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Project-Team Edelweiss

Exchanges Documents Extraction Languages Web Ergonomics Interaction Semantics Servers

Sophia Antipolis - Méditerranée

Theme : Knowledge and Data Representation and Management

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1. Team

Research Scientist

Jean-François Baget [Researcher (CR2), INRIA, LIRMM]
Olivier Corby [Team Leader, Researcher (CR1) INRIA]
Fabien Gandon [Vice Team Leader, Researcher (CR1) INRIA, HdR]
Alain Giboin [Researcher (CR1), INRIA]

Faculty Member

Martine Collard [Assistant professor, I3S, UNS, until August, HdR]
Isabelle Mirbel [Assistant professor, I3S, UNS, until August, HdR]

External Collaborator

Michel Buffa [Assistant professor, I3S, UNS]
Catherine Faron-Zucker [Assistant professor, I3S, UNS]

Technical Staff

Sébastien Comos [Development Engineer]
Nicolas Delaforge [Development Engineer]
Priscille Durville [Development Engineer, until October]
Adil El Ghali [Development Engineer, until April]
Leila Kefi-Khelif [Development Engineer, until October]
Khaled Khelif [Development Engineer, until June]
Amira Tifous [Development Engineer, until January]

PhD Student

Adrien Basse [University Gaston Berger, Saint-Louis, Sénégal]
Guillaume Erétéo [INRIA, UNS, Orange Labs]
Freddy Limpens [INRIA, Telecom Paris]
Noureddine Mokhtari [INRIA, UNS]

Administrative Assistant

Claire Senica [TR INRIA, until October]
Laurie Vermeersch [[TR INRIA, since November]

Other

Stéphane Aguilella Cobos [Institute SupGalilée, University Paris XIII, from June till September]
Papa Thierno Diop [University Gaston Berger, Saint-Louis, Sénégal, from July till December]
Corentin Follenfant [UNS, from June till September]
Djiby Gueye [University Gaston Berger, Saint-Louis, Sénégal, from July till November]
Abdoulaye Guisse [University Gaston Berger, Saint-Louis, Sénégal, till April]
Iyan Johnson [INRIA, INRA, from October till December]
Stéphanie Peron [UNS, from April till December]
Mohameth François Sy [University Gaston Berger, Saint-Louis, Sénégal, from April till September]

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 virtual communities 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 two complementary research directions, corresponding to these viewpoints:

1. 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.
2. 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, semantic annotation of information resources

2.1.3. International and industrial relations

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

2.2. Highlights of the year

- The Edelweiss team published a paper on *Semantic Social Network Analysis* at ISWC that was recognized a *spotlight paper* [26].

3. Scientific Foundations

3.1. Foundations

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 [9]. 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 an organizational memory and the resources of the Web. We considered that an organizational memory can be materialized in a community semantic Web [9], [61], 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 [75], 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 [76], 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 or a Community Memory.

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 SWUI, the International Workshop series on End-user SemanticWeb Interaction (2004, 2005, 2006, 2007, 2008, 2009), and more recently VISSW, the International Workshop series on Visual Interfaces to the Social and the Semantic Web (2009, 2010), which encompasses the social and semantic approaches to the Web. 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

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 community memory, in particular the use of intelligent agents, ontologies and XML technology, is of particular interest for companies of the telecommunications sector. A collaboration with Orange Labs started with a PhD Thesis and continues through an ANR project. We also 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”.

4.3. Engineering

Our work on community 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 had 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 community memory, in particular our 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 BioMarker project in collaboration with IPMC and ImmunoSearch). 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 (Institut Français du Pétrole) and BRGM (Bureau de Recherches Géologiques et Minières) 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 Ademe (Agence de l'Environnement et de la Maîtrise de l'Energie) on technological and scientific monitoring as well as corporate intelligence within the ISICIL ANR project.

5. Software

5.1. Corese

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 (co)developed by the Edelweiss team. 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 [60], [3], [7], [5], [4], [6].

5.2. Sewese

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. ECCO

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 several ways:

- 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 graphical user interface has been moved to a javascript framework called ExtJS;
- 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.

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 and to the partners of the Palette project having contributed to the construction of the Palette ontologies. ECCO has also been requested by members of research labs or academic departments such as Digital Media Technology Institute - Franhaufer (Germany), Laboratoire d'informatique de Lille Atlantique (France), National Center for Biomedical Ontology - Stanford University (USA), Orange-FT R&D Sophia Antipolis (France), Master Sciences de l'information et du document - Université de Lille 3 (France).

5.4. ISICIL Platform

Participants: Sébastien Comos, Nicolas Delaforge, Fabien Gandon [resp.], Djiby Gueye, Freddy Limpens.

The software platform ISICIL is producing several software components:

- XUL extensions for the Firefox browser to assist the technology watch and business intelligence tasks by collecting relevant metadata according to the navigation context of the user.
- An application server based on Tomcat publishes services using REST to process requests of the users' applications and in particular the navigation extensions.

This architecture is summarized in Figure 1. Its major interest lies in the flexibility introduced by the loose coupling between REST services and navigators extensions or other applications.

In the context of the ISICIL ANR project, we have developped a Semantic Web server which provides core services to manage simple tagging of resources (internal or from the Web) and to assist the semantic enrichment of the folksonomy of our communities of users. This server's implementation is based on the ISICIL main framework. The tagging model combines already existing ontologies such as SIOC[1], SCOT, and Newman's Tag Ontology[2] as shown in Figure 2. SRTag, the model of folksonomy enrichment, is based on a named graph mechanism to be able to maintain diverging statements made between tags using SKOS (for thesaurus like relation between tags) or SCOT (for spelling variant relations), and is shown in Figure 3.

