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Languages, Web, Ergonomics, Interactions,
Semantics, Servers*

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1. Team

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2. Overall Objectives

2.1. Overall Objectives

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), 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.

3. Scientific Foundations

3.1. Fondation

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

The former Acacia project approach relied on the analogy between the resources of an organizational memory and the resources of the Web. We considered that an organizational memory can be materialized in a community semantic Web [7], [44], 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 [40], 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 [49], 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 Semantic Web 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 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 RDF/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'Énergie) 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 is used and has been used in more than 40 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 [43], [1], [5], [3], [2], [4].

5.2. ISICIL

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

The software platform ISICIL is producing several software components:

- XUL (XML-based User interface Language) 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 the REST protocol 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 developed 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 SIOC¹, SCOT, and Newman's Tag Ontology² 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>

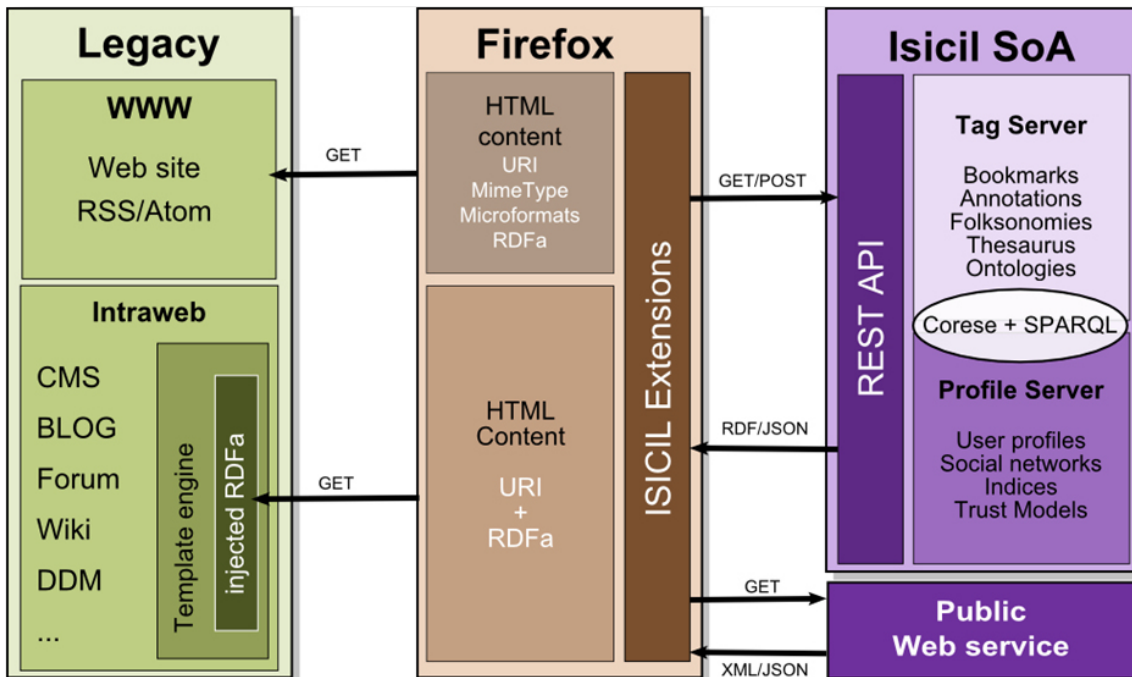


Figure 1. ISICIL Platform Architecture

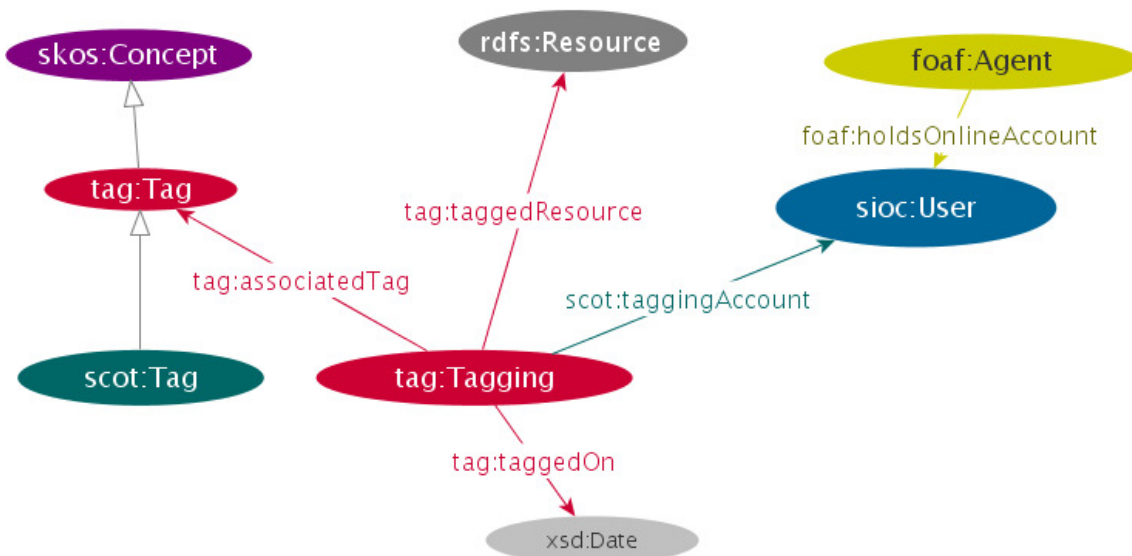


Figure 2. Model of tagging used in the Semantic Tag Server

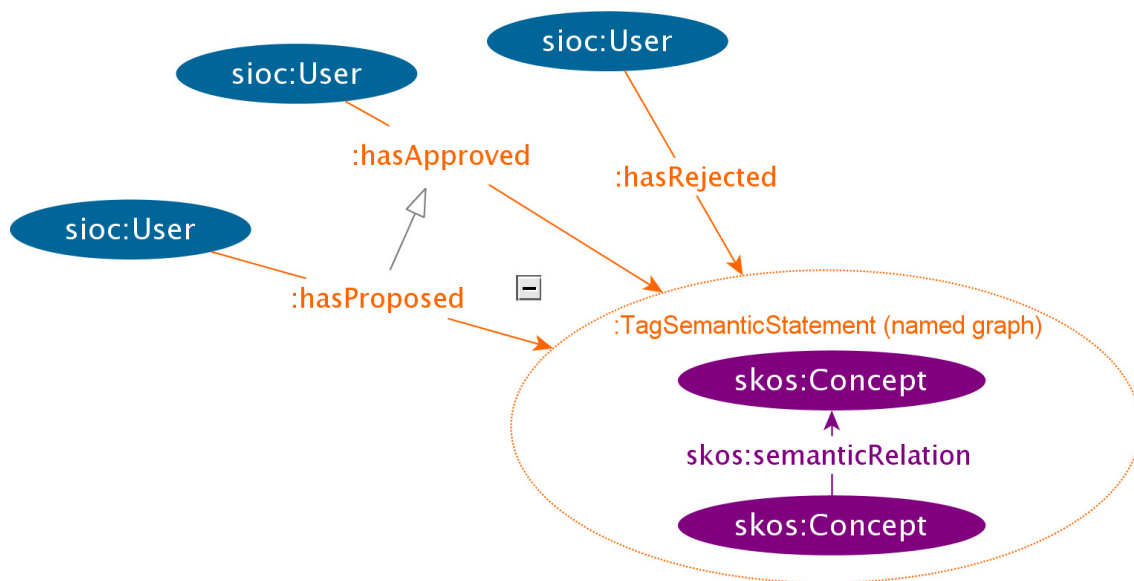


Figure 3. Folksonomy enrichment model

The functionalities 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 developed to perform computations on the tagging data. Two types of computations have been implemented:
 1. Spelling Variant detection.
 2. Related tag detection based on the computation of the similarity between tags [46].
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 behind 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 framework³, 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. Graph Based Knowledge Representation

6.1.1. KGRAM: Knowledge Graph Abstract Machine

Participants: Olivier Corby, Catherine Faron-Zucker, Fabien Gandon.

