generated annotations. During the search process, Corese uses the taxonomical relationships in the SKOS⁵ thesaurus (i.e., narrower, broader, etc.) to retrieve annotated pages which are related to the user's query.
- Semantic browsing of a Web portal: the Corese-based engine offers the possibility to identify and highlight terms retrieved from a structured vocabulary on a visited Web page. From the highlighted terms, it can then create dynamic links to related pages within the portal, thereby enabling the semantic browsing. Moreover, a query can be built from the highlighted terms in order to query external resources such as Google and PubMed.

We participated in several deliverables and we are the editors of the I2D3 deliverable [76]: This deliverable describes the evaluation of techniques developed in the SeaLife project: (i) information extraction from texts and word sense disambiguation, (ii) information extraction from patents, and (iii) information extraction from navigation logs.

6.1.4. *Ontology and Annotations for a Discussion Forum of a Community of Practice*

Participants: Bassem Makni, Khaled Khelif, Rose Dieng-Kuntz, Hacène Cherfi.

In order to facilitate navigation among past e-mails and to find solutions to problems previously discussed, we propose an approach for automatic creation of semantic annotations on such e-mails, annotations based on an ontology partly created from linguistic analysis of this corpus of e-mails. SemanticFAQ portal relies on such generated annotations and on a semantic search engine for offering ontology-guided navigation through the e-mails. The @pretic ontology consists of the following sub-ontologies:

- OntoPedia: all possible computer components on which problems may occur are not necessarily mentioned in the e-mails; so relying on a linguistic analysis of the e-mail corpus would have led to an incomplete ontology. Therefore, we preferred to reuse an existing term hierarchy (WeboPedia). We developed a program that, from the term hierarchy of this online encyclopaedia, generates automatically an ontology represented in RDFS.
- Oemail: it describes metadata on e-mails by defining generic concepts (e.g. E-mailMessage), more specific concepts (e.g. ReplyMessage) and semantic relationships (e.g. author, date, recipient, etc.).
- O'CoP: this ontology detailed in [102] comprises concepts enabling to describe a CoP, its actors, their roles and competences, the resources they use, etc. We used O'CoP ontology to describe @pretic CoP members.

⁵W3C Simple Knowledge Organization System.

- Computer-Problem ontology: it is the main module of @pretic ontology and it aims to provide concepts and properties enabling to describe the computer problems faced by CoP members. To initiate and enrich this ontology, we applied NLP techniques on the corpus of e-mails.

The ontology and the annotations thus obtained are then used in a semantic portal that facilitates ontology-guided and personalized navigation of the CoP members. This work was published in [48], [37], [38].

6.1.5. *Semi-Automatic Identification of n-ary Relations in Textual Corpus*

Participants: Van Tien Nguyen, Khaled Khelif, Hacène Cherfi.

The objective of this work is to propose a methodology for the identification and the extraction of n-ary relations within a text. The use cases are the ones described by the W3C that describe best practices for the RDF representation of n-ary relations aiming at solving the identification and extraction issues. We proposed a method based on linguistic approaches. The main idea is that each use case which determines the type of an n-ary relation is characterized by a set of grammatical relation patterns identified from the result of sentence syntactic analyses. Basically, the main steps of our approach are:

- The identification of an n-ary relation category by setting-up the set of grammatical relations which characterize each use case. The use cases are four, with many sub-cases, the categories identified apply to simple and complex sentences.
- The extraction of the relation arguments. By stating that each sentence can be considered as a direct-labeled graph, the arguments of the n-ary relation are extracted by setting-up a graph corresponding to the sentence. We apply a traversal search algorithm in order to explore the generated graphs.

The process takes as input a text and provides as output an XML file which describes n-ary relations found in this text. Our system can detect and extract most of n-ary relations present in simple and complex sentences.

6.1.6. *Semantic Web for Biomarker Experiments*

Participants: Leila Kefi-Khelif, Martine Collard, Olivier Corby, Rose Dieng-Kuntz.

This work is done in the context of the BioMarker project whose objective is to design biomarkers for controlling the harmlessness of molecules used in perfumes, aromatics and cosmetics. The purpose of this research is to conduct comparative studies of in vivo and in vitro test models on the skin (irritation, allergy) and to propose alternative methods defining new norms applicable in this field.

Our role, in this project, is to provide biologists with methodological tools allowing them (i) to explore the huge amount of heterogeneous data such as data description vocabularies (e.g. Gene Ontology⁶), scientific literature, gene expression data analysis stored in public databases (e.g. GEO⁷), or biologists background knowledge, (ii) to make meta-analysis on multiple independent microarray data sets, in order to identify gene profiles for specific biological process.

We propose an approach based on Semantic Web techniques in order to describe and semantically query the huge set of heterogeneous information sources related to gene expression data resulting from micro-arrays experiments. Our main contributions for this year are:

6.1.6.1. *Building ontologies*

GEOnto: this ontology describes gene expression data experiments and its conditions. Some concepts in GEOnto cover general biology fields (in vivo, inductor, subject, sample...) and others are specific to a particular field. In a first step, we limit it to dermatology (skin, eczema, contact dermatitis...) but GEOnto can be extended towards other biologic fields. To build GEOnto, we rely on (i) a corpora of experiment descriptions used to pick out candidate terms, (ii) biologists who help us to structure the concepts and validate the proposed ontology and (iii) existing ontologies (UMLS⁸ and OntoDerm⁹) to extract specific concepts.

⁶<http://www.geneontology.org/>

⁷<http://www.ncbi.nlm.nih.gov/geo/>

⁸<http://www.nlm.nih.gov/research/umls/>

⁹<http://www.gulfdocor.net/ontoderm/>

GMineOnto: this ontology provides concepts for the description of statistical analysis and more complex mining processes on expression data (e.g. clustering method, cluster).

6.1.6.2. (Semi-)automatic Semantic Annotation Generation

GEAnnot: considering the public experiments selected from the public repository GEO, we annotated the MINiML formatted family file which is an XML document relying on the MIAME formalism¹⁰. The annotation process is semi-automatic. Instances of GEOnto concepts are detected in the document, some of them are directly used to generate the annotation describing the experiment (exp. contributors, pubmedID, keywords, condition titles), and others are proposed to the biologist who selects the more relevant instance for each condition (exp. time point, treatment, subject). An interactive interface is proposed to annotate experiments.

MeatAnnot-V2: this tool uses a declarative method to generate, starting from a scientific paper, a structured annotation based on MeatOnto[14] that describes interactions between genes/proteins and other concepts. Each sentence of the text is described with (i) an XML document which is an abstract syntax parse tree coming from a transformation of the RASP NLP tool [91] result and (ii) the instances of MeatOnto relationship and concepts detected in the sentence using MeatAnnot [14]. We designed SPARQL extensions that include XPath to detect which instances of MeatOnto concepts are linked by a relationship according to the ontology and to generate an annotation describing this interaction.

6.1.6.3. Combined retrieval

We proposed an "intelligent" information retrieval that uses not only semantic annotations but also data stored in XML documents and/or in classic databases. Indeed, some information, such as information about gene behaviour (expressed, inhibited or stable), are stored in a classic database referenced in the semantic annotations of the experiment. When a user needs to find "experiments that use an inductor x and where the gene g is expressed", it seems to be useful to have one query that finds the relevant data, combining information stored in the annotations and in the database. The idea here is to query the database using SQL embedded in SPARQL through the Corese semantic search engine [3]. In the same way, we used Corese to query XML documents (containing information about clusters of genes and referenced in the semantic annotations of the experiment) using XPath embedded in SPARQL. This work was published at I-Semantics 2008 [33].

6.1.7. Ontology for Open Source Development Communities

Participant: Isabelle Mirbel.

Due to the rise of the Web, several online professional communities dealing with software development have emerged. They are communities of people who organize themselves and interact primarily through the Web for work and knowledge sharing. Open source software development may be seen as a particular case of distributed software development having a volatile project structure, without clearly-defined organization and assigned tasks for all of its members. It requires a long term commitment as well as a common vision of the participants and raises new challenges in terms of knowledge management. Indeed, these communities generate huge amount of information as result of their interactions. This information is mostly structured in order to be quickly reused (mailing lists, forums, etc.). There are few means (like FAQ for instance) to capitalize the information over a longer period of time and to turn it into knowledge (through a semantic FAQ for instance).

In this context, our current consideration focuses on means to improve knowledge spreading and sharing in these kind of communities. We choose a Semantic Web approach relying on an ontology allowing the annotation of the community resources in order to enhance the exploitation of these resources through dedicated knowledge management services.

¹⁰<http://www.mged.org/Workgroups/MIAME>

While building this ontology, our aim was twofold. On one hand we modeled the pertinent concepts for open source development community resource annotation from a community of practice point of view and we therefore started from the O'CoP generic ontology provided in the framework of the Palette European project. On the other hand, we reused the ontologies about FLOSS (Free/Libre Open Source Software) provided in the literature (Dhruv [81], [82] and OSDO [100]) as well as the ontology provided in the framework of the SIOC, Semantically-Interlinked Online Communities¹¹, project. The proposed ontology has been formalized in RDFS/OWL. It has been published in [49] and core concepts are available online¹².

We now plan to focus our efforts on knowledge management services. We will focus more particularly on complex and context-dependent search procedures. Such procedures may be seen as sequences of several steps (or sub-goals) dealing with elementary information searches. Howtos are examples of resources highlighting this kind of complex processes to be followed to perform a task. As it has been highlighted in the literature, dedicated strategies are built by domain experts to search for information and it may be difficult for novice users to acquire such search procedures. Moreover, these procedures become critical because of the current multiplication of knowledge bases, growing specialization of information sources and therefore spreading of information.

In this context, the aim of our work will be to provide means, based on models and techniques of the semantic Web, to specify search queries and complex search procedures in order to facilitate their reuse, share and spreading inside a virtual community of practice.

6.2. Interaction Design

Keywords: *Assistance to the User, Co-operation, Cognitive Psychology, Cognitive Sciences, Communication, Community of Practice, Corporate Memory, Corporate Semantic Web, Human-machine interaction, Knowledge Engineering, Knowledge Management, Ontology, Virtual Community.*

The objective of this research direction is to study various forms of human interoperability (e.g. search / annotation human interoperability, users' scenarios / developers' scenarios interoperability), so as to specify and to implement corresponding articulating functionalities. We will perform experimentations on different kinds of semantic distances. Moreover, we aim at extending the current interaction toolkit (Sewese) with new visualization techniques (e.g. statistical views on ontology-based representations) and new interaction channels (e.g. mails, IRC). We also intend to generalize ontology-based reasoning for smarter interfaces.

6.2.1. Modeling, Reusing and Flexibility of Information Systems

Participant: Isabelle Mirbel.

This work was carried out for an HDR thesis [18] which summarizes our contributions about modeling, reuse and flexibility in the information system development field. Our contributions, through several projects we have been involved in, cover various aspects of information system development but focus on three complementary and critical problems: i) structuring and separating dimensions during the conceptual modeling activity of information system development, ii) supporting reuse in the information system engineering domain and iii) supporting flexibility in the information system engineering domain.

Perspectives of this work rely on the link between Method Engineering on one hand and Knowledge Engineering and Semantic Web models and techniques on the other hand. They focus more specifically on the elicitation of information search procedures over the Web by adapting models and techniques from the method engineering fields to the Semantic Web domain.

6.2.2. Ontology for Communities of Practice: Extensions of O'CoP Ontology

Participants: Rose Dieng-Kuntz, Adil El Ghali, Alain Giboin [resp.], Bassem Makni, Amira Tifous.

¹¹<http://sioc-project.org>

¹²<http://ns.inria.fr/oflossc>

In 2007, we had proposed the O'CoP ontology, aimed both at modeling a CoP and at annotating its resources. This ontology had a structure based on several layers: a high-layer (generic), a middle-layer and a specific layer. In addition to the specific concepts already modelled in the specific layer of O'CoP ontology, some specific domain concepts can be useful for annotating the CoP's resources. This led us, in 2008, to assist some CoPs in developing their own specific ontologies, to be attached to the specific layer of O'CoP: an ontology of human problems, and ontology of technical problems, and an ontology of learning and teaching. A detailed presentation of the ontologies and building processes is available in the 2007 Palette deliverable D.KNO.02 and synthesized in [54].

6.2.3. Designing User-Adapted Semantic Web Applications

Participants: Adil El Ghali, Olivier Corby, Rose Dieng-Kuntz, Priscille Durville, Fabien Gandon, Alain Giboin [resp.], Stéphanie Peron, Amira Tifous.