[1] http://sioc-project.org
[2] http://www.holygoat.co.uk/owl/redwood/0.1/tags

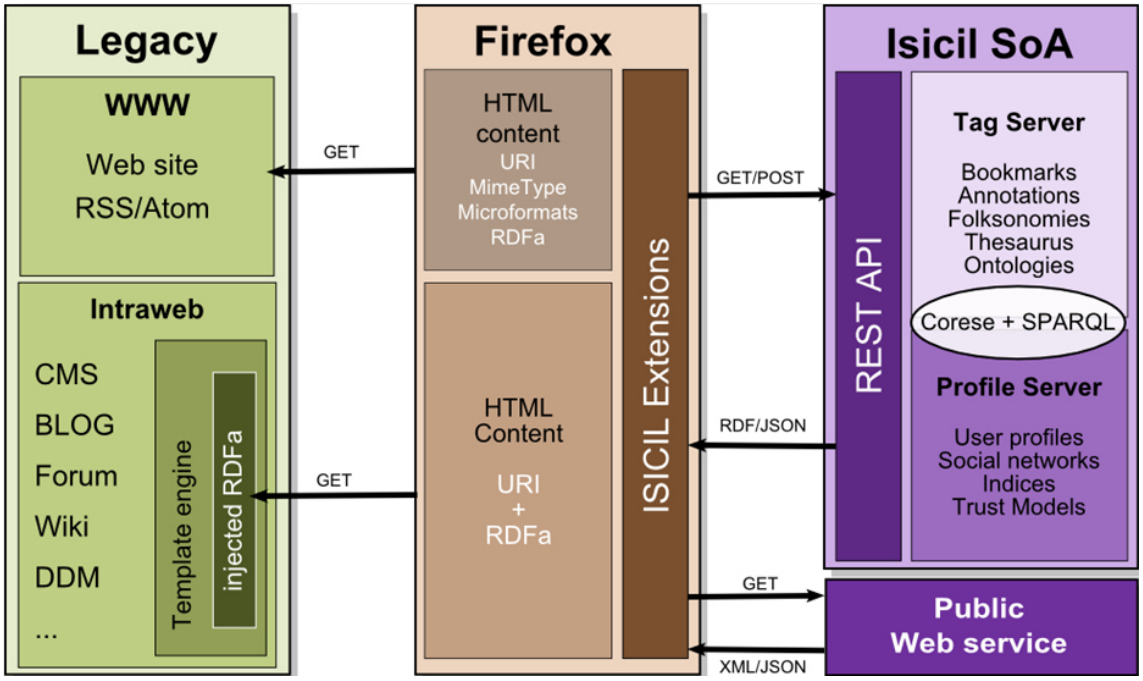

Figure 1. ISICIL Platform Architecture

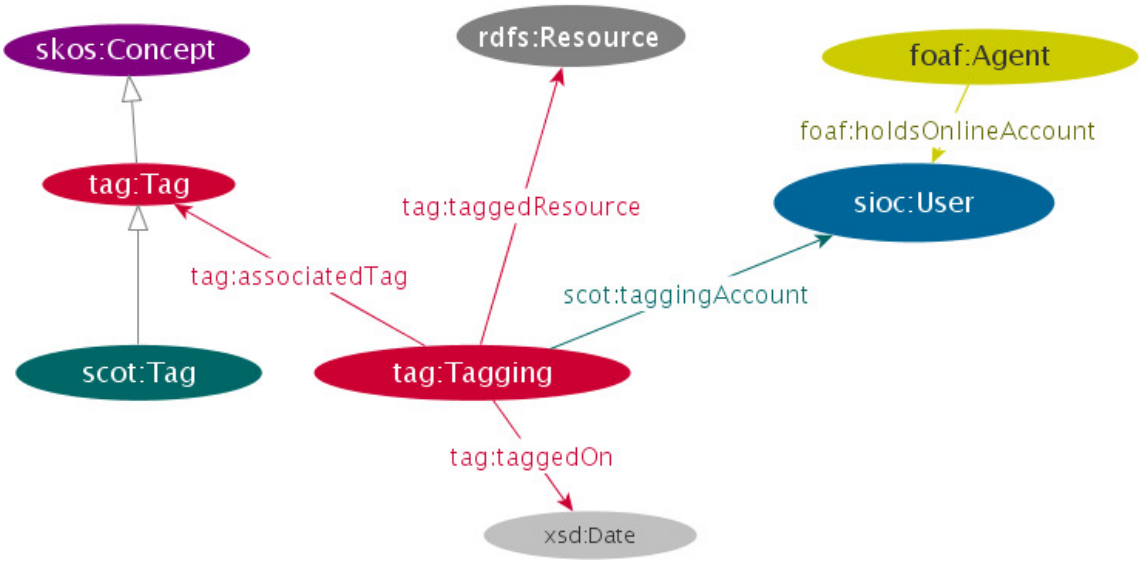

Figure 2. Model of tagging used in the Semantic Tag Server

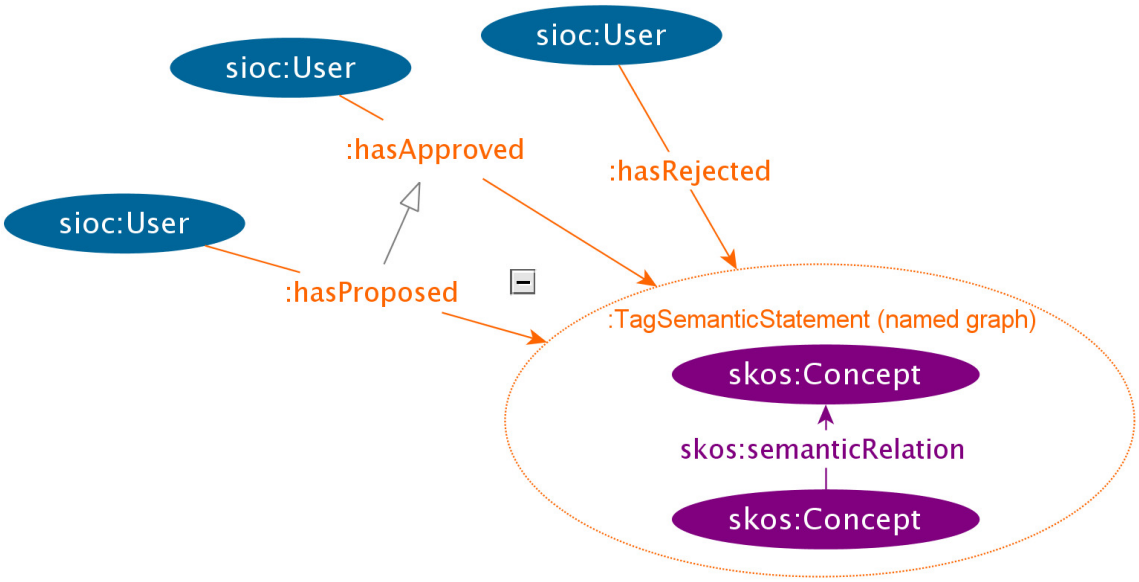

Figure 3. Folksonomy enrichment model

The functionnalities of this server can be divided into three categories:

1. Tagging : creating a tag; get tag suggestions based on the input characters; create a tagging, i.e. a link between a resource, a user, and a tag.
2. Computing: an external library (exported as a java jar file) has been developped to perform computations on the tagging data. Two types of computations have been implemented:
    1. Spelling Variant detectection.
    2. Related tag detection based on the computation of the similarity between tags [69].
3. Managing Semantic relations between tags: get semantically related tags, reject or propose new semantic relations.

We developed a Firefox extension to help users navigate within a folksonomy and organize semantically the tags. The main idea behing this tool is to combine organization tasks with everyday tasks in the least intrusive way, that is to say, without forcing the user in any way, and by providing a user friendly graphical interface. This tool, developed using the XUL framework[3], is supported by the SRTag model and the Semantic Tag Server. Users are provided with search bar for navigating the folksonomy. When available, other tags are suggested and ordered according to their semantic relation with the searched tag (broader, narrower, related, spelling variant). Each suggestion can be either :

- clicked to search content tagged with this tag;
- rejected by clicking on a cross besides the label;
- modified thanks to a drag-and-drop mechanism where a tag can be dropped in another category of semantic relation.

[3] https://developer.mozilla.org/en/XUL

6. New Results

6.1. Annotation of Information Resources

The objective of this research direction is to study and experiment collaborative, Semantic Web based, annotation process in a community of practice.

6.1.1. Semantic Text Mining

Participants: Olivier Corby, Priscille Durville, Fabien Gandon, Alain Giboin.

Semtoolbox is a lightweight library developed in Java. It allows developers to find concepts of one (or more) specified RDFS/OWL ontology(ies) inside texts. The matching process between text and concepts relies on concepts' labels. It can be strict, case insensitive or *grammar insensitive*. For that last kind of matching, the snowball stemmers are used. The same functionalities are provided for properties of one (or more) specified ontology(ies) and, in a more general way, for every kind of semantic resources available in a knowledge base (here a set of ontologies, annotations and rules accessible locally or on the web).

In that last case when using any kind of resources, in order to create an index containing all the resources to look for in the text, and to have no constraint of what kind of resources it is, we use a SPARQL query to denote them. Thus, resources can be values of properties or much more complex computing resources. This SPARQL query is sent to a semantic engine, Corese, which will return a SPARQL result used to create a dedicated and temporary index.

When neither an ontology nor a knowledge base is provided, the library acts as a term extractor. The default index used in that case to look for terms in a text is built using the WordNet 5 lexical database. This lexical base is used to filter words and reduce the noise generated otherwise. The tagging process can be viewed, in this case, as the first step of an ontology creation process. This first step deals with the creation of a draft vocabulary that can be later refined, completed, organized and structured. Results of this tagging process is provided as follows:

- a list of found resources (semantic resources or WordNet terms),
- a list of found resources and, for each resource, its frequency into the text,
- a list of found resources and, for each resource, the exact word(s) or expression found into the text, the start and end offsets of that word(s)/expression into the text. This can be useful to highlight words in a text editor for example.

The Semtoolbox library does not exceed 40Ko and, as it is written in Java, it can be embedded in J2EE web applications. A web service version of the library has also been developed so that web applications can call Semtoolbox tagging functionalities in a SOAP or REST way. This work was published in [25].

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

Participants: Noureddine Mokhtari [resp.], Olivier Corby.

This work is carried out within the framework of Noureddine Mokhtari's PhD Thesis. In order to reach the semantic Web, approaches to automatically extract semantic annotations from textual documents have been proposed. These annotations often represent a set of terms (concepts) connected by relationship. The aim of this work is to propose an approach to automatically extract annotations by taking into account context in order to obtain a better representation of the document content. Our context is modelled by contextual relations built up from both the structure (as interweaving relations) and the semantics (as discourse markers) of the text. Our approach requires text documents and a domain ontology as input. It automatically generates a set of contextual semantic annotations represented in RDF.

The main steps of the proposed approach [31] are summarised as follows: i) identification of textual objects; ii) identification of contextual relations corresponding to textual objects; iii) generation of semantic annotations represented by RDF triples; iv) identification of contextual semantic relations. All proposed steps are automated, and a prototype is implemented to assess the various steps of this contextual extraction approach. Furthermore, the proposed approach has been experimented on large corpus of 2422 sentences on the SevenPro framework. The evaluation results are very satisfactory. Indeed, all titles and their hierarchy are identified correctly and this experimentation makes a good score (82% of precision, 78,4 of Recall) of generated triple. 593 triples are constructed from 64 classes and 50 properties in the domain ontology. The originality of this work is twofold:

1. the integration of the semantic annotations context which gives new ways of reasoning and more information based on both structure [71] and semantic of text [41];
2. the use of several technologies such as NLP (GATE, JAPE, TreeTagger), Semantic annotations, Knowledge representation, XML technologies (XQuery, XSLT) and semantic web (RDF(s), OWL, Ontology, SPARQL, Corese) to build a system of automatic extraction and exploitation of contextual annotation from texts.