A generic SPARQL interpreter was designed and developed as well as an Abstract Graph API. It is a generalization of SPARQL for labeled graphs, not only RDF but also Conceptual Graphs [22], [23], [19].

This year we leverage KGRAM with SPARQL 1.1 statements such as: select expression, subquery, property path, minus, exist, aggregate, group by, having.

We also designed an extension that enables the mashup of data coming from several graph servers. This generic extension is used in the ISICIL ANR project.

We performed a port on Jena Semantic Web platform <http://jena.sourceforge.net/> and on a fresh Graph structure to validate KGRAM architecture.

We also have designed several extensions that enable to enumerate edges from property paths, perform XPath queries and write pragmas to tune query execution. A generic Event Listener has been added to KGRAM that enables to write debuggers.

6.1.2. Graphic User Interface

Participants: Jérôme Maraninchi, Fabien Gandon, Olivier Corby.

A new version of Corese Graphic User Interface have been released with graph visualisation for construct & describe SPARQL queries [37]. The GUI also manages a SPARQL query debugger.

6.1.3. Graph Visualization

Participants: Erwan Demairy, Fabien Gandon, Olivier Corby.

A development activity (ADT) with support from INRIA started the 1st of October 2010 for two years, on Semantic Graph Visualization. The action focus is on coupling Corese and Gephi Open Graph Visualization Platform <http://gephi.org> to provide a framework to query and visualize RDF data taking into account their schemas.

6.1.4. Distributed Query Processing

Participants: Adrien Basse, Fabien Gandon.

We are interested in designing an architecture to support the distribution of a SPARQL query on a small and fixed number of RDF repositories. To do so, the key stage is to characterize the content of the base of each server in order to be able to predict if a server could contribute or not to the answer of a query. Then, we propose an algorithm to extract a compact representation of the content of an RDF store. We improve the canonical representation of RDF graphs based on DFS code proposed in the litterature by providing a join operator to reduce the number of generated redundant patterns [18].

6.1.5. Contextual Semantic Annotations

Participants: Nouredine Mokhtari, Olivier Corby.

This PhD thesis [15] falls within the framework of the former European project SevenPro (Semantic Virtual Engineering Environment for Product Design) whose aim is to improve the engineering process of production in manufacturing companies, through acquisition, formalization and exploitation of knowledge. We propose a methodological approach and software for generating contextual semantic annotations from text. Our approach is based on ontologies and Semantic Web technologies.

In the first part, we propose a model of "context" for text. This modeling can be seen as a projection of various aspects of "context" covered by the definitions in literature. We also propose a model of contextual semantic annotations, with the definition of different types of contextual relationships that may exist in the text. Then, we propose a generic methodology for the generation of contextual semantic annotations based on domain ontology that operates at best with the knowledge contained in texts.

The novelty in the methodology is that it uses automatic language processing techniques and grammar extraction (automatically generated), domain relations, concepts and values of property in order to produce semantic annotations associated with contextual relations. In addition, we take into account the context of occurrence of semantic annotations for their generation. A system that supports this methodology has been implemented and evaluated.

6.1.6. Collaborative Management of Interlingual Knowledge

Participants: Maxime Lefrançois, Fabien Gandon.