In the framework of the Palette project and its participatory design methodology, we contributed to the elaboration of generic scenarios, namely the "reification scenario", the "debate and decide scenario", the "animation scenario" and their instantiations for some CoPs. These generic scenarios guided the design of integration functionalities between Edelweiss software and other partners software. In this context, we coordinate the team in charge of the "debate and decide scenario" and participate to the implementation of the scenarios involving our services in the CoPs. The work is detailed in the deliverable D.IMP.08.

6.2.3.1. User Testing and Validation of a Folksonomy Editor and Cognitive Analysis of the Process of Editing a Folksonomy

As part of the European project Palette and of Stéphanie Péron's Master of Cognitive Ergonomics, a method of user testing of a folksonomy editor was developed and applied to the SweetWiki Folkon editor, to validate the user-oriented modifications made to a previous version of this editor. This testing and validation required to thoroughly analyse the not yet well-known process of editing a folksonomy, by exploiting the record of the users' interactions with the editor. To complement the testing and validation, a new technique of brainstorming was adapted to make potential users of the folksonomy editor envision new improvements to the editor [80].

6.2.3.2. Scenario-based Design of Semantic Services and Applications

Extending the «motivating scenario» technique to design "affective ontologies". We initiated an extension to the "Motivating-Scenarios" technique to motivate the use of an emerging kind of ontologies: "affective ontologies", i.e., the sets of concepts and relations allowing describing the affective aspects of computer-mediated communications. The extension relies on three basic requirements: (1) putting forward the interdependencies between affective aspects and other psychological and overt-behaviour aspects, by resorting to "integrative scenarios"; (2) putting persons forward, by resorting to "personas;" (3) putting relations between persons forward, by resorting to "relational scenarios." It is suggested to feed the scenarios by exploiting descriptions of situations found in empirical studies and/or empirically-grounded models and theories of cooperative interactions taking affective aspects into account [45].

6.2.3.3. Collaborative and Participatory Engineering of Semantic Web applications and services

Several actions were conducted this year aimed (a) at analysing the collaboration between the different categories of potential participants (e.g., requirements engineers, developers, domain experts, end-users) to the engineering of user-adapted semantic applications and services, and (b) at developing methods and tools to improve this collaboration.

6.2.3.4. Participatory Ontology Engineering and Participatory Knowledge Engineering

The first versions of the collaborative editor of ontologies ECCO implemented a form of collaborative engineering between ontologists and user representatives, the latter trying to convey usage features to the ontologies and to the user interfaces based on these ontologies. We are now turning towards what we called a Participatory Ontology Engineering, a subset of Participatory Knowledge Engineering [44]. The goal of Participatory Ontology Engineering is to implement tools/functionalities, processes and representations making possible (a) the effective participation of end-users to the construction of ontologies and, generally speaking, of "terminological ontological resources", and (b) a real cooperation between users, ontologists and ontology-based interface designers.

6.2.3.5. *Collaboration Between Instructional Designers and Technical Developers*

In the Palette European project, we faced the issue of aligning different perspectives on the modeling of Communities of Practice (CoPs), mainly the perspectives of technical partners (acting as technical-services developers) and the perspectives of instructional partners (acting as CoP observers and instructional-services developers). Focusing on the modeling of CoPs' activities, we analysed the origin of the gap between the initial models of CoPs' activities, and the strategies used or to be used for filling this gap [54].

6.2.3.6. *Collaboration between Business Components Engineers, User Interface Components Engineers, User Interaction Analysts and End-Users*

This year we initiated a joint effort with User Interface and Software Components Assembling specialists from the Rainbow research team (I3S Laboratory) in order to design a method allowing the collaboration between (1) the developers of the business components of an application, (2) the developers of the user interface components, (3) the analysts of the user interaction, and (4) the end-users. This year the focus was (1) on the collaboration between business components developers and UI components developers, (2) on the interoperability between business components and UI components.

6.2.4. *Collaborative Knowledge Creation Services: SweetWiki*

Participants: Adil El Ghali, Fabien Gandon, Alain Giboin, Bassem Makni, Amira Tifous, Reda Boucid, Rose Dieng-Kuntz.

The SweetWiki tool, formerly deployed for ten CoPs involved in the Palette project, continued to be developed and enhanced with new functionalities, such as: Folkon, a new folksonomy editor, the semantic management of the users and the access rights, a semantic awareness mechanism based on RSS feeds, and the support for registering and logging using OpenID.

In addition, some capabilities have been implemented, in order to make SweetWiki interoperable with other services of the Palette project partners. For instance, it is now possible to (i) share the semantic annotations of SweetWiki resources, in order to allow other applications to retrieve resources from Sweetwiki, (ii) upload in SweetWiki documents from authoring application (Amaya, LimSee, CoPe_It!). We also develop a widget for reading SweetWiki RSS feeds, to be integrated in a widget portal for accessing Palette services. Some of these enhancements are detailed in [69], the others will be published in a Palette deliverable early 2009. In addition, a book chapter dedicated to SweetWiki is to be published [60].

6.2.5. *Knowledge Connection Service: LinkWidget*

Participant: Adil El Ghali.

In a context of a growing web 2.0 where users and communities participate and produce data in a plenty of web applications, making links between these islands of data become an urgent need for the communities and their members. The aim of LinkWidget is to support this link in the context of a Community of Practice. It relies on semantic annotations of the resources of the CoP to connect resources the users are currently working on, in a given web application, to other resources of the CoP hosted in other applications.

6.2.6. *Knowledge Evolution Service*

Participants: Rose Dieng-Kuntz [resp.], Olivier Corby, Priscille Durville.

Based on the survey of some CoP evolution models available in the literature, we worked on the identification of CoP evolution events originating the evolution of the CoP knowledge and explored two approaches to deal with the coherent evolution of semantic annotations in case of evolution of a CoP ontology. This work is detailed in the deliverable [71].

6.2.7. *Detection of Emerging Communities of Practice and Support to their Life Cycle*

Participants: Guillaume Erétéo, Fabien Gandon, Michel Buffa.

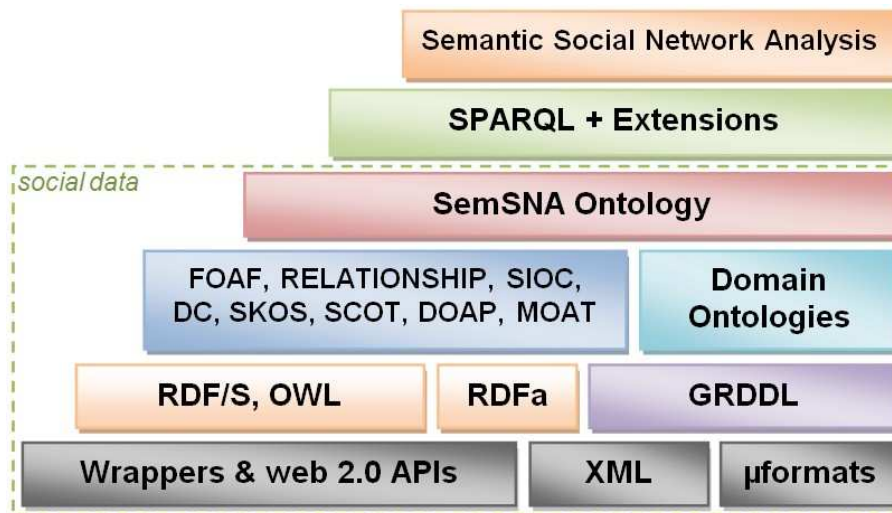


Figure 1. Abstraction stack for semantic social network analysis

During the first year of this PhD, a state-of-the-art on Social Network Analysis (SNA) and its application to the Semantic Web was conducted [31]. We build on enhanced RDF-based representations to carry out fully semantic social network analysis of online interactions. We leverage Semantic Web technologies to merge and exploit the best features of each of these approaches. To achieve this, we designed a framework using the graph models underlying RDF and SPARQL extensions enabling us to extract efficiently and semantically parameterize the SNA features such as strategic positions, roles, community detection etc. directly using these representations. Figure 1 illustrates the abstraction stack we follow. We use RDF graphs to represent social data, using existing ontologies (FOAF, SIOC, SCOT, RELATIONSHIP, DOAP) together with specific domain ontologies if needed. Some social data are already available in a semantic format (RDF, RDFa, hCard μ format, etc.) and can be exploited straightforwardly (e.g. FOAF profiles from LiveJournal.com, RDF data from openguides.com, SIOC metadata from blogs like Wordpress, GRDDL extraction of μ formats, etc.). However, today, most of the data are still only accessible through APIs (Youtube, Flickr, Open Social, Facebook, etc.) or by crawling web pages and need to be converted.

We also designed SemSNA, an ontology that describes the SNA notions (e.g. centrality) and allows us to manage the life cycle of an analysis. With this ontology, we can (1) abstract social network construct from domain ontologies to apply our tools on existing schemas; and we can (2) enrich the social data (the RDF graph nodes) with new annotations such as the SNA indices that will be computed (centrality degree, betweenness centrality, closeness centrality, etc.). These annotations enable us to manage more efficiently the life cycle of an analysis, by calculating the SNA indices only once and by updating them incrementally when the network changes over time.

Based on this model, we propose SPARQL formal definitions to compute semantically parameterized SNA features and annotate the graph nodes consequently, caching the results. The current test uses the semantic search engine Corese based on graph representations and processing that supports powerful SPARQL extensions particularly well suited for the computation of the SNA features that, in particular, require path computations [22]. Among important results in SNA is the identification of sociometric features that characterize a network [31]. For example, the centrality highlights the most important actors of the network. We adapted in our approach the computation of the three kinds of centrality that have been proposed by [95]. Our perspectives include the

adaptation of other algorithms in particular for community detection and new semantic algorithms based on adaptation of classical SNA definitions.

6.2.8. *Bridging Folksonomies and Ontologies for Knowledge Sharing*

Keywords: *Communities, Folksonomies, Semantic Annotations, Semantic Web, Social Network, Social Web.*

Participants: Freddy Limpens, Fabien Gandon, Michel Buffa.

During the first year of this PhD, we published two surveys about the complementary use of folksonomies and ontologies in knowledge sharing systems over the social web [47], [36]. Social tagging systems have recently become very popular as a means to classify large sets of resources shared among on-line communities over the social Web. However, the folksonomies resulting from the use of these systems revealed limitations : tags are ambiguous and their spelling may vary, and folksonomies are difficult to exploit in order to retrieve or exchange information. In our contributions, we have compared the recent attempts to overcome the limitations of folksonomies and to support their use with formal languages and ontologies from the Semantic Web.

We can thus split all the contributions in two kinds. The first one includes the works that try to discover and formalize the semantics “hidden” in folksonomies [98], [101], [97]. The second kind of approaches strive to describe the content of the knowledge sharing platforms of the Web 2.0 thanks to formal vocabularies [90], [96], allowing in turn to navigate more precisely within and across knowledge sharing platforms.

In the unfolding of our PhD work and as a participation in the ANR project ‘ISICIL’, we plan to investigate more deeply the techniques to combine folksonomies and ontologies as used by a community of technological watchers. We intend to tackle problems of knowledge acquisition in the case of specific vocabularies and jargons, and the construction of ontologies [89] by members of communities of practice [103].

6.2.9. *Ontology-Driven Adaptive Course Generator for Web-based Education*

Participants: Amel Yessad [resp.], Catherine Faron-Zucker, Rose Dieng-Kuntz.

This work is done in the context of A. Yessad PhD Thesis. In the context of increasing need of life-long training, we investigate the means to construct a Web-based learning environment that supports personalized learning for autonomous learners. Particularly, we develop OrPAF (Organisateur de Parcours Adaptatifs de Formation) an Adaptive Educational Hypermedia and Web-based System (AEHS) which uses ontologies in order to formally describe learning knowledge (domain, pedagogy, learner, etc.). On the one hand, the ontologies permit to have an explicit and common description of learning knowledge and so improve the adaptation of OrPAF components for different learning contexts. The learning context is defined by the learning domain (e.g. the algebra domain), the learner characteristics (e.g. the level of knowledge) and the pedagogical strategy (e.g. the inductive strategy). On the other hand, the ontologies are used to annotate the learning resources queried from the Web repositories in order to reuse them in a particular learning context. The fact that the resource annotation is based on an ontological model improves the personalization and the interoperability of our learning system.