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

Participants: Martine Collard, Olivier Corby, Fabien Gandon, Khaled Khelif [resp].

This work is done in the context of the SeaLife European research 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 is 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 were the implementation and evaluation of the Corese Semantic Web Browser (SWB) for the Sealife project:

The Corese-based engine supports the navigation within 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: the semantic annotations are generated from Web pages using a provided knowledge artefact. The Corese SWB bases its search on the generated annotations. During the search process, Corese uses the relationships of SKOS, Simple Knowledge Organization System, (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 SWB offers the possibility to identify and highlight terms retrieved from a structured vocabulary within 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 Wikipedia.

Semantic browsing provides users with dynamically selected concepts or links from an ontology. This is enriched by the profile-based customization which selects and integrates web portals by working as a "semantic recommender" system. The Corese SWB enables users to semantically browse the Web by highlighting ontology concepts and providing dynamic access to Web servers or knowledge portals semantically related to the Web content being visited. It relies on semantic annotations generated from the visited web pages to do this. This work was published in [18], [19].

The evaluation for the Corese SWB relied on an online questionnaire that was split into the following stages:

1. A pre-questionnaire that collected demographic information.
2. Tasks that could be answered by each SWB counterbalanced with an equal number of tasks that could be answered via the NeLI Web site[4] followed by two short questions about each task.
3. A post-questionnaire which collected user satisfaction and usability feedback. It was evaluated by 14 domain experts. This evaluation enabled us to fix some technical errors and to adapt some functionalities to users needs.

6.1.4. Semantic Web for Biomarker Experiments

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

This work is done in the context of the BioMarker/ImmunoSearch project the objective of wich 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 Ontology[5]), scientific literature, gene expression data analysis stored in public databases (e.g. GEO[6]), 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.

6.1.4.1. 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. 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 [49].

6.1.4.2. Navigating Semantic Graphs

We have applied our semantic text mining process to annotate GeneRIF sentences. A GeneRIF (Gene Reference Into Function)[7] is a concise sentence that describes specific function(s) of a gene in addition to a reference to a research paper. Here is an example: *Smad7 plays a crucial role upstream of ATM and p53 to protect the genome from insults evoked by extracellular stress*.

We have developed a semantic graph plugin for the Cytoscape[8] bioinformatics software platform for visualizing molecular interaction networks and integrating these interactions with gene expression.

[4] http://www.neli.org.uk
[5] http://www.geneontology.org/
[6] http://www.ncbi.nlm.nih.gov/geo/.
[7] http://www.ncbi.nlm.nih.gov/projects/GeneRIF
[8] http://www.cytoscape.org

Our plugin enables to build and visualize an interaction graph between genes and other biomedical concepts (e.g. from UMLS), including the GeneRIF annotations. We model the relations below:

- UMLS relations such as affects, inhibits, plays-role, etc.
- Co-occurrence relations: a concept and a gene are in relation if they appear in the same GeneRIF

We process a set of SPARQL queries on the GeneRIF metadata to extract appropriate graph paths and then we create a graph that merges these paths. Nodes represent genes, UMLS or Gene Ontology concepts and they are labelled with additional attributes (names, types, etc.) from UMLS or GeneRIF. Hyperlinks enable to navigate back to the GeneRIF sentences where the metadata come from. This work was published in [43], [42], [38].

6.1.5. Intentions & Information Retrieval

Participants: Olivier Corby, Catherine Faron-Zucker, Isabelle Mirbel.

Knowledge capitalisation, management and dissemination inside a community of members sharing some interest for a given topic may be supported by a collective memory, that is to say an explicit, disembodied and persistent representation of the community knowledge in order to facilitate access, sharing and reuse [9]. The Web appears to be a privileged means to assist the management of knowledge distributed in different and heterogeneous sources inside a community.

To facilitate the exploitation of Web resources (documents, actors, services, etc.), the Semantic Web research community aims at making explicit the knowledge contained into resources. This knowledge is represented by ontologies which structure terms, concepts and relations of a given domain. Ontologies are used to extract and represent the meaning of resources through annotations. In semantic collective memories, resources are indexed by their annotations in order to explicit and formalize their informative content. Resource retrieval inside the collective memory relies on the formal manipulation of these annotations and is guided by ontologies.

The members of a community exploit its collective memory by specifying queries to search for relevant resources helping them in performing their tasks. Support is therefore required to store, reuse and share queries among community members. Beyond query capitalisation, the capitalisation of search processes also becomes a real challenge in many domains. By search process, we mean a sequence of queries enabling to find comprehensive and accurate information by composing results from different information sources. These search processes aim at supporting domain specific tasks. In this context, we proposed an intention-based semantic approach to capitalize, reuse and share search queries and to organize them into formalized search processes.

To support knowledge transfer about search process from experts to novices inside the community, we are concerned with the modeling of why the search process is decomposed the way it is (i.e. the way the search process intention is decomposed into sub-goals), as well as with the specification of how it is decomposed. Moreover, to handle different users'profiles and levels of knowledge, search processes have to be defined at different levels of detail. A refinement process is required from novices to decompose goals (i.e. search intentions) into sub-goals in order to get comprehensive understanding of a topic about which no source contains all the relevant information. For all these reasons, the approach we proposed to model search processes is based on the adaptation of an intentional process modeling formalism [74]. This formalism allows us to explicit sub-goals governing the organization of a search process and the order in which sub-goals have to be satisfied.

By modeling search processes, our aim was to capture knowledge and best practices into series of structured search activities. Therefore, starting from an intentional process modeling formalism, we provided an ontology to annotate search processes and we proposed to model guidelines associated to search processes fragments with rules implemented as SPARQL queries [35], [33]. As a result, search processes can be shared and exploited by reasoning on their representations. Beyond an alternative way to organize and to dynamically access resources in a community memory, we provide means to capitalize search processes themselves. We take advantage of the inference capabilities provided by the RDF framework to reason on search process representations, especially to organize them and retrieve them for reuse.

In our approach, the knowledge base only stores rules. Search processes are dynamically created when needed all along the backward chaining process, as temporary subgoals, until resources' annotations are found to match all the sub-goals and therefore the general search process intention. As a result, a community member looking for a rule to help him perform a search will take advantage of all the rules and all the resource annotations stored in the semantic community memory at the time of his search. This memory may evolve over the time and therefore the resources retrieved by using a rule may vary as well.

In collaboration with the MODALIS research team at I3S (CNRS & University of Nice - Sophia Antipolis), we are currently applying this approach to web services retrieval in the domain of neurosciences [36]. We are also applying our proposal to a community of ecophysiologists, agronomists and geneticists who wish to share and capitalize their expertise about how and why they exploit different scripts in order to understand plant tolerance with regards to heat and water shortages. This work is carried out in the framework of a Desir Color action. And we are working on improving our models to rely on the Corese semantic engine for both backward chaining on the knowledge base of SPARQL queries and matching with the knowledge base of RDF annotations of domain resources.

Future works will focus on generic queries. Our aim is to provide means to associate parameters to queries in order to increase their reusability. We also plan to work on carrying parameters from one query to another. Finally, we plan to integrate in our model knowledge about user profiles and contexts in order to improve the reuse of search processes.

6.2. Interaction Design

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.

6.2.1. Models and Methods for Representing Groups of Individuals and Their Activities

Participants: Alain Giboin, Stéphanie Peron.

6.2.1.1. A Framework for Analysing the "Instrumental Genesis" of Social Semantic Web Services

Our goal is to elaborate models or to adapt existing models of groups of people and of their specific work activities and collective activities. An existing model we use is the Engeströms' model of activity (or model of activity system). Presenting this model will help the reader understand what we mean by *interaction design* and by the kind of "system" we intend to design. We will present the model through the following scenario (schematized in Figure 4)[9]: A primary care physician (Subject) has to examine an ill boy (Object). To realize this task (and the corresponding subtasks, e.g. to diagnose the disease), the physician both uses a tool (Instrument) and interacts with a nurse and a surgeon (who belong to the same Community), by observing some norms and conventions (Rules) accepted explicitely or implicitely by the community. The tasks necessary to transform the Object to an Outcome (the boy's recovery) are distributed among the physician, the nurse and the surgeon (Division of Labor). Note that in the model, the Subject (also called Actor) refers either to the individual or to the sub-group chosen as the point of view in the analysis of the activity system.

This first model shows that the kind of system that we want to design is not uniquely the technical system or tool (the user interface or the software), but the larger activity system encompassing the technical system together with the other elements of the larger system. It is the interaction between the technical tool and the other elements of the larger system (esp. the Subject and the Community) that we want to design.