This new PhD thesis, directed by Fabien Gandon and Christian Boitet (from CLIPS-IMAG at Grenoble), is focused on filling the gap between Semantic Web technologies and the Universal Networking Language (UNL), an artificial interlingua designed for humans and computers. This may enable the design of Knowledge bases management workflows that would involve different human actors interacting in their natural language. The main goal of the thesis is to study and assist collaborative management and organization of interlingual knowledge. We plan to design and experiment a prototype to validate our work.

As a first step we are working on a formalization of some aspects of an eXtended UNL specification using recommendations of the World Wide Web Consortium. We will then propose to enable translation between UNL and SPARQL so that : a) the speech act of an input sentence can be translated to an action that can be performed on one or more knowledge bases ; b) SPARQL results could be translated to UNL, and then back to natural language.

6.2. Interaction Design

6.2.1. Folksonomies

Participant: Freddy Limpens.

During this 3rd year of the PhD on Multi-points of view semantic enrichment of folksonomies, the focus was mostly on the NiceTag ontology and the achievement of our approach to semantically structure tags that was developed in the PhD dissertation. The NiceTag ontology aims at overcoming the lack of expressivity of current tagging models. Indeed, the model of tag we developed in collaboration with Alexandre Monnin and David Laniado, aims at covering the diversity in form and usages of the tags. This model considers tags primarily as a link, typed according to the use of the tag, between a tagged resource and a sign used to tag. Then we propose using named graph to embody this record and type it in order to account for other dimensions of tag actions. This model has been presented in two french-speaking conference [29], [24] and an international conference [21].

The PhD dissertation [14] presents in details our multi-points of view approach to the semantic enrichment of folksonomies [20]. We propose a socio-technical system, grounded on a usage analysis, and combining automatic processing of tags and users' contributions through user-friendly interfaces. Automatic processing of tags allows bootstrapping the process by using a combination of a custom method analyzing tags' labels and adapted methods analyzing the structure of folksonomies. The contributions of users are described thanks to our model SRTag (Semantically Related Tag) that allows supporting diverging points of view, and captured thanks to our user friendly interface allowing the users to structure tags while searching the folksonomy. Conflicts arising between individual points of view are then detected and temporarily solved by an automatic agent, whose outcome is then exploited to help a referent user maintain a global and coherent structuring of the folksonomy. Each individual point of view can then be enriched with the others' contributions, with the global point of view serving as a reference to guaranty a local coherence for all users. The result of our method allows enhancing the navigation within tag-based knowledge systems, but can also serve as a base for building

thesauri or ontologies fed by a truly bottom up process, providing therefore a solution to the bottleneck effect of knowledge acquisition.

6.2.2. Mobile Access to the Web of Data

Participant: Luca Costabello.

The PhD Thesis, directed by F. Gandon & I. Herman (CWI and Semantic Web Activity Lead at W3C), is focused on end-user interaction with the Web of Data from mobile devices. As initiatives such as Linked Data grow, we face the challenge of designing novel end-user services that benefits from this heterogeneous, unbound amount of interconnected resources. Moreover, the evolution of mobile devices raises new questions and enables brand new ways of accessing the web of data: mobile user context plays a central role, since multiple data dimensions, such as location or time, are crucial in enabling the design of new tools and interaction paradigms in the mobile environment. In these early steps of the work, efforts have been focused on the state of the art and on choosing the most suitable approach to the problem.

6.2.3. Social Network Analysis

Participants: Guillaume Erétéo, Fabien Gandon, Michel Buffa.

In the first two years of this PhD thesis, we developed a method to conduct a Social Network Analysis (SNA) that takes benefits of the ontological primitives that type the rich graphs formed by the RDF descriptions of online social networks [8]. Building on top of our results on semantic social network analysis, we designed a community detection algorithm that takes benefits of the semantic information of the RDF description of social network. This algorithm not only detects communities, but also labels them with meaningful terms.