In the first step of our work, we represent the learning knowledge in two levels: a meta-level where we construct an e-learning ontology and describe general learning knowledge about domains, learners, pedagogical strategies, etc. Classes and properties of this e-learning ontology are instantiated in order to create a specific domain model, a specific pedagogical model and a specific learner model. In the next step, we generate for a learner an adaptive educational hypermedia that represents the personalized course. The structure of the generated hypermedia is an Adaptive Conceptual Map (ACM) of learning concepts obtained by filtering the domain model and annotated by using the learner model. The content of the generated hypermedia course is composed of the learning resources queried for Web repositories (Ariadne, Merlot, etc.).

In order to improve the automatic reuse of learning resources, they are submitted to a semi-automatic annotation process assisted by a teacher/expert. The conceptual annotation of the resource is constructed as follows: the learning topics of the resource are manually identified by the teacher/human experts, while other resource characteristics (e.g. the resource type, the resource author, the resource interactivity type) are automatically extracted from the IEEE LOM of the resource. This conceptual annotation is then automatically

generated by OrPAF according to the learning models. Once the annotation process is performed, the problem is to automatically detect the semantic relevance of a learning resource for the learning context of a learner. In our research, we propose a novel approach based on the learning context to detect the semantic relevance of learning resources. The semantic relevance measure expresses the relatedness between the learning resource conceptual annotation and the learning context which is represented by both the ACM and the current concept interesting the learner. Several experiments are performed in order to evaluate the OrPAF system usability and the semantic relatedness measure performance. This work has been published in [40], [21].

6.2.10. *Semtags and Semservices Libraries*

Participant: Priscille Durville.

Semservices is a set of Web Services relying on the same functionalities as Semtags but dedicated to Web Service architectures. This set of services is written in Java and they are currently deployed with the CXF Web Service container (and Apache Tomcat). The services were accessible through the SOAP protocol. We have added this year an access through the REST protocol. The services are now deployed on a server so that they are accessible from everywhere by any Web applications.

These two libraries are used in a european project (Palette), in a RNTL project (e-WOK_HUB) and in applications developed by the Edelweiss team.

6.2.10.1. *Semantic Tools*

We have developed and distributed under the CeCILL-C license a tool that allows users to translate their RDFS/OWL ontologies to TopicMaps in order to be able to visualize them as graphs with existing tools dedicated to end-users like CMapTool.

This tool is used by people involved in the management of ontologies of the Palette european project.

Another toolbox has been developed to find concepts/properties of given ontologies in texts. This software is provided as a Java archive.

6.2.10.2. *Graphical User Interfaces Dedicated to Search and SPARQL Query Sending*

We have worked on graphical user interfaces about queries dedicated to end-users that are not comfortable with SPARQL queries syntax. The aim of this work was to define a generic way to create such interfaces relying on ontologies. Although we try to be domain independant, our use-case comes from the geosciences and the e-WOK client application created by the ANR e-WOK_HUB project.

6.2.11. *Management and Composition of Semantic Web Services*

Participant: Mohamed Bennis.

In addition to our work on a description of Web Services by using Semantic Annotation Web Service Description Language (SAWSDL¹³) we complemented the XSL transformation of SAWSDL file towards RDFS ontology by adding a new specification of RDF Mapping of WSDL Schema (Types, Complex Type).

In order to allow efficient use of this semantic we developed a Web application which helps users to:

- Deploy the Web Service annotated (or not) into a semantic engine (Corese),
- Find out a Web Service by using a simple keyword (semantic search),
- Compose Web Services which depend on their semantic descriptions.

Our approach allowed users to build abstract processes by an effective composition of Web services. Therefore we use a specific composition Language: Business Process Execution Language for Web Services (BPEL¹⁴).

6.2.12. *SweetWiki*

Keywords: *Community, Cooperation, Ontology, Semantic Web, Wiki.*

¹³<http://www.w3.org/TR/sawSDL>

¹⁴<http://www.ibm.com/developerworks/library/specification/ws-bpel>

Participants: Michel Buffa [resp.], Guillaume Erétéo, Fabien Gandon, Adil El Ghali, Amira Tifous.

The idea of SweetWiki is to revisit the design rationale of wikis, taking into account the wealth of new standards available for the Web eleven years later to address some of the shortcomings identified through experience. SweetWiki relies on Web standards for the wiki page format (XHTML), for the macros included in pages (JSPX/XML tags), for the semantic annotations (RDFa, RDF), for the ontologies it manipulates (OWL Lite) and for queries (SPARQL). It improves access to information with faceted navigation, enhanced search tools and awareness capabilities, acquaintance networks identification [20], [59].

It also provides a single WYSIWYG editor for both metadata and content editing, with assisted annotation tools (auto-completion, checkers for embedded queries or annotations). It comes with an embedded ontology editor and a reasoning engine. Finally it allows metadata to be extracted and exploited by other applications. By semantically annotating the resources of the wiki and by reifying the wiki object model itself, SweetWiki provides reasoning and querying capabilities. All the models are defined in OWL Lite schemata capturing concepts of the wikis (wiki word, wiki page, forward and backward link, author, etc.) and concepts manipulated by the users (users, folksonomy, external ontologies). These ontologies are exploited by an embedded instance of Corese allowing us to support the lifecycle of the wiki, e.g., to restructure pages, to propose new functionalities, e.g., semantic search, user-profile-based monitoring and notification, and to allow for extensions, e.g., support for new medias or integration of legacy software.

In SweetWiki we have paid special attention to preserving the essence of a wiki: simplicity and social dimension. Thus SweetWiki supports all the common wiki features such as easy page linking using WikiWords, versioning, etc., but also innovates by integrating a WYSIWYG editor extended to support social tagging functionalities, embedded SPARQL queries etc., masking the OWL-based annotation implementation. Users can freely enter tags and an auto-completion mechanism suggests existing ones by issuing queries to identify existing concepts with compatible labels. Thus tagging is both easy and motivating (real time display of the number of related pages) and concepts are collected in folksonomies. Wiki pages are stored directly in XHTML or in JSPX format, embedding semantic annotations (RDFa and GRDDL) ready to be reused by other software.

6.3. Knowledge Graph Representation

Keywords: *Conceptual Graphs, Corporate Memory, Graphs, Information Retrieval, Knowledge Engineering, Knowledge Management, Knowledge Representation, OWL, Ontology, RDF, Semantic Web, Web services, XML.*

The goal of this research direction is to propose a framework to develop applications at the knowledge level i.e. a framework where data structures and processing can be designed relying on ontology-oriented models and ontology-based inferences. We want to provide functionalities (e.g. search, clustering, statistics, etc.) independent from the low-level implementation details (storage, distribution, provenance, etc). We aim at developing a family of graph-characteristic inferences for simulating semantic distances used in approximate searching, clustering, and suggesting. We will start abstracting graph structures, indexing and operations and generalize representations and operators.

6.3.1. Corese Semantic Web Factory

Keywords: *Conceptual Graphs, Information Retrieval, Knowledge Representation, OWL, Ontology, RDF, SPARQL, Semantic Web, XML.*

Participants: Olivier Corby [resp.], Catherine Faron-Zucker, Fabien Gandon, Birahim Sall.

Corese is a Semantic Web Factory which implements RDF/S, part of OWL light, SPARQL and RDF Graph Rules. It relies on the conceptual graph formalism and is now open source with CeCILL-C free software license¹⁵. Corese is a research platform that is used in several research projects and applications in the Edelweiss team. It is also included as Semantic Search Engine in generic platforms such as Sewese, SweetWiki and MeatAnnot.

¹⁵<http://www.inria.fr/sophia/edelweiss/software/corese>

This year we have focused on the points described below.

6.3.2. SPARQL Graph Path

We had designed an extension to SPARQL that enables us to search for path of length greater than one between resources. In addition, the path may match a regular expression that constrains property labels. It is also possible to enumerate the target relations that have been found in a path.

We have extended the graph path engine in Corese in such a way that it can consider relations in reverse order (i.e. from second argument to first argument) as if the inverse relation would exist in the RDF graph. The syntax is the following:

```
select * where {
  ?x $path ?y
  filter(match($path, star(rdfs:domain || rdfs:range), 'i'))
}
```

6.3.3. SPARQL Extensions

In the past, we had introduced an extension that enables to return the result of the evaluation of an expression:

```
select fun(?y) as ?z
where { ?x ex:relation ?y }
```

We have designed an extension that enables to combine a construct clause with a select expression clause:

```
construct { ?x ex:relation ?z }
select fun(?y) as ?z
where { ?x ex:relation ?y }
```

This can be used with aggregate operators such as group and sum.

```
construct { ?x ex:total ?sum }
select sum(?y) as ?sum
where { ?x ex:relation ?y }
group by ?x
```

Distinct and group by can operate on such evaluable expressions.

To finish, it is also possible to combine construct with graph pattern clauses.

```
construct { graph?g { ?y ex:isPartOf ?x } }
where { graph ?g { ?x ex:hasPart ?y } }
```

We supported a W3C member submission for SPARQL Update Extensions [77].

6.3.4. Querying the (Semantic) Web of Data Using SPARQL

RDF can embed XML data by means of the `rdf:parseType='Literal'` syntax and the `rdf:XMLLiteral` datatype. We have designed an extension that enables SPARQL to query such XML data by means of XPath expressions. We introduce an `xpath()` function that can be used in filters :

```
select * xpath(?xml, "//object/@id") as ?id
where {
  ?object ex:relation ?xml
  filter(?id = '2718')
}
```

The XPath expression can reference SPARQL variables and prefixes.

The evaluation of an XPath expression returns a sequence of node-set. To handle this, we introduce a new datatype: the sequence of datatype values. Hence, an XPath node-set is translated into a sequence of datatype values, e.g. sequence of `xsd:string` for text nodes and `rdf:XMLLiteral` for XML nodes.

We propose an extension of SPARQL filter evaluation, in the spirit of XPath evaluation rules, to take sequences into account. When evaluating an expression, if one value to be compared is a sequence and the other is a single value, then the comparison will be true if and only if there is a value in the sequence such that the result of performing the comparison on the two values is true.

In order to process XML data, we also introduce an `xslt()` function that enables to perform an XSL transformation within a SPARQL query.

We have designed a similar extension that enables to compute a nested SQL query within a SPARQL query. This is done by means of a `sql()` function.

```
prefix db: <jdbc:derby://localhost:1527/>
select *
sql(db:DBTest, 'login', 'passwd',
  'SELECT name, dept FROM employee WHERE age > 18')
as (?name, ?dept)
where {
  ?x c:name ?n
  filter(?n = ?name)
}
```

The same design pattern has been used to introduce an extension that enables to compute a nested SPARQL query. This is done by means of a `sparql()` function.

```
select *
sparql("select ?s where { PAT1 }") as ?s
where {
  graph ?g { PAT2 } . filter(?g = ?s)
}
```

We have designed an API to create SPARQL Abstract Syntax trees. It is hence possible to create a SPARQL query by program. This query in abstract syntax can then be processed by the query engine.

6.3.5. *Backward Chaining Inference Rule Engine*

Participants: Birahim Sall, Olivier Corby [resp.], Catherine Faron-Zucker.

We have designed and developed, during Birahim Sall Master Thesis, a backward chaining inference rule engine for RDF that is integrated in the Corese Semantic Factory. We have chosen for rule syntax the construct pattern of SPARQL where the `construct` clause is the head of the rule and the `where` clause is the body. This is a preliminary work for implementing high level Information Retrieval strategies. This work was done in the e-WOK_HUB project.

6.3.6. *GRIWES : Towards a Shared Knowledge Graph Platform*

Keywords: *Conceptual Graphs, Knowledge Representation, OWL, RDF, SPARQL, Semantic Web, XML.*

Participants: Jean-François Baget, Olivier Corby, Rose Dieng-Kuntz, Catherine Faron-Zucker, Fabien Gandon [resp.], Alain Giboin.

Graph-based knowledge representation formalisms are more and more common, from Conceptual graphs (CG) which are historical descendants of semantic networks, to more recently proposed representations such as RDF, SKOS or Topic Maps. The web is playing an important role in the emergence of these new formalisms and in recent web architectures the RDF graph model became a core layer of the stack of standards. Many knowledge representation frameworks are now used online (RDF, RDFS, SKOS, OWL, GRDDL, RDFa, μ Formats, etc.) allowing human and artificial agents to weave graphs describing web resources or just any entity and the relations existing between them. In a post Tim Berners-Lee insisted on the graph nature (Giant Global Graph) of the Semantic Web and the importance of this structure in developing and exploiting the Semantic Web (i.e. the web of data).