Another existing model we use and which can help to understand what we want to design is the Rabardel's model of *instrumental genesis* [73], which is a direct descendant of the Engeström's model. This model accounts for the process of appropriation of a technical object by an Actor, in order to make the object an Instrument. In this model indeed, an instrument is composed of the pair Artefact (technical object) and Schema of use or of activity (embodied in the Actor). The artefact refers to the technical object, and the schema refers to the cognitive structure that the Actor has constructed or constructs in order to understand and to use the

[9] Credit for the image: http://www.edu.helsinki.fi/activity/pages/chatanddwr/activitysystem

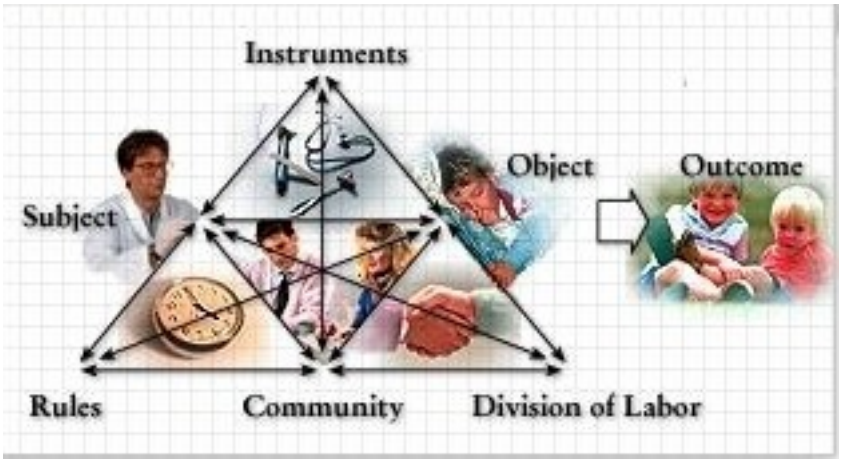

Figure 4. The work activity of a primary care physician (Engeström)

artefact (see Figure 5). It is thus the interaction between the Actor's schema and the artefact that we intend to design. This explains the choice we made to use the interaction design approach to design Social Semantic Web applications.

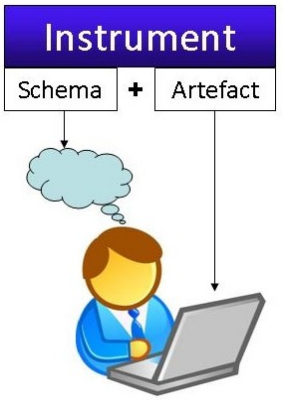

Figure 5. Instrument = Schema of use + Artefact

In the context of the European Project Palette, we contributed to the elaboration of a framework based on the instrumental genesis theory, for analyzing the use of different services (e.g., knowledge services; see Section 6.2.2) by Communities of Practice (CoPs). The framework has been used to analyze seven cases of use of the services by Palette CoPs. The analysis highlighted the common conditions of use of the services [50].

6.2.1.2. Specifying a Method for Representing "Collective Personas"

This year, we started up again a research action initiated in 2006 in order to extend the Alan Cooper's persona technique [59] to the design of cooperative systems. The persona technique is used to model system users.

A persona is *a fictional person created to represent a particular class of real users or system participants*. A persona is *an archetypal user, who resembles several people, but does not exactly match any one of them*. Personas "embody the key trends" elicited from interviews of users, in terms of *distinct sets of behavior patterns and goals* [59]. The original persona technique is intended to represent mainly individuals. However, when we are to design tools aimed at groups of people or communities, we need to represent such groups or communities. If the idea of group personas [68] or collective personas [65] has already been issued, the definition of this kind of persona is not yet clearly stated, and there is not yet a proven method to elaborate these personas. In the context of the ANR project Isicil we started to specify the definition of collective personas [52].

6.2.1.3. Criteria for Evaluating the Collective Acceptability of Social Semantic Web Applications

This year we initiated a study of the acceptability of Social Semantic Web applications (esp. collaborative ontology editors) by groups of people. The goal is to get a set of acceptability criteria to evaluate such applications from a user point of view. We started from the now classical framework proposed by [72] to evaluate the "social acceptability" and "pratical acceptability" of user interfaces (UI), this second kind of acceptability including the well-known "usability" and "utility" criteria or heuristics. Nielsen's acceptability heuristics refer to the acceptability of UIs by individuals; even social acceptability is considered from the point of view of individuals (cf. Nielsen's definition: *social acceptability refers to whether the interface is acceptable to the users in the context of the culture of the society in which the users are from*). However we are interested in the acceptability of UI and applications by groups of individuals, and not only by individuals. We already studied the practical acceptability from a collective point of view (see previous Edelweiss activity reports). We resumed this study and began to expand it to social acceptability. This first work has been presented during a workshop organized by the Working group "Acceptability" of the GDR CNRS Psycho Ergo.

6.2.1.4. Analyzing the Use of Collaborative Ontology/Folksonomy Editors

A folksonomy is a system of classification derived from the practice of collaboratively creating and managing tags to annotate and categorize content.

This work (realized in the context of the Palette project) allowed to : (a) validate from a usage point of view the functional changes proposed for the second version of the folksonomy/ontology editor (the so-called Folkon) of the semantic wiki SweetWiki; (b) to identify, in a logic of iterative design, new user needs and further changes necessary to improve Folkon; and (c) to explicit the cognitive processes implemented by the "folksonomists"/ontologists when editing and maintaining folksonomies/ontologies (strategies for classifying tags, for managing lexical ambiguities, visually exploring the folsksonomies/ontologies, etc.) [55]. This work has opened new methodological perspectives, including the integration of eye-tracking to refine the functional and cognitive analysis of the use of collaborative Ontology/Folksonomy Editors. This opening gave birth to the project AVISICIL funded by the Région PACA (see Section 8.1.5).

The work on Folkon complements the ergonomic work on the ECCO collaborative ontology editor previously performed in the context of the e-WOK_HUB ANR project, and reported this year in [48].

6.2.2. KM Services and Ontologies for Communities of Practice

Participants: Olivier Corby, Alain Giboin, Adil El Ghali, Amira Tifous.

The following work has been performed in the context of the European Projet Palette, a project which aimed at offering several services for Communities of Practice (CoPs), in particular Knowledge Management (KM) services based on an ontology dedicated to CoPs, the so-called O'CoP.

6.2.2.1. KM Services

In collaboration with our partners of the project Palette, we achieved an experience feedback on the KM services we developed and adapted to the Palette CoPs:

- Basic KM services (Knowledge evolution service : Corese Type Checker; SweetSemServices).
- Collaborative Knowledge Creation service (SweetWiki).
- Semi-automatic Annotation and Semantic Retrieval/dissemination service (SemanticFAQ).
- Knowledge Connection services (LinkWidget).

In particular, we reported the evolution (and the consequences of this evolution) from the purely Semantic-Web approach to design that we adopted at the beginning of the project, to the "Social-Semantic-Web" or "Pragmatic-Web" approach that we thereafter adopted, an approach combining Semantic Web and Web 2.0 technologies [53], [57].

6.2.2.2. Ontologies

O'CoP is the generic ontology we designed in Palette for modelling a CoP and for annotating its resources [45]. Last year, we assisted some CoPs in developing their own specific ontologies, using and adapting the ontology construction method we proposed in 2007, so contributing to extend the specific layer of O'CoP. This year we helped our Palette partners from ULg (who were also CoPs' representatives) in proposing new extensions and adaptations to O'CoP, relying on a transversal analysis of the specific ontologies [53].

6.2.2.3. Scenarios and Interoperability-support Services for Communities of Practice

In the context of the Palette project, we contributed to the elaboration of a participatory procedure for instantiating generic (context-independent) scenarios, to obtain instances of scenarios which are contextualized for a particular Community of Practice (CoP) and which can serve to guide the design and evaluation of the services adapted to this particular CoP. The instantiation procedure has been applied collaboratively by the Palette project members and CoP members to instantiate the three generic scenarios previously identified in Palette [56].

We also contributed to the design of services supporting the interoperability of the three types of higher-order services designed in Palette: KM services, Information services and Mediation services. Four support services were designed [56]:

- an identity management service (Single Sign-On);
- a common repository;
- a search engine over common services (CroSSE); and
- a Cross-Awareness Knowledge Base (CAKB).

6.2.3. Towards Synergetic Use of Folksonomies and Ontologies

Participants: Freddy Limpens, Fabien Gandon.

The beginning of this year has coincided with the start of the ISICIL ANR project. In this project and in it's PhD Thesis, Freddy Limpens is in charge of the tasks related to building up a model for supporting the use of folksonomies with the help of ontology-based systems. To this regard we have submitted as a ISICIL deliverable a detailed state of the art in this matter [54].