Community detection algorithms only consider the graph structure of social networks [45]. Recently, the RAK algorithm [47] proposes to trap random labels in communities by propagating them through links of the graph. In addition, social web applications made folksonomies popular: users annotate online resources with freely chosen keywords called tags, and each tag may label a community of interest composed of all the actors using this tag. Moreover methods were developed to help online communities to enrich folksonomies with semantic relations between tags [14], which may help refining the labeling of communities.

We defined an algorithm that merges both approaches in order to perform community detection that takes benefit, not only of the link structure of the social network, but also of the community effect and labeling value of folksonomies and their emerging semantics. Our algorithm, called SemTP (Semantic Tag Propagation), is a variant of the RAK algorithm that is described above. SemTP turns the label propagation mechanism of RAK into a semantic propagation of tags. The basis consist in (1) assigning the tags that the actors used to annotate resources, and (2) propagating them by handling semantic relations between tags (e.g. skos:narrower). The Figure 4 shows a toy execution of this algorithm.

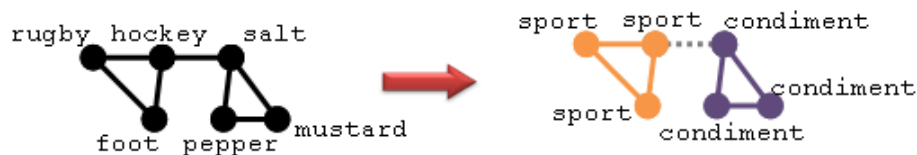


Figure 4. Toy example of a semantic tag propagation

We tested and validated this algorithm on the social network of all the Ph.D. thesis funded by the ADEME agency from which we extracted 1853 actors, 13982 relationships, 6583 tags and 3570 skos:narrower relations between 2785 tags.

6.2.4. Knowledge Sharing

Participant: Isabelle Mirbel.

In collaboration with the MODALIS research team at I3S (CNRS & University of Nice-Sophia Antipolis) we proposed an intentional approach to enhance sharing and reuse of in-silico experiments.

In-silico experiments are traditionally automated through scientific workflows. While those systems effectively tackle the complexity of underlying technologies, they themselves do little to ease and organize sharing and reuse. Indeed, scientific workflow models blur the line between user goals and techniques and often mix abstraction levels.

As our aim in this context is to assist knowledge sharing between users of various technical and process modeling levels, we relied on our previous work about intentions and information retrieval, in which we proposed an approach to support knowledge transfer about search processes from experts to novices. In this previous work, starting from an intentional process modeling formalism, we provided an ontology to annotate search processes.

To enhance sharing and reuse of in-silico experiments, we first extended the chosen intentional process modeling formalism in order to support the modeling of in-silico experiments. We extended it in two ways: (1) we made fork specification both explicit and mandatory so as to allow automatic handling of modeled processes and (2) we introduced the notion of parameterized process parts to further ease and enhance reuse and repurposing. Then we extended the ontology previously proposed to annotate search processes in order to reflect the changes we made to the intentional process modeling formalism. We applied our approach to several in-silico experiments represented by scientific workflows on myExperiment.org. As a result, intentional specifications of in-silico experiments can be shared and exploited by reasoning on their representations.

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

Participant: Alain Giboin.

6.2.5.1. Models and Methods for Representing Collective Personas

Context of the work: ISICIL project.

Individual Personas are user models that are represented as specific, realistic humans. Collective personas are models representing specific, realistic groups of people as such (e.g., teams, communities). We updated our review of the existing methods for elaborating collective personas, and reported remaining issues about how to elaborate such methods, e.g., How to give a realistic aspect to a collective persona? Do we need to elaborate collective personas or is it enough to develop the collective dimensions of individual personas (e.g., personas' relationships, roles, etc.), and/or to develop the collective scenarios related to individual personas acting collectively?

6.2.5.2. Models and methods for Representing Relationships between Individuals

Context of the work: AVISICIL project, in collaboration with researchers from the Kewi team (I3S, UNS) and from the Laboratoire de Psychologie Cognitive et Sociale (UNS) who are involved in affective computing design projects (designing systems intended to help elderly people maintain their relationships, or autistic children to build relationships with others).