Tools designed and developed for these different graph-based frameworks are tailored to specific languages and/or scenarios. Our own experiences convinced us that it would be interesting to share these efforts and avoid re-designing and re-implementing the same structures and operators again and again. For this reason we carried out the project Griwes that stands for Graph-based Representations and Inferences for Web Semantics. The main objective of this initiative was to bootstrap an open-source platform, to share efforts on developing graph-based data structures and algorithms with anyone who wants to contribute. This also implies a proper definition of the considered graph structures shared by the different graph-based formalisms.

We proposed a layered architecture for Griwes. We first detailed the basic mathematical structures that are used to characterize the primitives for graph-based knowledge representation. We then factorized recurrent knowledge representation primitives that can be shared across specific graph-based languages. Finally we provided a proof of concept by showing how two languages (Simple Conceptual Graphs and RDF) can be described in this framework. These results are published in a scientific article [25] and a research report from Griwes available online¹⁶.

Rules have played an important part in the design of Griwes. Their expressivity and genericity is an important feature to be able to encode knowledge expressed in other languages into our unified formalism. A major drawback of that expressivity is the undecidability of rules-based languages. Our work in collaboration with the RCR team in Montpellier has been (1) the study of decidable/tractable fragments of rules-based logics, (2) the encoding of other KR languages into these specific fragments, and (3) the increase of expressivity of these languages while keeping their essential combinatorial properties.

1. Our search for decidable/tractable fragments of rule-based logics stems from our characterization of dependencies between rules and their use in a forward chaining reasoning scheme [85]. This work has later been extended to reasonings in backward chaining [88] and in hybrid forward/backward chaining reasoning mechanisms [53]. To further improve the compilation part of our algorithms, our supervision of a Master 2 work in Montpellier [83] led to an exponential decrease of the dependencies required during the reasonings.
2. We have shown how to express other languages in our graphs and rules framework. The studied languages are: concept graphs [84], RDF/S [86], or description logics [53]. For all these languages, the translation into our framework provided new and efficient algorithms for the represented languages.
3. To improve the expressivity of our languages, we have provided them with additional and necessary features such as datatypes and functional relations [87].

7. Contracts and Grants with Industry

7.1. KmP (Follow up)

The KmP projects were a set of pluridisciplinary and user participatory projects aiming at designing systems for managing collective and individual competencies, which resulted in 2006 in a prototyped knowledge-management platform based on Corese and SeWeSe (see Acacia activity report 2006). In 2007, a pre-industrial platform was designed from the prototyped platform following the Telecom Valley partner's initiative (see Edelweiss activity report 2007). Since March 2008, the co-proprietaries of the solution (Telecom Valley, UNSA/CNRS, and INRIA) put the @CTIS-Ingénierie society in charge of commercializing and developing the platform¹⁷.

¹⁶<http://www.inria.fr/sophia/acacia/project/griwes>

¹⁷<http://www.telecom-valley.fr/kmp.fr.htm> & <http://stic-paca.actis-kmp.com>

8. Other Grants and Activities

8.1. Regional Actions

8.1.1. *Laboratory of Usages at Sophia Antipolis*

Participant: Alain Giboin.

We take part in the Laboratoire des usages (Laboratory of Usages) of Sophia Antipolis, and in the Association Use Age (Sophia Antipolis) ¹⁸.

8.1.2. *Competitvity Poles*

- The e-WOK_HUB ANR RNTL project has been labelled by the Solutions Communicantes Sécurisées (SCS) competitiveness pole.
- The BioMarker project with Immunosearch and IPMC has been labelled by the PASS (Pôle Parfums, Arômes, Senteurs, Saveurs) competitiveness cluster.

8.1.3. *Griwes*

Keywords: *Conceptual Graphs, Knowledge Representation, Ontology, RDF, SPARQL, Semantic Web.*

Participants: Jean-François Baget, Olivier Corby, Rose Dieng-Kuntz, Catherine Faron-Zucker, Fabien Gandon [resp.], Alain Giboin.

Griwes is a one-year COLOR INRIA project on graph-based representation and reasoning and corresponding programmatic interface with a special emphasis on semantic Web applications. It is a collaboration between Edelweiss, RCR from LIRMM, and I3S from UNSA to design a shared and generic platform for graph-based knowledge representation and reasoning. We are interested in multiple languages of representation, such as conceptual graphs, RDF/S, and in various extensions of these languages. More details on the work performed can be found at [6.3.6](#).

8.2. National Actions

8.2.1. *ANR ISICIL*

Keywords: *Corporate Intelligence, Scientific Monitoring, Semantic Web, Web 2.0.*

Participants: Olivier Corby, Guillaume Erétéo, Fabien Gandon [resp], Alain Giboin, Freddy Limpens.

ISICIL is an ANR project submitted and accepted in 2008 and that will start beginning of 2009. Recently, online communities of interest have emerged and started to build directories of references in their domains of interest at an impressive speed and with very agile responses to changes in these domains. As examples of online communities sharing the same interests, activities, purposes or governance, we can cite the well-known Wikipedia, the music fans on mp3.com, the open source OS Debian community or the business angels investors community fool.com. One of the forces of the tools enabling these communities is their ability to turn usually passive users into active participants and producers. The diversity and the mass of users are used to tackle the diversity and the mass of information sources.

Monitoring science and technological change is a vital ability of today's organizations, yet the growing diversity of sources to track in each domain of interest remains a challenge for any organization. Therefore there is a growing interest in importing the tools and practices that made the success of these online communities inside corporate information systems. Blogs and wikis are being set up in more and more intranets; for instance Motorola's initiative with its 4,400 blogs and 4,200 wikis, or Procter & Gamble's deployment of Microsoft's Sharepoint.

¹⁸<http://www.use-age.org>

But, on the one hand, Web 2.0 tools exhibit limits when it comes to automating some tasks or controlling some processes, as usually required in a corporate environment. On the other hand, more structured information systems often suffer from usability and knowledge capture issues. In addition, in the context of intelligence, corporate structures can also provide assistance at different stages of these processes to ensure that corporate quality standards and rules are met. Thus a challenge of this project is to reconcile viral new web applications with formal representations and processes to integrate them into corporate practices for technological and scientific monitoring.

More specifically, ISICIL proposes to study and to experiment with the usage of new tools for assisting corporate intelligence tasks. These tools rely on web 2.0 advanced interfaces (blog, wiki, social bookmarking) for interactions and on Semantic Web technologies for interoperability and information processing.

8.2.2. ANR RNTL project e-WOK_HUB

Keywords: *Evolution, Ontology, Semantic Annotation, Semantic Web, Web service.*

Participants: Mohamed Bennis, Olivier Corby, Rose Dieng-Kuntz [resp.], Priscille Durville, Fabien Gandon, Alain Giboin.

e-WOK_HUB is a 3-years ANR RNTL project, coordinated by the Edelweiss team, with IFP, BRGM, EADS, ENSMP, ENSMA and CRITT as partners. e-WOK_HUB aims at building a set of communicating portals (the e-WOK Hubs), offering both: (a) Web applications accessible to end-users through online interfaces, and (b) Web services accessible to applications through programmatic interfaces. As applicative objectives, e-WOK_HUB aims at enabling management of the memory of several projects on CO_2 capture and storage, with use of results of technological watch on the domain.

Edelweiss is responsible for WP2 on Generic Tools and Services and worked on Support to ontology creation, Management and composition of semantic Web Services and Annotation processing. We are involved in the task of ontology creation. About ten ontologies have been created and described in terms of vocabulary and hierarchy as graphical schemes. We have implemented these schemes as RDFS/OWL DL ontologies.

As part of the e-WOK_HUB project, a global common prototype has been developed by all the partners. Each partner is responsible of a set of web services part of the prototype. Our set of web services is mainly dedicated to annotation generation relying on an existing knowledge base growing that way, to request answering and to semantic repository. All of these services are relying on Corese engine. The annotation generation services are both for linguistic annotation and semantic annotation. Another web service was developed to extract RDF data from a SAWSDL description in order to be included in a global process chain of the next version of the prototype. This work have been published in conference proceedings [24], [39], [58].

8.2.3. BioMarker

Keywords: *Biomedicine, Natural Language Processing, Ontology, Semantic Annotation, Semantic Web.*

Participants: Leila Kefi-Khelif [resp.], Rose Dieng-Kuntz, Olivier Corby, Khaled Khelif.

This work is carried out in the framework of the P.A.S.S (Parfums, Arômes, Senteurs, Saveurs) Hub. It is a collaborative project with ImmunoSearch SARL, Institute of Molecular and Cellular Pharmacology (IPMC-CNRS/UNSA), I3S (UMR CNRS-UNSA) and industry (Iris Pharma and Skinethic, perfumers such as l'Oréal, etc.) The objective of this project is to design biomarkers for controlling the harmlessness of the molecules used in perfumes, aromatics and cosmetics. The purpose of this research is to conduct comparative studies of in vivo and in vitro test models on the skin (irritation, allergy) and to propose alternative methods defining the new norms applicable in this field. In this context, we aim at proposing methodological and software support for capitalization and valorization of knowledge resulting from experiments and techniques to preserve and reuse data. We rely on the semantic Web technologies (semantic annotations, ontologies, RDF, SPARQL...).

8.2.4. Working Groups

Rose Dieng-Kuntz was member of:

- the board of the GRACQ (*Groupe de Recherche en Acquisition des Connaissances*) <http://www.irit.fr/GRACQ>.
- the TIA Group (*Terminology and AI*) <http://tia.loria.fr>.

Alain Giboin is member of:

- Group “Psychologie ergonomique” of the Département Recherche de la Société française de Psychologie (SFP), Founder member.
- Research Network "Psycho Ergo". Member of the Conseil de groupement. Coordinator (with Pascal Salembier, IRIT Toulouse, UTT Troyes) of the Thematic Group "Coopération homme-machine et Coopération homme-homme".

8.3. European Actions

8.3.1. Palette

Keywords: *Assistance to the User, Co-operation, Collaboration, Community of Practice, Ergonomics, Interaction Design, Knowledge Engineering, Knowledge Management, Ontology, Scenarios, Semantic Annotation, Semantic Web, User interfaces, Virtual community, Web Service.*

Participants: Olivier Corby, Rose Dieng-Kuntz [resp.], Adil El Ghali, Fabien Gandon, Alain Giboin [resp.], Bassem Makni, Amira Tifous.

Palette is a 3-years long integrated project, coordinated by ERCIM and EPFL, with as partners the University of Fribourg, CTI (Greece), Centre de Recherche Public Henri Tudor (Luxembourg), University Abou Bekr Belkaid (Algeria), University of Liège, EM Lyon, Groupe d'Analyse et de Théorie Economique (GATE CNRS), Center for Study of Education and Training (CSET) (Lancaster), ePrep, Nisai, MindOnSite - Integral Coaching SA, LICEF Téliuq (Canada), INRIA.

The Palette project aims at facilitating and augmenting individual and organisational learning in Communities of Practice (CoPs). Towards this aim, an interoperable and extensible set of innovative services as well as a set of specific scenarios of use are designed, implemented and thoroughly validated in CoPs of diverse contexts. Palette thus offers information services, knowledge management services (based on an ontology dedicated to communities of practice) and mediation services for communities of practice (CoPs). Eleven pilot CoPs are involved in the participatory design of Palette services. These CoPs, located in various European countries (Belgium, France, Greece, Switzerland, UK), belong to three different domains: (i) teaching, (ii) management, and (iii) engineering. Their size varies from less than ten members to more than a hundred of members.

Edelweiss is leader of the WP3 aimed at designing ontologies and ontology-based services for Knowledge Management in Communities of Practice. In 2008, we focused on: (1) the extension of the O'CoP ontology, (2) scenario-based design of semantic services, and (3) the development of Knowledge management services for Communities of Practice, for instance, Collaborative knowledge creation services, Knowledge connection service, and Knowledge evolution service. We participated to the following deliverables: [78], [71], [69], [72]. This work was published in [54], [61], [60] and [48], [37], [38].

8.3.2. SeaLife

Keywords: *Biology, Life Sciences, Medicine, Natural Language Processing, Ontology, Patent Mining, Semantic Annotations, Semantic Web, Text-mining, Web Services.*

Participants: Olivier Corby, Rose Dieng-Kuntz [resp.], Fabien Gandon, Nizar Ghoula, Khaled Khelif, Yassine Mrabet.

SeaLife is a 3 year-long STREPS project, coordinated by Dresden University, with Edinburgh University, London College, Manchester University, Scionics as other partners; it started on April 2006.