At the annual conference *Ingénierie des Connaissances*, we presented the first version of our model for assisting the collaborative semantic structuring of folksonomies[34]. The first idea is to exploit (1) the power of automatic handling of tags, suggesting for instance related tags as computed following [69], and (2) the expertise of users by inviting them to correct or validate the suggestions. We want to take the benefit of the users being at one task (browsing tags) to suggest them organizing tags, the least intrusively, with the help of a user-friendly graphical interface. The model also supports contradictory points of view which allow for further exploitation of the contributions of users to detect, for instance, divergences among the community or the polysemic tags in a systematic way. Considering the importance of the ergonomic aspects for the success of such a system, we presented a second version of the interface at the Web Intelligence conference [29].

Finally, we participated at the VoCamp event in Nice and worked on an ontology of tags. This draft was further developed and presented at the ISNI workshop [40]. The NiceTag Ontology, drafted at the VoCamp event in Nice[10], aims at providing for a flexible and powerful means of modeling "tagging actions" spread across the Web [40]. The motivation behind this RDF schema is the need for a model which properly takes into account the diversity of use of tags. Currently available models of tags put a stress each on a different aspect of tags:

[10] http://vocamp.org/wiki/VoCampNiceSeptember2009

SCOT[11] considers tags as part of a cloud of tags, MOAT[12] considers tags as a mere character string bound to a meaning through the tagging action, Common Tag[13] considers tags as potential concepts whose meaning should be attached directly to the instance of the tag.

In the NiceTag Ontology we propose to model tags primarily as a link between a resource and a sign. Then, this link is encapsulated in a named graph, and encoded using the RDF/XML source declaration proposed by [64]. This model can thus be seen as (1) a way of representing tags without constraining the model of the sign used to tag, and (2) a way of bridging all current models of tags (SCOT, Newman Tag Ontology, CommonTag, etc) and to retrieve in a single query all taggings written with these models and spread across the social web of data.

6.2.4. Online Communities

Participants: Sébastien Comos, Nicolas Delaforge, Guillaume Erétéo, Fabien Gandon, Alain Giboin, Freddy Limpens.

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. 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. The ISICIL project[14] studies and experiments 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. Academic publications from Edelweiss in the ISICIL project have been made on the following topics:

- Representing tags as named graphs in RDF [40];
- Collaborative semantic structuring of folksonomies [29];
- Social network analysis using semantic web frameworks [28], [44], [37], [26].

The project started the 3rd of February 2009 and the first deliverables include:

- A state of the art of Business Intelligence applications;
- Overall specifications of the framework choices and rationale and first version of the platform [28];
- State of the art on social network analysis techniques;
- State of the art on ontology & folksonomy hybrids;
- State of the art on trust calculation and propagation in social networks;
- Use case, scenarios and usage analysis [52].

6.2.5. Social Network Analysis

Participants: Guillaume Erétéo, Fabien Gandon, Michel Buffa.

Social Network Analysis (SNA) proposes graph algorithms to characterize the structure of a social network, strategic positions, specific sub-networks and networking activities. Collaborative applications now capture more and more aspects of physical social networks and human interactions, spanning both internet and intranet networks. Such rich and diffuse data cannot be represented using only raw graphs as in classical SNA algorithms without some loss of knowledge. Semantic Web frameworks answer this problem of representing and exchanging knowledge on such social networks with a typed graph model (RDF), a query language (SPARQL) and schema definition frameworks (RDFS and OWL).

[11] http://scot-project.org/scot/
[12] http://moat-project.org
[13] http://www.commontag.org
[14] http://isicil.inria.fr

Reporting on the experiments of SNA on online social networks, we have shown [62], [27] the lack of techniques for applying SNA on these rich typed representations of social networks. We proposed to exploit directly the RDF representations of social networks using semantic web search engines, in order to take advantage of the rich information they hold and in particular the typed relations that form these labeled graphs [27], [26]. Many algorithms are available for detecting social structures, roles and positions. But one aspect of our work that differentiates us from other approaches is in going beyond the application of classical algorithms to social networks described with semantic web technologies. We propose to extend these algorithms and to create new ones, in order to manage communities' life cycles, taking into account not only the graph structure but also the semantics of the ontological primitives used to label its nodes and edges.

In [26] we present a framework for exploiting the graph models underlying RDF representations of social networks. The solution we propose offers to realize a social network analysis combining structural and semantic characteristics of the network with queries performed with Corese [3]. We provide formal definitions in SPARQL of SNA operators parameterized by the ontologies underlying these representations. Subsumption relations are natively taken into account when querying the RDF graph in SPARQL with an engine like Corese. Parameterized operators formally defined in SPARQL rely on this to allow us to adjust the granularity of the analysis of relations. New queries that compute new operators can be defined at anytime.

In addition we modeled SemSNA, an ontology of social network analysis characteristics used to enrich social data. SemSNA proposes primitives to describe strategic positions, based on Freeman's definition of centrality [63], and primitives to annotate social data with different definitions of groups and useful indices to characterize their properties. The core of SemSNA to describe any semantic SNA enable to model new semantic SNA metrics. SemSNA annotations can be used to provide services based on the analysis (e.g. filter social activity notifications), to use them in the calculation of more complex indices or (in the future) to support iterative or parallel approaches in the computations.

Furthermore we validated this framework on a real social network, Ipernity.com, a French social network that offers to its users several options for building their social network and sharing multimedia content. The anonymized dataset we analyzed contains 60k users, half a million declared relationships and millions of interactions. We revealed the importance of considering the diversity of relationships and their semantic links. The sub-networks we analyzed present different characteristics that highlight in particular the strategic actors and the partioning of the different activities.

Our perspectives include the development of a semantic based community detection algorithm and methods to manage the evolution of the ever-changing networks of the read/write Web. More precisely, we plan to exploit these semantic based SNA metrics to structure overwhelming flows of corporate social data and to foster social interactions. Organizing this huge amount of information produced in a social intranet is one of the major challenges of Web 2.0 for its acceptance in corporate contexts and to achieve the full potential of Enterprise 2.0, i.e., the efficient use of Web 2.0 technologies like blogs and wikis within the Intranet [70].

6.3. Knowledge Graph Representation

Participants: Stéphane Aguilella Cobos, Olivier Corby [resp.], Catherine Faron-Zucker, Corentin Follenfant, Fabien Gandon.

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.

6.3.1. Corese Semantic Web Factory

Corese is a Semantic Web Factory which implements RDF/S, part of OWL light, SPARQL and RDF Graph Rules [49]. It relies on the conceptual graph formalism and is now open source with CeCILL-C free software

license[15]. 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. This year we have focused on the points described below.

6.3.2. KGRAM: Knowledge Graph Abstract Machine

We have designed the KGRAM Abstract Machine and its language GRAAL dedicated to the query of knowledge graphs. KGRAM and GRAAL together result from an abstraction process we performed with the goal of reaching a generic solution to the problem of querying graph-based knowledge representations in various models such as Conceptual Graphs, RDF graphs and possibly Topic Maps. By doing so we identified high level abstract primitives which constitute the expressions of the GRAAL language and the interfaces of the KGRAM abstract machine for both its data structures and its operations.

GRAAL stands for GRAph Abstract query Language. We defined its abstract syntax with primitives enabling to represent query graphs: basically EDGE and NODE, SPARQL-like primitives such as UNION, AND, OPTIONAL, GRAPH, FILTER, and features such as SELECT DISTINCT, GROUP BY, ORDER BY, LIMIT, OFFSET and aggregates such as MIN, MAX, COUNT AND SUM. We also included new primitives for expressing upcoming features in SPARQL 1.1 like subqueries and graph paths. We designed GRAAL to be easily extendable; it is a family of languages, each one defined by the primitives implemented and new primitives can easily be added to the core language.

We have defined the operational semantics of GRAAL in Natural Semantics. The rules we established for each primitive define the behaviour of the KGRAM abstract machine: KGRAM is designed as an interpret of the GRAAL language. For example, the two rules below define the semantics of the FILTER statement. The first rule states that in case of failure of the filter, the evaluation fails (it produces an empty list of environments). The second rule states that if the filter succeeds, the evaluation succeeds too and produces a list of environment made of the input environment.

$$\frac{eval(ENV \vdash F : false)}{ENV \vdash filter\ F \rightarrow \phi} \qquad \frac{eval(ENV \vdash F : true)}{ENV \vdash filter\ F \rightarrow list\ ENV}$$

The rule below shows the semantics of the UNION operator that evaluates each argument in the same input ENV environment. The result is the merge of the two lists of environments, produced by each argument's evaluation.

$$\frac{ENV \vdash A \rightarrow LENV \ \wedge \ ENV \vdash B \rightarrow LENV'}{ENV \vdash A\ union\ B \rightarrow LENV\ .\ LENV'}$$

The KGRAM abstract machine manages a stack of expressions, a binding environment and it implements a set of basic data structures such as mappings to represent query results. It implements a set of basic operations such as push, pop, backtrack and backjump. It relies on a graph proxy that is able to enumerate candidate edges and nodes according to the current binding environment. The graph proxy hides the structure of the graph and of the graph indexing scheme. It is accessed by means of a standardized API. Hence, KGRAM can operate on different graph proxies provided that they implement the required interface.