We initiated a literature survey on relationships models and vocabularies: models of, and vocabularies describing interpersonal relationships, and models and vocabularies describing underlying aspect of interpersonal relationships such as emotions. We paid particular attention to vocabularies developed by Semantic Web and Social Web communities (e.g., EmotionML markup language; FOAF ontology).

6.2.5.3. Models of Shared Representations and Representation Sharing Processes

Criteria for Assessing the Effectiveness of Shared Representations Context of the work: ISICIL project; in collaboration with Florie Bugeaud and Eddie Soulier (UTT).

Any collaborative work depends on the quality of representations shared by collaborators (mental or internalized representations, material or externalized representations), especially representations of the object of the work. In the context of a broader study on the role of shared representations in innovation projects teamwork, we studied how to better characterize the effectiveness of a shared representation, relying on the existing literature surveying the characteristics of effective shared representations, boundary objects, intermediary objects, or related notions (see, [41], [42], [48]). Our aim is to enrich the set of criteria for evaluating the representation effectiveness that have been used hitherto and to structure these criteria in a coherent framework [26].

6.2.5.4. *Comparing and Bridging Models of Shared Representations and Representation Sharing Processes*

Context of the work: GDR CNRS Psycho Ergo⁴, Groupe thématique *Coopération homme-homme et Coopération home-machine* Action de recherche RefCom (*Référentiel commun, Intelligibilité mutuelle, Contexte partagé, Team/Situation Awareness... : quel(s) rapport(s) ?*) ; in collaboration with Pascal Salembier (UTT).

The notions of shared representations and representation sharing processes are examined in the research literature from several points of view; this variety of viewpoints gave rise to different conceptualizations, which are referred to using such terms as Common Frame of Reference, Mutual Intelligibility, Shared Context, Team/Situation Awareness, etc. In order to achieve mutual intelligibility between researchers working on such conceptualizations, we elaborated a grid for collaboratively comparing and bridging them. This grid consists of a set of dimensions allowing to characterize shared representations and representation sharing processes (e.g.: individual and collective attitudes towards sharing (social, relational, emotional aspects) ; dynamics of sharing (proactiveness in managing the sharing)) and the approaches used to perform this modeling (e.g., theoretical assumptions ; aim of the modeling) . The grid is currently applied by participants of the RefCom joint action research.

6.2.5.5. *Webmarks: Revisiting the Notion of Bookmarks Toward Contextualized Reference on the Web*

Participant: Nicolas Delaforge.

In the early days of the web, we were many to think that we were witnessing the advent of the giant global library. This librarian vision led to a modeling of web content (pages) which was propitious to the development of web tools, concepts and terms directly inherited from the paradigm of documentation. With web applications, web 2.0 and the rise of social web applications, the nature of the web evolved considerably and eventually the documentary vision of it became obsolete or at best very much confined. However, some remnants of this ancient metaphor remain and one of their best representatives certainly is the bookmark.

On the web, every resource is accessed by an URL. By analyzing both the technical and editorial web specificities we show that the web is not, from our definition, a documentary space. Due to their documentation legacy, bookmarks are built on top of the old archivist principle "access to support give access to content" and they should be reconsidered as well. For instance, as web pages are dynamically generated, the transposition of this principle to the web gives a drastically different result : "access to support potentially generates a new content at every access". In fact, on the web, a bookmark does not give access to a content. It is more like a road sign that points to a web place where something is happening.

We believe we can improve the traditional bookmark system by a deeper understanding of the true nature of the web. Starting again from the documents of the W3C Technical Architecture Group (TAG), we propose a model of the web as a superposition of three spaces: the web pages, web of data and web of services. Then we focus on the inherent intentionality behind the act of marking a URL and we show that in most cases, the original intention has nothing to do with the initial documentary practice of book-marking. We finally propose a definition of what we called "webmarks" which allows us to envision innovative and contemporary applications.