The objective of SeaLife is the design and realization of a semantic Grid browser for the Life Sciences, which will link the existing Web to the currently emerging eScience infrastructure. The SeaLife browser will allow users to automatically link a host of Web servers and WebGrid services to the Web content they are visiting. This will be accomplished using eScience growing number of WebGrid Services and its XML-based standards and ontologies. The browser will identify terms in the pages being browsed through the background knowledge held in ontologies. Through the use of Semantic Hyperlinks, which link identified ontology terms to servers and services, the SeaLife browser will offer a new dimension of context-based information integration.

This SeaLife browser will be demonstrated within three application scenarios in evidence-based medicine, literature and patent mining, and molecular biology, all relating to the study of infectious diseases. The three applications vertically integrate the molecule/cell, the tissue/organ and the patient/population level by covering the analysis of high-throughput screening data for endocytosis (the molecular entry pathway into the cell), the expression of proteins in the spatial context of tissue and organs, and a high-level library on infectious diseases designed for clinicians and their patients.

In this project we take part in 6 among the 7 work packages and we are coordinator of the text mining and natural language processing work package [70], [76], [74]. This work was published in [43], [34], [35], [29], [30].

8.3.3. SevenPro

Keywords: *Corporate Memory, Natural Language Processing, Ontology Design for Products, Reasoning Engine, Semantic Annotation, Semantic Web, Virtual Reality.*

Participants: Hacène Cherfi, Olivier Corby, Rose Dieng-Kuntz [resp.], Ibrahima Diop, Fabien Gandon, Alain Giboin, Emmanuel Jamin, Cheikh Niang.

SevenPro (Semantic Virtual Engineering Environment for Product Design) is a European STREPS project. The SevenPro project develops technologies and tools supporting deep mining of product engineering knowledge from multimedia repositories and enabling semantically enhanced 3D virtual reality (VR) interaction with product knowledge in integrated engineering environments. It aims at helping an engineer to design new objects by providing a 3D viewing of the object designed, informations on each part of the object (suggestions of other objects with similar or close properties could be performed) and information about repetitive design.

SevenPro is coordinated by Semantic Systems (Spain), and involves partners from industrial and academic areas. SevenPro project was carried out during 34 months, from January 2006 to October 2008, by a consortium composed of partners from five different EU countries.

This work was published in [28], [55]. Edelweiss is WP leader on the Document repository annotation (WP04) [67]. We also worked on: Virtual reality (VR) interaction based on knowledge reasoning [75], Engineering memory tool [73], Semantic server agent, Liaison and standardisation [68].

8.4. International Actions

8.4.1. W3C

Participant: Fabien Gandon.

We participate to several W3C working groups and interest groups. We are respectively editors and co-authors of two documents of the GRDDL working groups (a mechanism to extract RDF from XML dialects).

9. Dissemination

9.1. Animation of the Scientific Community

9.1.1. Program committees

Rose Dieng-Kuntz was member of the following program committees:

- EGC 2008, (8èmes journées francophones "Extraction et Gestion des Connaissances"), January 29th-February 1st, INRIA Sophia Antipolis.
- ESWC 2008, The 5th Annual European Semantic Web Conference, Tenerife, Spain June 1st-5th.
- IC 2008, (19èmes Journées Francophones d'Ingénierie des Connaissances), June 18th-20th, Nancy.
- ODBIS 2008, 4th ODBIS Workshop on Ontologies-based Techniques for DataBases in Information Systems and Knowledge Systems, Auckland, August 23rd.
- EKAW 2008 - 16th International Conference on Knowledge Engineering and Knowledge Management Knowledge Patterns, Acitrezza, Catania, Italy, September 29th-October 3rd.
- ISMICK 2008, International Symposium on the Management of Industrial and Corporate Knowledge, Rio de Janeiro, Brazil, November 3rd-5th.

Fabien Gandon was member of the program committees or reviewer for:

- Autonomous Agents and Multiagent Systems AAMAS 2008,
- European Semantic Web Conference ESWC 2008,
- IEEE/WIC/ACM Web Intelligence WI2008,
- International Conference on Internet and Web Applications and Services ICIW2008,
- ACM Symposium on Applied Computing SAC 2008,
- International Conference Information Systems 2008,
- Pratical Aspects of Knowledge Management PAKM 2008,
- Workshop Web Semantics 2008,
- Workshop Ontologies, Databases and Information Systems ODBIS 2008,
- Workshop Role of Services, Ontologies, and Context in Mobile Environments RoSOC-M 2008
- Workshop Social Data on the Web SDoW2008,
- International Workshop on Ontologies and Information Systems for Semantic Web (ONISW 2008)
- Langages et Modèles à Objets LMO2008,
- Ingénierie des Connaissances IC2008,
- Extraction et Gestion des Connaissances EGC2008.

Alain Giboin was member of the steering committee of COOP'08, The 8th International Conference on the Design of Cooperative Systems, Carry-le-Rouet, France, May 20-23, 2008. He was member the following program committees:

- "Atelier Gestion des connaissances", a workshop held in conjunction with EGC'2008 (8èmes Journées francophones "Extraction et Gestion des Connaissances"), INRIA Sophia Antipolis - Méditerranée, 29 janvier 2008, Website: <http://www-sop.inria.fr/axis/egc08/>.
- IS-2008, The IADIS International Conference on Information Systems 2008, Algarve, Portugal, April 9-11, 2008, Website: <http://www.is-conf.org>
- DeViNT'2008, Sixième journée "Déficients visuels et NTIC", Sophia Antipolis, France, May 29, 2008, Website: <http://devint.polytech.unice.fr>
- HCP-2008, The Third International Conference on Human Centered Processes, Delft, The Netherlands, June 9-12, 2008, <http://wiki.decis.nl/publichcp2008>

Martine Collard was Program committee member of EGC 2009, Conference on "Extraction et Gestion des Connaissances", Strasbourg, France, January 2009 and Benchmark 09, DAFSAA Workshop on Benchmarking of XML and Semantic Web Applications, Brisbane, Australia, April 2009.

Olivier Corby is member of the program committee of LMO 2009, 15^{ème} Conférence francophone sur les Langage et Modèles à Objets. He was program committee member of EKAW 2008, ODBIS 2008.

Isabelle Mirbel is member of the program committee of CAISE 2008, 20th International Conference on Advanced Information Systems Engineering and RCIS 2008, Second IEEE International Conference on Research Challenges in Information Science.

9.1.2. Journals and Publishers

Rose Dieng-Kuntz was co-editor of the Series *Frontiers in Artificial Intelligence and applications* at IOS Press and member of the Editorial Board of *Revue d'Intelligence Artificielle*.

Fabien Gandon is:

- Editorial Board Member of *Electronic Commerce Research and Applications* journal, Elsevier.
- Reviewer for IEEE Internet Computing, IEEE Transactions on Knowledge and Data Engineering, IEEE Computer Magazine, IEEE Transaction on Multimedia, World Wide Web Journal, IJISWIS special issue for MOSO, Integrated Computer-Aided Engineering Journal, Journal of Universal Computer Science,

Alain Giboin is Member of the Board of the External Experts of the bilingual and multidisciplinary journal in human factors *Le Travail Humain* and reviewer for the International Journal of Human-Computer Studies.

9.2. Organization of conferences and courses

- Rose Dieng-Kuntz was Conference co-chair of IFIP 20th World Computer Congress, Conference on Knowledge Management in Action, KMIA, [62].
- Alain Giboin is member of the organizing committee of:
 - Workshop «Affective aspects of cooperative interactions», held in conjunction with Coop'2008, May 20, 2008, Carry-le-Rouet, France, [63].
 - DeViNT'2008, Sixième journée "Déficients visuels et NTIC", Sophia Antipolis, France, May 29, 2008, Website: <http://devint.polytech.unice.fr/>
 - Workshop "IC 2.0 Vers une ingénierie "sociale" des connaissances: dans quelle mesure les usages du Web 2.0 font-ils évoluer les pratiques d'IC ?" [65], Nancy, June 17, 2008, within 19^{èmes} Journées Francophones d'Ingénierie des Connaissances (IC2008).
 - WUD Sophia 2008, World-Usability-Day event organized in Sophia Antipolis (France) by the Use Age Association, the LudoTIC, etc. and hosted by INRIA, November 13, 2008.
 - Journées d'été of the GDR CNRS Psycho Ergo, Paris, July 1-4, 2008.
 - Journées d'automne of the GDR CNRS Psycho Ergo, Paris, November 20-21, 2008.
 - Co-organizer of the Workshop of the Thematic Group "Coopération homme-machine et Coopération homme-homme" of the GDR CNRS Psycho Ergo, Paris, December 10, 2008.
- Martine Collard was:
 - Co-chair with Rose Dieng-Kuntz of ODBIS 2008, VLDB Workshop on Ontologies based techniques for databases in Information Systems and Knowledge Systems, Auckland, New Zealand.
 - Co-editor of the proceedings of ODBIS VLDB 2007 [64].
 - Program Chair of RCIS 2008, 3rd International Conference on Research Challenges in Information Science, Fez, Morocco, april 2009.
- Khaled Khelif was member of the organising committee of ODBIS'2008.

9.3. Others

9.3.1. Scientific Councils and Evaluation tasks

Rose Dieng-Kuntz was member of International Advisory Board of Cooperation Unit of EPFL and Fondation C.Genial for Scientific and Technical Culture.

Olivier Corby was referee for ANR 2008 and for the evaluation of a research program in an european country.
Alain Giboin was referee for ANR 2008.

9.3.2. International Working Groups

Rose Dieng-Kuntz was chair of the IFIP Working Group on Knowledge Management.

Isabelle Mirbel is member of the IFIP Working Group 8.1 on Design And Evaluation of Information Systems¹⁹.

9.3.3. Collective tasks

- Olivier Corby is member of: CDL (Committee for software development) and CAS (Committee for Scientific Animation) at INRIA Sophia Antipolis.
- Fabien Gandon is Member of the INRIA Sophia Antipolis committee for the funding of conferences (CCC) and the PhD follow up committee (CSD).
- Alain Giboin is Member of the Cumir (Commission des Utilisateurs des Moyens Informatiques pour la Recherche). He is coordinator, with Elisabeth Verplanken, of the Working Group "Hotline", aimed at specifying the Hotline aspects of the future "Contrat de service Semir".

9.3.4. Visits

The Edelweiss team welcomed:

- Andrew McCallum, Associate Professor at the University of Massachusetts, Amherst, July the 18th. He gave a talk on *Text Mining and Social Network Analysis*.
- Mathieu d'Aquin from Knowledge Media Institute at Open University²⁰ on September the 9th.
- Kleber Xavier Sampaio de Souza from Embrapa Campinas - Brasil on November the 4th.

9.4. Teaching

9.4.1. University

The Edelweiss project is a welcoming team of the *Ecole doctorale STIC of the Nice-Sophia Antipolis University (UNSA)*. The members of the project gave the following courses:

- Jean-François Baget: Master course on Knowledge Representation at University Montpellier 2.
- Martine Collard: Course on "Data Mining, applications in Security and in Biology", Master 2 IFI - EPU - University of Nice-Sophia Antipolis and a Course on "Decisional Databases" Master 1 in Computer Science - University of Nice-Sophia Antipolis (UNSA).
- Olivier Corby (resp.), Catherine Faron-Zucker, Fabien Gandon and Alain Giboin: course on Knowledge Engineering & Semantic Web. It is a one semester course during the last year of the curriculum at EPU (Ecole Polytechnique UNSA, Master 5), 45 hours. They supervised several student projects.
- Olivier Corby, Catherine Faron-Zucker and Fabien Gandon: Semantic Web at the License pro., IUT, UNSA.
- Olivier Corby and Catherine Faron-Zucker: Semantic Web and Description Logics in a Research Master at UNSA.
- Fabien Gandon
 - Two weeks of courses and seminars at Gaston Berger University in St Louis (Sénégal) from the 31st of January to the 14 of February on Web technologies with an emphasis on semantic Web frameworks.