To perform edge and node match operations KGRAM relies on a matcher proxy which is able to compare nodes and edges. Several matching scheme may be implemented using different match proxy.

In addition to graph match operation, KGRAM processes evaluable constraints called filters. A partial mapping is acceptable if its associated filters evaluate to true, otherwise the mapping is rejected and KGRAM backtracks. In the current version, filter evaluation is delegated to an evaluator which is given an abstract binding environment corresponding to the current partial mapping. In a future version, we may design a filter language within KGRAM.

KGRAM operates on an *abstract* graph structure by means of an API that hides the graph implementation: it manages *abstract* edges and nodes. Hence it can be used on different graph models and implementations - this has been successfully tested with Corese CG/RDF graphs and with Jena RDF graphs. Another expected

[15] http://www.inria.fr/sophia/edelweiss/software/corese

port of KGRAM would be on Topic Maps. As a result, the genericity and interoperability of KGRAM should enable to connect several different graph managers and address scenarios where treatments are distributed on several knowledge bases and whose partial result are mashed up to answer complex problems. This work will be published at EGC [32].

6.3.3. RIF Rule Interchange Format

We have designed and developped two parsers for W3C RIF Rule Interchange Format, Basic Logic Dialect. One parser for the presentation syntax and one parser for the XML syntax with a common abstract syntax tree have been developped. This work was performed during the training of Corentin Follenfant.

6.3.4. Graphical User Interfaces for SPARQL Query

We have designed a new graphic user interface for Corese that enable to load a knowledge base and send SPARQL queries. This work was performed during the training of Stéphane Aguilella Cobos.

6.3.5. Reasoning with rules

Participant: Jean-François Baget.

Logical rules of form $\forall^*(H \rightarrow (\exists^* C))$, where the hypothesis H and the conclusion C are conjunctions of positive atoms, have been the subject of an increased interest in the last few years. They have been studied in databases under the name of *tuple generating dependencies* (TGDs) and form the basis of rules-based extensions of the semantic web languages such as SWRL. These rules form a very expressive subset of first-order logics, since they allow to simulate any Turing Machine (they form a computation model). This expressivity has an immediate drawback, however: reasoning with rules is an undecidable problem. We have focused this year on the study of decidable subclasses of this logic of rules, and on the development of an extension of this logic, that can be seen as the "rule fragment of Reiter's default logics".

6.3.5.1. Decidable subclasses of the logic of rules

In [24], we consider three *abstract decidable subclasses* of this logic of rules. Though we have proven [58] that these classes are not finitely recognizable, they form a convenient way to characterize the behavior of algorithms in all decidable subclasses we are aware of.

6.3.5.2. An abstract classification

- The first two abstract classes rely upon a forward chaining algorithm to characterize termination. Forward chaining basically enriches a knowledge base with new information drawn from the application of rules until an answer to a given question can be found.
  - With *finite expansion sets* of rules (f.e.s.), we ensure that we can derive, from any initial set of information, a finite knowledge base that is sufficient to answer any question.
  - With *bounded treewidth sets* (b.t.s.), we ensure that, even when the derivation is potentially infinite, the graph representing that derived Knowledge Base has finite treewidth. We can then conclude, thanks to Courcelle's theorem, that reasonings are decidable. Though b.t.s. form a strict superset of f.e.s., the computational cost of its halting criterium is far more important, and thus justifies our study of the previous class.
- The last abstract class relies upon backward chaining. In backward chaining, we use rules to rewrite a question until one of the rewritten questions can be answered in the initial knowledge base. *Finite unification sets* ensure that a question can only be rewritten as a finite number of non-comparable questions, thus ensuring decidability.

We were able to classify all decidable classes we are aware of along these three abstract classes. Our goal has thus been to populate these abstract classes with *concrete classes*, recognizable in finite time, as shown in Figure 6.

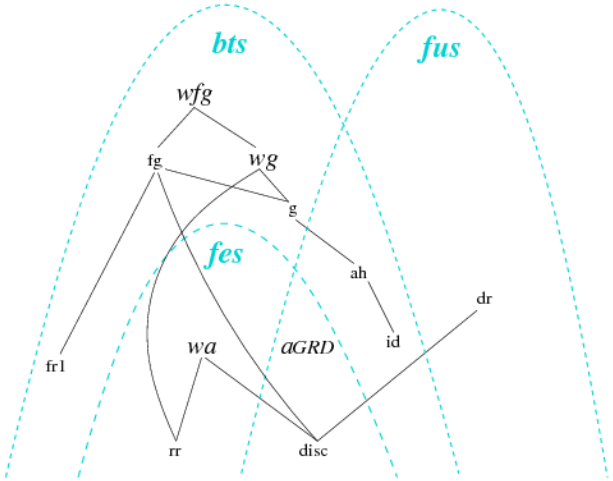

Figure 6. A map of decidable cases

For example, *range restricted rules* (r.r.), that do not have new variables in their conclusion, belong to the f.e.s. abstract class (and thus are also b.t.s.), and form a subclass of Gottlob's *weakly guarded rules* (w.g.), that belong to the b.t.s. class. This year, we have introduced the f.u.s. abstract class and the two new concrete classes, *atomic hypothesis* (a.h.) and *domain restricted* (d.r.) that implement their behaviour. We have also began the study of bounded treewidth sets, following the work initiaited by Gottlob on guarded and weakly guarded TGDs. We were able to generalize these concrete classes by lifting constraints on the necessary guards, thus introducing the *frontier guarded* (f.g.) and *weakly frontier guarded* (w.f.g.) rules. This study also led to the introduction of a new concrete class of rules having a frontier of size 1 (f.r.1), which draws an interesting limit between decidability and undecidability, since we already knew that rules with frontier of size 2 are undecidable.

6.3.5.3. Combining decidable subclasses

Let us consider now two ontologies, each one containing a decidable set of rules. An important question is now: is the union of these two sets a set for which the deduction problem is decidable? The same question is also the basis for our approach of hybrid languages: let us consider two logical languages $\mathcal{L}_1$ and $\mathcal{L}_2$, whose semantics can be expressed respectively by two decidable sets of rules. Is the union of $\mathcal{L}_1$ and $\mathcal{L}_2$ a decidable language?

We have been able to prove [58] that (with the notable exception of disconnected rules, that can be safely mixed with all other subclasses), mixing any two non comparable decidable subclasses in Figure 6 leads to an undecidable problem (we are still able to encode any Turing Machine). It is thus necessary, when making the union of different decidable subclasses, to precisely study the interactions between these rulesets. We use our *graph of rules dependencies* (GRD) to obtain the following compatibility condition:

Let $\mathcal{R}$ be a set of rules. If all strongly connected components of the GRD of $\mathcal{R}$ are f.e.s. (resp. f.u.s., resp. b.t.s), then $\mathcal{R}$ is a f.e.s. (resp. f.u.s., resp. b.t.s.).

This theorem allows us to combine concrete classes implementing the same abstract behaviour into a new decidable class implementing that behaviour. The importance of this theorem relies upon the multiplying effect it has on any concrete class we consider, or will consider in the future. Additional restrictions allow us to combine b.t.s. (and thus f.e.s.) and f.u.s. into a new decidable class which relies upon a mixed forward/backward chaining algorithm, and does not implement any of the three abstract classes we have considered.

6.3.5.4. Default logics

Very often, standard logic is not sufficient for real-world applications. In particular, our modelling of an agronomy application considered in the GraphIK EPI proposal requires non-monotonic features. We have studied in [23] an extension of our logic of rules that takes into account Reiter's default rules. We have thus considered a fragment of that logic where the standard part of defaults is a rule such as the ones we have presented above, and the justification is the negation of a conjunction of atoms. Such a default rule can be intuitively understood as: "if hypothesis, then conclusion, unless it creates a violation of our justification".

Reiter's default usually rely upon a normality condition (the justification is the same as the conclusion) to achieve efficient reasonings. But the defaults we had to consider in our application did not respect that normality condition. However, we were able to prove that our fragment of Reiter's default had the same interesting combinatorial property, without having to consider normal defaults.

We were also able to define new decidable subclasses for Reiter's Default Logics, by extending the forward chaining classes (f.e.s. and b.t.s.).