¹⁹<http://home.dei.polimi.it/pernici/ifip81>

²⁰<http://kmi.open.ac.uk/people/mathieu>

- Semantic Web, Master Pro Course, Polytech’Nice Master Pro, UNSA.
- Design and maintenance of online tutorials on Corese and Sewese.
- Alain Giboin gave the following courses:
 - EPU, Polytech’Nice 3rd year, Module "Interfaces graphiques homme-machine" (GUI), UNSA (<http://www.essi.fr/~pinna/MODULEIHM/>): contribution to the organization of the module, lectures, participation to tutorials, and assessment of students’ GUI projects. Supervising the collaboration between the EPU-SI students and the ergonomics students who contribute also to the GUI projects.
 - Master "Ergonomie des Nouvelles Technologies de l’Information et de la Communication (ErgoNTIC)", UNSA (<http://www.unice.fr/master-ErgoNTIC/>): in charge of the «EPU Project» with Anne-Marie Pinna-Déry (EPU-SI). The EPU project allows ergonomics students from ErgoNTIC and software engineering students from the EPU-SI to work together as early as the learning phase, so preparing future collaborations when working together in enterprise.
 - Polytech’Nice at UNSA, Semantic Web course: lectures and tutoring of student projects.
- Khaled Khelif: course on XML and Multimedia Programming - a one semester course (30 hours) during the last year of the license Pro diploma (IUT University of Nice-Sophia Antipolis)
- Leila Kefi-Khelif and Adil El Ghali: course on Web applications - a one semester course in Master MIAGE - UNSA.
- Nouredine Mokhtari :
 - Practical courses on Algorithm and Java Programming in University of Nice-Sophia Antipolis (48h for 1st years license students)
 - Practical courses on Database management system in IUT Nice Côte d’Azur : (48h)
 - Practical courses on XML, XSLT and XQuery in IUT Nice Côte d’Azur : (8h for License pro)
 - Practical courses on Database management system in IUT Nice Côte d’Azur : (8h for License pro)

9.4.2. PhD Thesis

1. Adrien Basse: *Intégration d’applications et de données distribuées : une approche basée sur les services web sémantiques*, University Gaston Berger, Saint-Louis, Sénégal,
2. Guillaume Erétéo: *Detection of Emerging Communities of Practice and Support to their Life Cycle through Semantic Annotation of Activities, Uses and Persons*, PhD Thesis with Orange Labs,
3. Freddy Limpens: *Semantic Annotation of Usages and Persons*, University of Nice-Sophia Antipolis,
4. Nouredine Mokhtari: *Extraction and Exploitation of Contextual, Evolving Semantic Annotations for a Virtual Community*, University of Nice-Sophia Antipolis,
5. Amel Yessad: *Ontology-Driven Adaptive Course Generator for Web-based Education*, University Badji Mokhtar, Annaba, Algeria.

Fabien Gandon was reviewer of PhD Thesis:

- Freddy Lécué, *Web Service Composition: Semantic Links Based Approach*, October 8th, Ecole Nationale Supérieure des Mines de Saint-Etienne,
- Laurent Mazuel, *Traitement de l’hétérogénéité sémantique dans les interactions humain-agent et agent-agent*, November 21st, Université Paris VI - Pierre & Marie Curie,
- Lobna Karoui, *Extraction contextuelle d’ontologie par fouille de données*, Novembre 28th, SUP-ELEC, Paris.

9.4.3. Training

We welcomed the following trainees:

- Reda Boucid from UNSA: *SweetWiki version 2.0*
- Andrzej Buryan from Poznan University of Technology, Faculty of Computing Science: *Graphical User Interfaces for Term and Relation Extraction from Texts*
- Gaoussou Camara from University Gaston Berger, Saint-Louis, Sénégal : *Interactive Visualization of a Virtual Reality Knowledge Base, Evaluation of the Ergonomics of Interactions,*
- Ibrahima Diop from University Gaston Berger, Saint-Louis, Sénégal: *Approximate Search with Multiple Semantic Distances*
- Abdoulaye Guisse from University Gaston Berger, Saint-Louis, Sénégal: *Ontologies and Annotations for Patent Clustering : Towards a Semantic Clustering Toolbox*
- Aroua Hedhili from Ecole Nationale des Sciences de l'Informatique (ENSI), Tunisie: *Data Mining and Semantic Annotations for Patents Classification in BioMedecine*
- Van Tien Nguyen from IFI, Vietnam: *Extraction of n-ary Relations from Textual Corpus*
- Cheikh Ahmed Niang from University Gaston Berger, Saint-Louis, Sénégal: *Distributed Servers for a Memory in Product Engineering*
- Stéphanie Peron from UNSA: *Ergonomic Analysis of Annotation and Information Retrieval User Interfaces for SweetWiki, LinkWidget and SemanticFAQ Services*
- Birahim Sall from University Cheikh Anta Diop, Dakar, Sénégal: *Backward Chaining Rule Engine.*

9.5. Participation to conferences, seminars, invitations

Olivier Corby was keynote speaker at the International Conference on Conceptual Structures, ICCS 2008, in Toulouse on July 9th. He represented the Edelweiss team at a workshop INRIA-pharmacology industry in Paris on June 23th and at a workshop INRIA-SAP at Sophia Antipolis on September 17th.

Fabien Gandon :

- was invited speaker of University of Liège on « ontologies on the web », at IST 2008 <http://www.inria.fr/actualites/colloques/2008/ist08/>, at JFO 2008 <http://jfo2008.aigtunisie.org/>
- was invited lecturer at Ecole Centrale Paris on ontologies for the future web; entitled : "Web Sémantique ou comment les ontologies pourront favoriser l'échange des connaissances sur le web du futur."
- was invited to teach a tutorial at "Journées Francophone sur les Ontologies" at Lyon, December 1st.

10. Bibliography

Major publications by the team in recent years

- [1] R. DIENG-KUNTZ, O. CORBY (editors). *Knowledge Engineering and Knowledge Management: Methods, Models and Tools, Proc. of the 12th International Conference, EKAW'2000*, Springer-Verlag, LNAI n.1937, Juan-les-Pins, October 2 -6 2000, <http://www.inria.fr/acacia/ekaw2000>.
- [2] O. CORBY, R. DIENG-KUNTZ, C. FARON-ZUCKER. *Querying the Semantic Web with Corese Search Engine*, in "Proc. of the 16th European Conference on Artificial Intelligence (ECAI'2004), Prestigious Applications of Intelligent Systems, Valencia, Spain", R. L. DE MANTARAS, L. SAITTA (editors), August 22-27 2004, p. 705-709.

- [3] O. CORBY, R. DIENG-KUNTZ, C. FARON-ZUCKER, F. GANDON. *Searching the Semantic Web: Approximate Query Processing based on Ontologies*, in "IEEE Intelligent Systems & their Applications", vol. 21, n^o 1, January-February 2006, p. 20-27.
- [4] O. CORBY, R. DIENG-KUNTZ, C. HEBERT. *A Conceptual Graph Model for W3C Resource Description Framework*, in "Conceptual Structures: Theory, Tools and Applications, Proc. of the 8th Int. Conference on Conceptual Structures (ICCS'2000), Darmstadt, Allemagne", B. GANTER, G. W. MINEAU (editors), Springer-Verlag, LNAI n. 1867, August 13 -17 2000, p. 468-482.
- [5] O. CORBY, C. FARON-ZUCKER. *RDF/SPARQL Design Pattern for Contextual Metadata*, in "Proc. of IEEE/WIC/ACM International Conference on Web Intelligence, Silicon Valley, USA", November 2007.
- [6] A. DELTEIL, C. FARON-ZUCKER. *A Graph-Based Knowledge Representation Language*, in "Proceedings of the 15th European Conference on Artificial Intelligence (ECAI 2002), Brighton, Lyon, France", F. VAN HARMELEN (editor), IOS Press, July 21- 26 2002, p. 297-301.
- [7] R. DIENG-KUNTZ, O. CORBY, F. GANDON, A. GIBOIN, J. GOLEBIEWSKA, N. MATTA, M. RIBIÈRE. *Knowledge Management: Méthodes et outils pour la gestion des connaissances, 3rd edition*, DUNOD, Octobre 2005.
- [8] R. DIENG-KUNTZ, O. CORBY, A. GIBOIN, M. RIBIÈRE. *Methods and Tools for Corporate Knowledge Management*, in "International Journal of Human-Computer Studies, special issue on knowledge Management", vol. 51, December 1999, p. 567-598.
- [9] R. DIENG-KUNTZ, A. GIBOIN, C. AMERGÉ, O. CORBY, S. DESPRÉS, L. ALPAY, S. LABIDI, S. LAPALUT. *Building of a Corporate Memory for Traffic-Accident Analysis*, in "AI Magazine", vol. 19, n^o 4, December 1998, p. 81-101.
- [10] R. DIENG-KUNTZ, S. HUG. *Comparison of "Personal Ontologies" Represented through Conceptual Graphs*, in "Proc. of the 13th European Conference on Artificial Intelligence (ECAI'98), Brighton, UK", H. PRADE (editor), Wiley & Sons, August 1998, p. 341-345.
- [11] F. GANDON, L. BERTHELOT, R. DIENG-KUNTZ. *A Multi-Agent Platform for a Corporate Semantic Web*, in "Proceedings of AAMAS'2002 (First International Joint Conference on Autonomous Agents and Multi-Agent Systems), Bringing People and Agents Together, Bologna, Italy", C. CASTELFRANCHI, W. JOHNSON (editors), July 15-19 2002, p. 1025-1032.
- [12] F. GANDON, O. CORBY, A. GIBOIN, N. GRONNIER, C. GUIGARD. *Graph-based Inferences in a Semantic Web Server for the Cartography of Competencies in a Telecom Valley*, in "Proc. International Semantic Web Conference, ISWC, Galway", Springer, Lecture Notes in Computer Science, November 6-10 2005.
- [13] A. GIBOIN. *Conversational Remembering in Teams of Road Accident Analysts: Using a Model of Collective Memory for Designing an Organizational Memory System*, in "Le Travail Humain", vol. 63, n^o 3, 2000, p. 227-257.
- [14] K. KHELIF, R. DIENG-KUNTZ, P. BARBRY. *An Ontology-based Approach to Support Text Mining and Information Retrieval in the Biological Domain*, in "Journal of Universal Computer Science (JUCS), Special Issue on Ontologies and their Applications", vol. 13, n^o 12, December 2007.

- [15] I. MIRBEL, J. RALYTE. *Situational Method Engineering : Combining Assembly-Based and Roadmap-driven Approaches*, in "Requirement Engineering Journal", vol. 11, n^o 1, 2006, p. 58–78.
- [16] M. RIBIÈRE, R. DIENG-KUNTZ. *A Viewpoint Model for Cooperative Building of an Ontology*, in "Conceptual Structures : Integration and Interfaces, Proceedings of the 10th International Conference in Conceptual Structures (ICCS'2002), Darmstadt, Allemagne", U. PRISS, D. CORBETT, G. ANGELOVA (editors), Springer-Verlag, LNCS 2393, July 15-19 2002, p. 220-234.

Year Publications

Doctoral Dissertations and Habilitation Theses

- [17] F. GANDON. *Graphes RDF et leur Manipulation pour la Gestion de Connaissances*, Habilitation à Diriger des Recherches, University of Nice - Sophia Antipolis, November 2008.
- [18] I. MIRBEL. *Contributions à la modélisation, la réutilisation et la flexibilité des systèmes d'information*, Habilitation à Diriger des Recherches, University of Nice - Sophia Antipolis, I3S, CNRS, June 2008.

Articles in International Peer-Reviewed Journal

- [19] D. ALEXOPOULOU, B. ANDREOPOULOS, H. DIETZE, A. DOMS, F. GANDON, J. HAKENBERG, K. KHELIF, M. SCHROEDER, T. WACHTER. *Biomedical Word Sense Disambiguation with Ontologies and Metadata: Automation Meets Accuracy*, in "BMC Bioinformatics Journal", to appear, 2009.
- [20] M. BUFFA, G. ERÉTÉO, C. FARON-ZUCKER, F. GANDON, P. SANDER. *SweetWiki: A Semantic Wiki*, in "Journal of Web Semantics, special issue on Web 2.0 and the Semantic Web", vol. 6, n^o 1, february 2008.
- [21] A. YESSAD, C. FARON-ZUCKER, R. DIENG-KUNTZ, M. T. LASKRI. *Adaptive Learning Organizer for Web-based Education*, in "International Journal of Web-based Learning and Teaching Technologies", vol. 3, n^o 4, October December 2008, p. 57-73.

Invited Conferences

- [22] O. CORBY. *Web, Graphs & Semantics*, in "Proc. of the 16th International Conference on Conceptual Structures (ICCS'2008), Toulouse", July 2008, p. 43-61.