If $(\mathcal{R}, \mathcal{D})$ is a default theory and $\mathcal{R} \cup \text{std}(\mathcal{D})$ is a b.t.s., then both skeptical deduction and credulous deduction are decidable.

7. Contracts and Grants with Industry

7.1. Orange Labs

We signed a CRE contract (Contrat d'Encadrement Recherche) with Orange Labs for our work on semantic social network analysis in the context of the PhD Thesis of Guillaume Erétéo.

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) [16].

8.1.2. Competitivity Poles

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

8.1.3. Color Desir

Participants: Olivier Corby, Catherine Faron-Zucker, Isabelle Mirbel, Iyan Johnson.

In the framework of the one year Desir project[17] we started a collaboration with INRA Montpellier on the theme of capitalization and sharing of expert knowledge. The goal of our work was to help ecophysiologists, agronomists and geneticists to capitalize and share their expertise about how and why they exploit different heterogeneous data sources and combine the retrieved data in order to understand plant tolerance with regards to heat and water shortages.

[16] http://www.use-age.org
[17] http://www-sop.inria.fr/edelweiss/projects/desir

More precisely, we focused on the scripts that INRA scientists write in the *R* language to query the data collected during experimental cultures of plants under semi-natural conditions (greenhouse or culture chamber). To help the scientists capitalize, share and reuse these *R* scripts, we explicited with them the criteria enabling to retrieve interesting *R* scripts in some given situations and we defined an ontology dedicated to the description of *R* scripts. Then we wrote (1) an RDFS/OWL schema formalizing this ontology, (2) RDF annotations of *R* scripts based on this schema and (3) SPARQL queries modelizing the search for interesting scripts. These queries exploit the RDF annotations of scripts and the RDFS/OWL schema and thus enable a semantic retrieval of scripts. We prototyped a semantic web application enabling to annotate and query a base of scripts. It relies on the Corese semantic engine developped in our team.

At the time of this report, the Desir project is finishing but all the participants are motivated to continue this initial collaboration. We did not get as far as to modelize search processes involving several scripts as we initially intended to but during this one year project we better characterized the needs of the INRA scientists. These would concern the classification of scripts rather than their scheduling into processes. Moreover, the modelization of their application domains would enrich the modelization of their expertise that we performed in the framework of this project.

8.1.4. Action Color Edccaeteras (Follow up)

Participant: Adil El Ghali.

Edccaeteras was an Action Color performed in 2006 (see Acacia activity report 2006) in order to elaborate and perform experiments to better understand the behaviour of humans when categorising terms/concepts and computing semantic distances between those terms/concepts, and to propose recommandations to simulate this behaviour with a computer. As a kind of follow-up to this Action, simulation experiments were performed and published [67], [66] by two former Edelweiss colleagues : Yann Vigile Hoareau (who participated to Edccaeteras) and Adil El Ghali.

8.1.5. AVISICIL : open project Région PACA

Participants: Fabien Gandon, Alain Giboin, Stéphanie Peron.

AVISICIL is a 3-year project partially funded by the Région PACA which complements the ANR project ISICIL. AVISICL goal is: (1) to analyze and model the social cognitive processes of networks of watchers managing common vocabularies; (2) to contribute to the installation of a laboratory (room) of use to be shared by several research teams. The AVISICIL partners are: the Edelweiss research team; the Kewi research team (I3S Laboratory, UNS, France) ;and the Laboratoire de Psychologie Cognitive et Sociale (UNS, France)

8.2. National Actions

8.2.1. ANR ISICIL

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

ISCIL is an ANR project submitted and accepted in 2008 and that started in March 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.

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

Participants: Olivier Corby [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 for a set of Web services part of the prototype. Our set of web services is mainly dedicated to annotation generation relaying 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 developped 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 project was declared *spotlight project* by the ANR at the final review in october 2009.

8.2.3. BioMarker

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

Participants: Leila Kefi-Khelif [resp.], 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/UNS), I3S (UMR CNRS-UNS) 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...).

8.3. Actions Funded by the EC

8.3.1. Palette

Participants: Olivier Corby, Adil El Ghali, Fabien Gandon, Alain Giboin [resp.], 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 Téluq (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. 2009 was dedicated to the writing of the final report of WP3 and of the whole Palette project, and to the preparation of the final project review. This review, which took place in Lausanne in April 1-3, was successful. This work was published in [45].

8.3.2. SeaLife

Participants: Olivier Corby, Fabien Gandon, Khaled Khelif, Abdoulaye Guisse.

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 . This work was published in [18], [19].

9. Dissemination

9.1. Animation of the Scientific Community

9.1.1. Program committees

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 was member of the program committee of LMO 2009, 15ème Conférence francophone sur les Langages et Modèles à Objets, IC Ingénierie des connaissances 2009, ISWC International Semantic Web Conference, JFO Journées Francophones sur les Ontologies, RCIS Research Challenges in Information Science and EKAW 2010, International Conference on Knowledge Engineering and Knowledge Management.

Fabien Gandon was:

- President of Program Committee of IC 2009, 20es Journées Francophones d'Ingénierie des Connaissances [47]
- Program Committee member for: ISWC 2009, ESWC 2009, ASWC 2009, ICIW 2009, Information Systems 2009, RCIS 2009, GKR 2009, SPOT 2009, ICWIT 2009, WebS 2009, DEXA 2009, SemaPro 2009, MUS 2009, ACM, SEMELS 2009, SDoW 2009, EPIQUE 2009, SAC-SWA 2009, SNI 2009, AER 2009, WISE 09, EGC09, MSW 2009, RCIS09, SEMELS09, SemWiki 09, TR4Web09, WI09.

Alain Giboin was member of the program committees of:

- VISSW 2009, Visual Interfaces to the Social and the Semantic Web, in conjunction with the International Conference on Intelligent User Interfaces (IUI 2009), Sanibel Island, Florida, 8th February 2009. Web site: http://www.smart-ui.org/events/vissw2009.
- IS 2009, IADIS International Conference on Information Systems 2009, 25-27 February 2009, Barcelona, Spain. Web site: http://www.is-conf.org.
- IC 2009, 20es Journées Francophones d'Ingénierie des Connaissances : "Connaissance et communautés en ligne", 25-29 mai 2009, Hammamet, Tunisie. Web site: http://ic2009.inria.fr. Co-chair of the Workshop "Systèmes d'organisation des connaissances" ("Modèles, méthodes, pratiques pour la conception de logiciels basés sur des Systèmes d'Organisation des Connaissances hétérogènes: ontologies, folksonomies, thésaurus, réseaux sémantiques, annuaires"), 26 mai 2009, Hammamet, Tunisie, in conjunction with IC 2009. Web site : http://www.mipadoc.org/AFIA.
- DeViNT'2009, Septième journée "Déficients visuels et NTIC : Accessibilité et Autonomie en milieu urbain: L'apport des technologies nomades", Sophia Antipolis, France, May 28, 2009, Web site: http://devint.polytech.unice.fr.
- EPIQUE 2009 (and member of the scientific committee), 5ème colloque de Psychologie ergonomique, 28-30 septembre 2009, Nice, France. Web site: http://epique2009.sfpsy.org. Co-chair of the Symposium "Interactions et coopérations dans les communautés en ligne et les réseaux sociaux" 28 septembre 2009, Nice, France, in conjunction with EPIQUE 2009.
- COGNITIVE 2009, The First International Conference on Advanced Cognitive Technologies and Applications, November 15-20, 2009 - Athens/Glyfada, Greece. Web site: http://www.iaria.org/conferences2009/COGNITIVE09.html.

Khaled Khelif was member of the program committee: RCIS'09 : The third IEEE International Conference on Research Challenges in Information Science, eHealth'09 : The second International ICST Conference on Electronic Healthcare for the 21st century.

9.1.2. Journals and Publishers

Fabien Gandon is reviewer for ACM Communication, IJMSO, IGI Books,

Alain Giboin is Member of the Board of the External Experts of the bilingual and multidisciplinary journal in human factors *Le Travail Humain*.

9.2. Organization of conferences and courses

Alain Giboin is:

- Co-organizer of the Workshop « Systèmes d'organisation des connaissances » (« Modèles, méthodes, pratiques pour la conception de logiciels basés sur des Systèmes d'Organisation des Connaissances hétérogènes (ontologies, folksonomies, thésaurus, réseaux sémantiques, annuaires »), 26 mai 2009, Hammamet, Tunisie, in conjunction with IC 2009.
- Member of the organizing committee of DeViNT'2009, Septième journée "Déficients visuels et NTIC", Sophia Antipolis, France, May 28, 2009.
- Member of the organizing committee of the Journées de Printemps of the GDR CNRS Psycho Ergo, Nantes, France, March, 26-27, 2009.
- Head of the organizing committee of EPIQUE 2009, 5ème colloque de Psychologie ergonomique, [46], 28-30 septembre 2009, Nice, France.
- Co-organizer of the Symposium « Interactions et coopérations dans les communautés en ligne et les réseaux sociaux » 28 septembre 2009, Nice, France, in conjunction with EPIQUE 2009.