International Peer-Reviewed Conference/Proceedings

- [23] F. ALKHATEEB, J.-F. BAGET, J. EUZENAT. *Constrained Regular Expressions in SPARQL*, in "Proc. International Conference on Semantic Web and Web Services (SWWS'08), Las Vegas, Nevada, USA", July 2008.
- [24] Y. A. AMEUR, N. BELAID, M. BENNIS, O. CORBY, R. DIENG-KUNTZ, J. DOUCY, P. DURVILLE, C. FANKAM, F. GANDON, A. GIBOIN, P. GIROUX, S. GRATALOUP, B. GRILHERES, F. HUSSON, S. JEAN, J. LANGLOIS, P. H. LUONG, L. MASTELLA, O. MOREL, M. PERRIN, G. PIERRA, J.-F. RAINAUD, I. A. SADOUNE, E. SARDET, F. TERTRE, J. F. VALIATI. *Semantic Hubs for Geological Projects*, in "Proc. Semantic Metadata Management and Applications Workshop, Fifth European Semantic Web Conference, Tenerife, Spain", June 2008.
- [25] J.-F. BAGET, O. CORBY, R. DIENG-KUNTZ, C. FARON-ZUCKER, F. GANDON, A. GIBOIN, A. GUTIERREZ, M. LECLÈRE, M.-L. MUGNIER, R. THOMOPOULOS. *Griwes: Generic Model and Preliminary Specifici-*

- cations for a Graph-Based Knowledge Representation Toolkit*, in "Proc. of the 16th International Conference on Conceptual Structures (ICCS'2008), Toulouse", July 2008.
- [26] L. BRISSON, M. COLLARD. *An Ontology Driven Data Mining Process*, in "Proc. ICEIS, 10th International Conference on Enterprise Information Systems, Barcelona, Spain", June 2008.
- [27] T.-D. CAO, R. DIENG-KUNTZ, M. BOURDEAU, B. FIÈS. *Automatic Generation of Semantic Annotations for Supporting Technology Monitoring on the Web*, in "Proc. ICEIS, 10th International Conference on Enterprise Information Systems, Barcelona, Spain", June 2008.
- [28] H. CHERFI, O. CORBY, C. FARON-ZUCKER, K. KHELIF, M.-T. NGUYEN. *Semantic Annotation of Texts with RDF Graph Contexts*, in "Supplementary Proc. of the 16th International Conference on Conceptual Structures (ICCS'2008), Toulouse", July 2008, p. 75-82.
- [29] G. DIALLO, K. KHELIF, O. CORBY, P. KOSTKOVA, G. MADLE. *Semantic Browsing of a Domain Related Resources: The Corese-NeLI Framework*, in "Proc. Int. Workshop on Web Information Retrieval Support Systems (held with the 2008 IEEE/WIC/ACM Int. Conference), Sidney, Australia", December 2008.
- [30] G. DIALLO, G. MADLE, G. JAWAHEER, P. KOSTKOVA, D. ALEXOPOULOU, R. STEVENS, S. JUPP, K. KHELIF. *A User-Centered Evaluation Framework for the SeaLife Semantic Web Browsers*, in "Proc. of the International Workshop on Semantic Web Applications and Tools for Life Sciences, Edinburgh, UK", November 2008.
- [31] G. ERÉTÉO, M. BUFFA, F. GANDON, P. GROHAN, M. LEITZELMAN, P. SANDER. *A State of the Art on Social Network Analysis and its Applications on a Semantic Web*, in "Proc. SDoW2008 (Social Data on the Web), Workshop held with the 7th International Semantic Web Conference, Karlsruhe, Germany", October 2008.
- [32] F. HENRI, B. CHARLIER, F. LIMPENS. *Understanding Personal Learning Environment as an Essential Component of the Learning Process*, in "Proc. ED-MEDIA, World Conference on Educational Multimedia, Hypermedia and Telecommunications, Vienna, Austria", June-July 2008.
- [33] L. KEFI-KHELIF, M. DEMARCHEZ, M. COLLARD. *A Knowledge Base Approach for Genomics Data Analysis*, in "Proc. International Conference on Semantic Systems, I-Semantics 2008, Graz, Austria", September 2008.
- [34] K. KHELIF, F. GANDON, O. CORBY, R. DIENG-KUNTZ. *Using the Intension of Classes and Properties Definition in Ontologies for Word Sense Disambiguation*, in "Proc. 16th International Conference on Knowledge Engineering and Knowledge Management - Knowledge Patterns, EKAW, Acitrezza, Italy", September-October 2008.
- [35] K. KHELIF, A. HEDHILI, M. COLLARD. *Semantic Patent Clustering for Biomedical Communities*, in "Proc. IEEE/WIC/ACM Int. Conference on Web Intelligence, WI'08, Sydney, Australia", December 2008.
- [36] F. LIMPENS, F. GANDON, M. BUFFA. *Bridging Ontologies and Folksonomies to Leverage Knowledge Sharing on the Social Web: a Brief Survey*, in "Proc. 1st International Workshop on Social Software Engineering and Applications (SoSEA), L'Aquila, Italy", September 2008.

- [37] B. MAKNI, K. KHELIF, R. DIENG-KUNTZ, H. CHERFI. *Building a Semantic Portal from the Discussion Forum of a Community of Practice*, in "Proc. International Conference on Semantic Systems, I-Semantics 2008, Graz, Austria", September 2008.
- [38] B. MAKNI, K. KHELIF, R. DIENG-KUNTZ, H. CHERFI. *Semi-automatic Creation of an Ontology and of Semantic Annotations from a Discussion Forum of a Community of Practice*, in "Proc. 16th International Conference on Knowledge Engineering and Knowledge Management - Knowledge Patterns, EKAW, Acitrezza, Catania, Italy", September-October 2008.
- [39] M. PERRIN, P. DURVILLE, S. GRATALOUP, L. MASTELLA, J. LIONS, O. MOREL, J.-F. RAINAUD. *Knowledge Issues for Automatic Identification of CO₂ Storage Sites by Means of Semantic Web Technology*, in "Proc. CO 2 Geological Storage Workshop, European Association of Geoscientists & Engineers, Budapest, Hungary", September 2008.
- [40] A. YESSAD, C. FARON-ZUCKER, R. DIENG-KUNTZ, M. T. LASKRI. *Adaptive Course Generation in Semantic Web Context*, in "Proc. ED-MEDIA, World Conference on Educational Multimedia, Hypermedia and Telecommunications, Vienna, Austria", June-July 2008.

National Peer-Reviewed Conference/Proceedings

- [41] T. L. BACH, R. DIENG-KUNTZ. *Algorithme à base de graphes pour l'alignement d'ontologies OWL*, in "Proc. 16e congrès francophone AFRIF-AFIA Reconnaissance des Formes et Intelligence Artificielle (RFIA'2008), Amiens", January 2008.
- [42] F. GANDON, M. LO, C. NIANG. *Un modèle d'index pour la résolution distribuée de requête sur un nombre restreint de bases d'annotations RDF*, in "Proc. 19èmes Journées Francophones d'Ingénierie des Connaissances, IC'08, Loria, Nancy, France", June 2008.
- [43] N. GHOULA, K. KHELIF, R. DIENG-KUNTZ. *Vers une fouille sémantique des brevets : Application au domaine biomédical*, in "Proc. of 8èmes journées francophones Extraction et Gestion des Connaissances, INRIA Sophia Antipolis - Méditerranée", January 2008, p. 19-30.
- [44] A. GIBOIN, P. DURVILLE, F. GANDON. *Ingénierie ontologique participative : essai de mise en oeuvre avec l'éditeur collaboratif ECCO*, in "Proc. Atelier IC 2.0, joint aux 19èmes Journées Francophones d'Ingénierie des Connaissances, Loria, Nancy, France", June 2008.
- [45] A. GIBOIN. *Motivating the Use of Affective Ontologies in Semantic Web Applications which Mediate Interactions Between Members of Organizations or Communities*, in "Proc. COOP'2008 Workshop on Affective Aspects of Cooperative Interactions, Carry-Le-Rouet", May 2008.
- [46] K. KHELIF, Y. MRABET, R. DIENG-KUNTZ. *Vers une personnalisation de la navigation par l'apprentissage de profils utilisateurs*, in "Proc. 19èmes Journées Francophones d'Ingénierie des Connaissances, IC'08, Loria, Nancy, France", June 2008.
- [47] F. LIMPENS, F. GANDON, M. BUFFA. *Rapprocher les ontologies et les folksonomies pour la gestion des connaissances partagées : un état de l'art*, in "Proc. 19èmes Journées Francophones d'Ingénierie des Connaissances, IC'08, Loria, Nancy, France", June 2008.

- [48] B. MAKNI, K. KHELIF, R. DIENG-KUNTZ, H. CHERFI. *Utilisation du Web Sémantique pour la gestion d'une liste de diffusion d'une CoP*, in "Proc. of 8èmes journées francophones Extraction et Gestion des Connaissances, INRIA Sophia Antipolis Méditerranée", January 2008, p. 31-36.
- [49] I. MIRBEL. *Vers une ontologie pour les communautés de développement de logiciel libre*, in "Proc. 19èmes Journées Francophones d'Ingénierie des Connaissances, IC'08, Loria, Nancy, France", June 2008.
- [50] N. MOKHTARI, R. DIENG-KUNTZ. *Extraction et exploitation des annotations contextuelles*, in "Proc. 8èmes journées francophones Extraction et Gestion des Connaissances, INRIA Sophia Antipolis - Méditerranée", January 2008.
- [51] A. YURCHYSHYNA, C. FARON-ZUCKER, I. MIRBEL, B. SALL, N. L. THANH, A. ZARLI. *Une approche ontologique pour formaliser la connaissance experte dans le modèle du contrôle de conformité en construction*, in "Proc. 19èmes Journées Francophones d'Ingénierie des Connaissances, IC'08, Loria, Nancy, France", June 2008.

Workshops without Proceedings

- [52] D. ALEXOPOULOU, B. ANDREOPOULOS, A. DOMS, K. KHELIF, M. SCHROEDER. *Biomedical Word-sense Disambiguation with Ontologies and Meta-data*, in "Poster session of the 3rd Conference of the Hellenic Society for Computational Biology and Bioinformatics HSCBB'08, Certh, Thessaloniki, Greece", October 2008.
- [53] J.-F. BAGET, M. LECLÈRE, M.-L. MUGNIER, E. SALVAT. *DL-SR: a Lite DL with Expressive Rules: Preliminary Results*, in "Proc. 21st International Workshop on Description Logics (DL2008), Dresden, Germany", May 2008.
- [54] A. EL GHALI, A. GIBOIN, C. VANOIRBEEK. *Bridging the Gap between Technical and Pedagogical Project-Partners' Perspectives on the Modelling of Communities of Practice*, in "Proc. Palette symposium at the 6th International Conference on Networked Learning (NLC 2008), Halkidiki, Greece", May 2008.
- [55] F. GANDON, O. CORBY, I. DIOP, M. LO. *Distances sémantiques dans des applications de gestion d'information utilisant le web sémantique*, in "Proc. Workshop Mesures de similarités sémantique, EGC, INRIA Sophia Antipolis - Méditerranée", January 2008, http://www.inria.fr/sophia/axis/egc08/atelier_5.pdf.
- [56] F. GANDON, A. GIBOIN. *Vers des ontologies à l'état sauvage*, in "Atelier IC 2.0, joint aux IC2008, 19èmes Journées Francophones d'Ingénierie des Connaissances, Loria, Nancy, France", June 2008.
- [57] F. LIMPENS, F. GANDON. *Economie de la contribution et outils de partage de connaissances*, in "Proc. Atelier IC 2.0, joint aux IC2008, 19èmes Journées Francophones d'Ingénierie des Connaissances, Loria, Nancy, France", June 2008.
- [58] J.-F. RAINAUD, L. MASTELLA, P. DURVILLE, Y. A. AMEUR, M. PERRIN, S. GRATALOUP, O. MOREL. *Two Use Cases Involving Semantic Web Earth Science Ontologies for Reservoir Modeling and Characterization*, in "W3C Workshop on Semantic Web in Energy Industries, Houston, Texas, USA", December 2008.

Scientific Books (or Scientific Book chapters)

- [59] M. BUFFA, G. ERÉTÉO, F. GANDON. *A Wiki on the Semantic Web*, in "Emerging Technologies for Semantic Work Environments: Techniques, Methods, and Applications", J. RECH, B. DECKER, E. RAS (editors), Information Science Reference, ISBN: 9781599048772, 2008, p. 115-137.
- [60] A. EL GHALI, A. TIFOUS, M. BUFFA, A. GIBOIN, F. GANDON, R. DIENG-KUNTZ. *Using Sweetwiki in Communities of Practice*, in "Web-Based Learning Solutions for Communities of Practice", N. KARACAPILIDIS (editor), to appear, IGI Global, 2009.
- [61] A. EL GHALI, A. TIFOUS, A. GIBOIN, R. DIENG-KUNTZ. *O'CoP, an Ontology for Communities of Practice*, in "Networked Knowledge - Networked Media. Integrating Knowledge Management, New Media Technology and Semantic Systems", T. PELLEGRINI (editor), to appear, Springer, 2009.