Martine Collard was Program Chair of 3rd International Conference on Research Challenges in Information Science, Fez, Morocco, april 2009.

Fabien Gandon:

- organized the 10th VoCamp (the first in France) the 24th and 25th September 2009. VoCamp is a series of free informal events where people can spend some time creating and maintaining lightweight vocabularies/ontologies/thesauruses for the Semantic Web/Web of Data/Linked Open Data[18].
- organized a Semantic Web tutorial at AFIA platform, Hammamet, Tunisia, June,
- was General Chair of IC 2009, Hammamet, Tunisia, June.

9.3. Others

9.3.1. Scientific Councils and Evaluation tasks

Olivier Corby was referee for ANR 2009.

Fabien Gandon was Jury member and referee of the ANR commission for the CONTINT program, reviewer and project officer for MODCO program at ANR and Jury member of the selection committee in computer science section, University Lyon 1

9.3.2. Working Groups

Alain Giboin is member of:

- Group "Psychologie ergonomique" of the Département Recherche de la Société française de Psychologie (SFP) : Alain Giboin is Founder member of this group.
- GDR CNRS "Psycho Ergo": Edelweiss is a member of this GDR. Alain Giboin is a member of the GDR Council, and the coordinator (with Pascal Salembier, UTT Troyes) of the Thematic Group "Coopération homme-machine et Coopération homme-homme".
- Working Group "Assembling UI Components" (Edelweiss-Rainbow): This year we pursued the 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.

9.3.3. International Working Groups

Olivier Corby is member of the SPARQL 1.1 RDF Data Access W3C WG.

[18] http://vocamp.org/

Fabien Gandon is member of the Social Web W3C XG.

Isabelle Mirbel is member of the IFIP Working Group 8.1 on Design And Evaluation of Information Systems[19].

9.3.4. Collective tasks

- Olivier Corby is member of CAS (Committee for Scientific Animation) at INRIA Sophia Antipolis.
- Fabien Gandon is Member of CUMIR (Committee for Usage of Computer and Network Resources) at INRIA Sophia Antipolis.
- Alain Giboin was member of the INRIA group ”Charte ergonomique et graphique” of the future Web Communication Platform of the INRIA. With Bernard Senach (EPI AxIS), they contributed as human factors experts to the evaluation of the proposals of the ergonomic and visual identity standards submitted to INRIA by candidate service providers.

  He also participated to one of the workhops “Outils Collaboratifs” organized by the DSI of INRIA in order to identify the collaborative tools needed by INRIA researchers.

9.3.5. Visits

The Edelweiss team welcomed:

- Clément Jonquet, Stanford University - National Center for Biomedical Ontology, January 29th. : *Ontology-based semantic annotation of biomedical data*
- Erik Gebers, Université de Technologie de Compiègne, March 24th : *La préservation à long terme pour les communautés artistiques : Comment interagir avec un framework technique ?*
- Milan Stankovic, Université Paris-Sorbonne, LaLIC, August, *Online Status and Good Old AI*
- Catherine Dominguès, Institut Géographique National. November 2-3.

9.4. Teaching

9.4.1. University

The Edelweiss project is a welcoming team of the *Ecole doctorale STIC of the University of Nice-Sophia Antipolis (UNS)*. 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 - UNS and a Course on "Decisional Databases" Master 1 in Computer Science - UNS.
- 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 UNS, Master 5), 45 hours. They supervised several student projects.
- Olivier Corby, Catherine Faron-Zucker (resp.) and Fabien Gandon: Knowledge Engineering, at EPU (Ecole Polytechnique UNS, Master 5).
- Olivier Corby, Catherine Faron-Zucker and Fabien Gandon: Semantic Web, License pro., IUT, UNS.
- Olivier Corby and Catherine Faron-Zucker: Semantic Web and Description Logics in a Research Master at UNS.
- Fabien Gandon: Course on "Semantic Web Standards" at University Gaston Berger, Saint Louis du Sénégal.
- Fabien Gandon: Invited intervention Ecole Centrale de Paris "Web Sémantique ou comment les ontologies pourront favoriser l’échange des connaissances sur le web du futur".

[19] http://home.dei.polimi.it/pernici/ifip81

- Fabien Gandon: Invited intervention at Université Technologique de Compiègne on *Semantic Web and Social Web*.
- Fabien Gandon: Cours M2 Miage in Nice : *Introduction to Semantic Web*.
- Alain Giboin: EPU, ESSI 3rd year, Module "Interfaces graphiques homme-machine" (GUI), UNS (http://www.essi.fr/pinna/MODULEIHM/).
- Alain Giboin: Master "Ergonomie des Nouvelles Technologies de l'Information et de la Communication (ErgoNTIC)", UNS (http://www.unice.fr/master-ErgoNTIC).
- Alain Giboin: EPU, Module «Paradigmes d'interaction Post-WIMP et évolutions des interfaces».
- Khaled Khelif: Applications Web - MIAGE (UFR Sciences, UNS).
- Leila Kefi-Khelif and Adil El Ghali: course on Web applications - Master MIAGE - UNS.
- Noureddine Mokhtari: Practical courses on Database management system in IUT Nice Côte d'Azur: (48h for third quarter).
- Noureddine Mokhtari: courses and Practical courses on Website Design at UNS (20h for third years licence MASS 2).
- Noureddine Mokhtari: Practical courses on Introducing to Web technologies at UNS (36h for first years licence).
- Noureddine Mokhtari: Practical courses on Fundamental Principles of Database at UNS: (12h for third years licence MIAGE 3).

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 Communuties 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*, INRIA & University of Nice-Sophia Antipolis.
4. Noureddine Mokhtari: *Extraction and Exploitation of Contextual, Evolving Semantic Annotations for a Virtual Community*, University of Nice-Sophia Antipolis.

9.4.3. Thesis Jury

Olivier Corby was invited jury member of the HDR Thesis of Philippe Martin on *Towards a Collaboratively-built Knowledge base of&for Scalable Knowledge Sharing and Retrieval*, University of Nice-Sophia Antipolis, December 8th.

Fabien Gandon was Jury member of the Ph.D. thesis of:

- Alexandre Passant, University La Sorbonne, *Technologies du Web Sémantique pour l'Entreprise 2.0*
- Adeline Leblanc, Université Technologique de Compiègne, *Environnement de collaboration et mémoire organisationnelle de formation dans un contexte d'apprentissage*
- Rim Jedidi, Supélec, University Paris-Sud XI, Faculté des Sciences d'Orsay, *Approche d'évolution d'ontologie guidée par des patrons de gestion de changement*

9.4.4. Training

We welcomed the following trainees:

- Stéphane Aguilella Cobos, University Paris XIII, *Graphic User Interface for Corese*.
- Papa Thierno Diop, University Gaston Berger, Saint-Louis, Sénégal, *Semantic Web Server of Representations and Indicators for Social Networks*.
- Corentin Follenfant, Polytech UNS, *A Parser for W3C RIF*.
- Djiby Gueye, University Gaston Berger, Saint-Louis, Sénégal, *Design of a Semantic Tag Server*.
- Abdoulaye Guisse, University Gaston Berger, Saint-Louis, Sénégal : *Ontologies and Annotations for Patent Clustering : Towards a Semantic Clustering Toolbox*.
- Iyan Johnson, INRIA-INRA, *Semantic Annotations for Information Retrieval in Vegetal Biology*.
- Stéphanie Peron, UNS, *Usability studies of the Folkon Folksonomy Editor*.
- Mohameth François Sy, University Gaston Berger, Saint-Louis, Sénégal, *Semantic Annotation of Gene Cluster*.

9.5. Participation to conferences, seminars, invitations

Olivier Corby :

- Participate to the workshop INRIA-Orange Labs in Issy les Moulineaux March 13th and Rocquencourt May 15th.
- Was invited speaker at workshop on *Flexibilité et Reconnaissance Biologique : de la biophysique aux modèles de données* at INRIA Sophia Antipolis, March 18th. Gave a talk on *Ontologies and Knowledge Engineering in Biology: a Semantic Web Approach*.
- Presented Edelweiss for european project and DEUKS: Doctoral School towards European Knowledge Society on May 12th.
- Gave a talk on Corese at Journées des Logiciels, INRIA Sophia Antipolis, November 27th.

Fabien Gandon was invited speaker at:

- the W3C workshop on Social networks, Barcelona, January 2009 [20]
- the summer school *Web Intelligence*, 6-10 July 2009
- University La Rochelle, 1/10/2009 *Ontologies in computer science : features and life-cycle of these new components of our information systems*
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