Books or Proceedings Editing

- [62] M. S. ACKERMAN, R. DIENG-KUNTZ, C. SIMONE (editors). *Knowledge Management in Action: IFIP 20th World Computer Congress, Conference on Knowledge Management in Action*, Springer, Milano, Italy, September 2008.
- [63] B. CAHOUR, A. GIBOIN, S. MARSELLA, B. PAVARD (editors). *Proc. Workshop «Affective Aspects of Cooperative Interactions», held in conjunction with Coop'2008 (The 8th International Conference on the Design of Cooperative Systems)*, 2008.
- [64] V. CHRISTOPHIDES, M. COLLARD, C. GUTIERREZ (editors). *Semantic Web, Ontologies and Databases - Revised Selected Papers of the SWDB-ODDIS VLDB 2007 Workshop*, Vienna, Austria, September, Lecture Notes in Computer Science, vol. 5005, Springer, July 2008.
- [65] A. GIBOIN, A. PASSANT, P. LAUBLET, N. AUSSENAC-GILLES, Y. PRIÉ (editors). *Proc Workshop "IC 2.0" Vers une ingénierie "sociale" des connaissances: dans quelle mesure les usages du Web 2.0 font-ils évoluer les pratiques d'IC ?, en association avec les 19èmes Journées Francophones d'Ingénierie des Connaissances (IC2008)*, 2008.

Research Reports

- [66] J.-F. BAGET, M.-L. MUGNIER, M. LECLÈRE, E. SALVAT. *Some Structural Properties of the Logic of Rules*, Technical report, n^o RR-08016, LIRMM, 2008.
- [67] H. CHERFI, O. CORBY, R. DIENG-KUNTZ. *Specification and Implementation of Annotation Extractors for Text Documents*, Deliverable Sevenpro: Semantic Virtual Engineering Environment for Product Design: STReP FP6-027473, n^o WP4/T4.1/D4.1.2, INRIA, May, 16 2008.
- [68] O. CORBY, H. CHERFI, F. GANDON. *Liaison and Standardisation Activities*, Deliverable Sevenpro: Semantic Virtual Engineering Environment for Product Design: STReP FP6-027473, n^o WP9/T9.4/D9.4.2, INRIA, November 2008.
- [69] O. CORBY, A. EL GHALI, A. TIFOUS, B. MAKNI, R. DIENG-KUNTZ, B. GATEAU, A. VAGNER, J.-D. LABAILS, M.-L. WATRINET, S. RIEPPI, E. VANDEPUT, G. VIDOU. *Knowledge Management Services for CoPs*, Deliverable Palette FP6-028038, n^o D.KNO.06, INRIA, March 2008, <http://palette.ercim.org/images/stories/DocumentPDF/d.kno.06-final.pdf>.

- [70] G. DIALLO, P. KOSTKOVA, K. KHELIF, ETAL . *SeaLife Evaluation Framework*, Deliverable of Sealife project, INRIA Contributors: Khaled Khelif, Technical report, n^o A1-D2, INRIA, March 2008.
- [71] R. DIENG-KUNTZ, A. GIBOIN, A. TIFOUS, O. CORBY, P.-J. BARLATIER, Y. NAUDET, A. VAGNER, G. VIDOU, M.-L. WATRINET. *KM Evolution and Evaluation Services*, Deliverable Palette FP6-028038, n^o D.KNO.07, INRIA, July 2008.
- [72] R. DIENG-KUNTZ, A. EL GHALI, A. TIFOUS, A. GIBOIN, B. MAKNI, B. GATEAU, Y. NAUDET, A. VAGNER, J.-D. LABAILS, R. PEETERS, S. RIEPPI, E. VANDEPUT, G. VIDOU. *Extensions of the O'CoP Ontology*, Deliverable Palette FP6-028038, n^o D.KNO.05, INRIA, March 2008, <http://palette.ercim.org/images/stories/DocumentPDF/d.kno.05-final.pdf>.
- [73] F. GANDON, H. CHERFI, I. DIOP. *Specification and implementation of Engineering Memory Tool*, Deliverable Sevenpro: Semantic Virtual Engineering Environment for Product Design: STReP FP6-027473, n^o WP7/T7.3/D7.3.2, INRIA, August, 19 2008.
- [74] J. HAKENBERG, M. SCHROEDER, ETAL . *First Prototype*, Deliverable of Sealife project, INRIA Contributors: Khaled Khelif, Rose Dieng-Kuntz, Technical report, n^o I4-D3, INRIA, March 2008.
- [75] E. JAMIN, H. CHERFI, F. GANDON, G. CAMARA. *Specification and Implementation of a Rule Based VR Reasoning Module*, Deliverable Sevenpro: Semantic Virtual Engineering Environment for Product Design: STReP FP6-027473, n^o WP6/T6.3/D6.3.2, INRIA, July, 31 2008.
- [76] K. KHELIF, R. DIENG-KUNTZ, ETAL . *Evaluation of Extraction Methods*, Deliverable of Sealife project, INRIA Contributors: Khaled Khelif, Rose Dieng-Kuntz, Fabien Gandon, Olivier Corby, Technical report, n^o I2-D3, INRIA, March 2008.
- [77] A. SEABORNE, G. MANJUNATH, C. BIZER, J. BRESLIN, S. DAS, I. DAVIS, S. HARRIS, K. IDEHEN, O. CORBY, K. KJERNSMO, B. NOWACK. *SPARQL/Update A language for updating RDF graphs*, Member Submission, W3C, July 2008, <http://www.w3.org/Submission/2008/04>.
- [78] S. SIRE, A. EL GHALI, N. KAROUSOS, M. TSAGARAKIS, V. QUINT, Y. NAUDET, M. PAQUIER, S. JACQUEMART, A. VAGNER, M.-L. WATRINET, A. BOUKOTTAYA. *Instances of Implementation of Palette Scenarios*, Deliverable Palette FP6-028038, n^o D.IMP.08, INRIA, November 2008.

Other Publications

- [79] A. EL GHALI, F. GANDON, T. MORRIS. *IRC Ontology: an RDF Vocabulary to Represent IRC Logs*, VoCamp Oxford, September 2008, <http://vocamp.org/wiki/VoCampOxford2008>.
- [80] S. PERON. *Evaluation ergonomique d'une interface d'annotations et de recherche*, Master thesis ErgoNTIC (Ergonomie des Nouvelles Technologies de l'Information et de la Communication), Masters thesis, University of Nice-Sophia Antipolis, 2008.

References in notes

- [81] A. ANKOLEKAR. *Towards a Semantic Web of Community, Content and Interactions*, Ph. D. Thesis, School of Computer Science, Carnegie Mellon University, Pittsburgh, 2005.

- [82] A. ANKOLEKAR, ETAL . *Supporting Online Problem-Solving Communities with the Semantic Web*, in "15th international conference on World Wide Web", 2006, p. 575-584.
- [83] G. ARTIGNAN. *Exploitation du graphe de dépendances de règles de Graphes conceptuels*, Master Thesis, Univ. Montpellier II, 2008.
- [84] J.-P. AUBERT, J.-F. BAGET, M. CHEIN. *Simple Conceptual Graphs and Simple Concept Graphs*, in "ICCS'06: 14th International Conference on Conceptual Structures", 2006, <http://hal-lirmm.ccsd.cnrs.fr/lirmm-00113155/en/>.
- [85] J.-F. BAGET. *Improving the Forward Chaining Algorithm for Conceptual Graphs Rules*, in "Proc. of the 9th Int'l Conf. on the Principles of Knowledge Representation and Reasoning (KR'04)", AAAI Press, 2004, p. 407-414.
- [86] J.-F. BAGET. *RDF Entailment as a Graph Homomorphism*, in "Proc. of the 4th International Semantic Web Conference (ISWC'05)", LNCS, vol. 3729, Springer, 2005, p. 82-96.
- [87] J.-F. BAGET. *A Datatype Extension for Simple Conceptual Graphs and Conceptual Graphs Rules*, in "Proc. of the 15th International Conference on Conceptual Structures (ICCS 2007)", LNCS, Springer, 2007, p. 83-96.
- [88] J.-F. BAGET, E. SALVAT. *Rules Dependencies in Backward Chaining of Conceptual Graphs Rules*, in "ICCS'06: International Conference on Conceptual Structures", 2006, <http://hal-lirmm.ccsd.cnrs.fr/lirmm-00112669/en/>.
- [89] S. BRAUN, A. SCHMIDT, A. WALTER, G. NAGYPÁL, V. ZACHARIAS. *Ontology Maturing: a Collaborative Web 2.0 Approach to Ontology Engineering*, in "CKC", N. F. NOY, H. ALANI, G. STUMME, P. MIKA, Y. SURE, D. VRANDECIC, N. F. NOY, H. ALANI, G. STUMME, P. MIKA, Y. SURE, D. VRANDECIC (editors), CEUR Workshop Proceedings, vol. 273, CEUR-WS.org, 2007.
- [90] J. BRESLIN, A. HARTH, U. BOJARS, S. DECKER. *Towards Semantically-Interlinked Online Communities*, in "Proc. ESWC 2005", 2005, <http://www.springerlink.com/content/xyetvllxfnk/>.
- [91] T. BRISCOE, J. CARROLL, R. WATSON. *The RASP System*, in "Proc. of the COLING/ACL 2006 Interactive Presentation Sessions, Sydney, Australia", July 2006.
- [92] O. CORBY, C. FARON-ZUCKER. *Implementation of SPARQL Query Language based on Graph Homomorphism*, in "Proc. of the 15th International Conference on Conceptual Structures (ICCS'2007), Sheffield, UK", July 2007, p. 472-475.
- [93] H. CUNNINGHAM, D. MAYNARD, K. BONTCHEVA, V. TABLAN. *GATE: A Framework and Graphical Development Environment for Robust NLP Tools and Applications*, in "Proceedings of the 40th Anniversary Meeting of the Association for Computational Linguistics (ACL'02), Philadelphia, USA", July 2002.
- [94] R. DIENG-KUNTZ. *Corporate Semantic Webs*, in "Encyclopaedia of Knowledge Management", D. SCHWARTZ (editor), Idea Publishing Group, September 2005, p. 67-80.
- [95] L. C. FREEMAN. *Centrality in Social Networks: Conceptual Clarification*, in "Social Networks", n° 1, 1979, p. 215-239.

- [96] T. HEATH, E. MOTTA. *Revyu.com: a Reviewing and Rating Site for the Web of Data.*, in "ISWC/ASWC", LNCS, vol. 4825, Springer, 2007, p. 895-902, <http://dblp.uni-trier.de/db/conf/semweb/iswc2007.html#HeathM07>.
- [97] R. JÄSCHKE, A. HOTH, C. SCHMITZ, B. GANTER, G. STUMME. *Discovering Shared Conceptualizations in Folksonomies*, in "J. Web Sem.", vol. 6, n^o 1, 2008, p. 38-53.
- [98] P. MIKA. *Ontologies are Us: a Unified Model of Social Networks and Semantics.*, in "ISWC", LNCS, vol. 3729, Springer, 2005, p. 522-536, http://dx.doi.org/10.1007/11574620_38.
- [99] E. PIETRIGA, C. BIZER, D. KARGER, R. LEE. *Fresnel: A Browser-Independent Presentation Vocabulary for RDF*, in "Proceedings of the 5th International Semantic Web Conference (ISWC'06), Athens, GA, USA", Lecture Notes in Computer Science (LNCS), vol. 4273, November 2006, p. 158–171.
- [100] G. SIMMONS, T. DILLON. *Towards an Ontology for Open Source Software Development*, in "IFIP Working Group 2.13 Foundation on Open Source Software", 2006, p. 65-75.
- [101] L. SPECIA, E. MOTTA. *Integrating Folksonomies with the Semantic Web*, in "Proc. 4th European Semantic Web Conference", 2007, <http://www.eswc2007.org/>.
- [102] A. TIFOUS, A. EL GHALI, R. DIENG-KUNTZ, A. GIBOIN, C. EVANGELOU, G. VIDOU. *An Ontology for Supporting Communities of Practice*, in "Proceedings of KCAP'07, The Fourth International Conference on Knowledge Capture, Whistler, BC, Canada", October 2007, p. 28-31.
- [103] E. WENGER, R. MCDERMOTT, W. M. SNYDER. *Cultivating Communities of Practice - A Guide to Managing Knowledge*, Harvard Business School Press, Boston, MA, 2002.
- [104] E. WENGER. *Communities of Practice: Learning as a Social System*, in "Systems Thinker", vol. 9, n^o 5, 1998.