We suggest to define several Webmark types : a reference mark, a location mark, an application mark [25]. Each of these marks should be managed in a specific way, with dedicated tools offering adequate functionalities. A "Reference Mark" can be scrapped from the web and stored on a server. Then a stable access and a referencable URL could be guaranteed. A "Location Mark" is used when a user wants to mark a

⁴<http://www.gdr-psychoergo.org>

social place, like a pin on a map. We could propose a personal web map of the user's social web and provide notifications when social activities are detected. An "Application Mark" works more like a shortcut on a web desktop. It could be placed on a personal dashboard for instance and other specific services can be proposed according to their public API (Google Maps, Facebook,...).

7. Contracts and Grants with Industry

7.1. Grants with Industry

Participants: Corentin Follenfant, Olivier Corby.

We start a PhD Thesis (Cifre) with SAP on *Semantic graphs for decisional information systems*.

8. Other Grants and Activities

8.1. Regional Initiatives

8.1.1. RBP Immunosearch

Participants: Oussama Cherif, Olivier Corby.

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...).

This year we leverage the GUI for graph query and navigation. We designed an XML Format for SPARQL Query Templates with variable parts. This XML format enables the SPARQL query pipeline to be defined in a declarative way, as an external resource of the application [35].

8.1.2. AVISICIL

Participant: Alain Giboin.

AVISICIL is a 3-year project funded by the Région PACA which complements the ANR project ISICIL. AVISICIL initial goal was: (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. This year the project has been repositioned. The main topic of the project (analyzing and modelling the collaborative construction of common vocabularies) has been put in the background.

A secondary topic (analyzing and modelling emotions occurring in the interactions between people) has been put in the foreground. A major reason for this repositioning is that the emotion topic became a priority for most AVISICIL partners; partners agreed on the objective of contributing to the design of a system supporting elderly people by recognizing/monitoring their emotions. 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 Initiatives

8.2.1. ISICIL

The ISICIL ANR project had its mid-term review in June 2010 and was positively evaluated. 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.

As part of a paradigm of social epistemology, the project combines in an ergonomic approach, an impregnation of ground truth data, a bibliometric study and technological inspiration to offer schemas and inferences exploiting the semantic web and social networks to assist the Corporate intelligence. Initially, three core modules have been developed (tag management service, users' profiles service and a service coupling scraping and semantic wiki) to validate the architecture.

For the tag server, Edelweiss designed a semi-automatic method for semantic structuring of folksonomies: we compared and selected thirty distances for calculating the spelling variations that we combined with usage metrics (co-utilization, inclusion of communities). The use of SKOS (description thesaurus), SIOC and SCOT (for tags) to model the outcome of the analysis was extended by new ontologies published and open-source (SRTag and NiceTag) that support semantic contradictions between users.

For the profile server we designed schemas and algorithms for a series of operators for the semantic analysis of social networks. We signed a research agreement with the social network Ipernity that allowed us to test the algorithms on a network of 60,000 members and 500,000 relations typed in RDF. A first version of the model used for the representation of communities has been tested as well as several SPARQL formalizations for the calculation centrality parameterized by an ontology. A full test campaign is underway as well as a new work on the identification of communities.

Two Master Thesis have been performed [38], [39]. Deliverables: [36], [33], [34]. Web site: <http://isicil.inria.fr>.

8.2.2. DataLift

The DataLift ANR project started in September 2010 for three years. DataLift is a research project funded by the French national research agency. Its goal is to develop a platform to publish and interlink datasets on the Web of data. DataLift will both publish datasets coming from a network of partners and data providers and propose a set of tools for easing the datasets publication process. See <http://datalift.org>.

8.2.3. Kolflow

The Kolflow ANR project was accepted in 2010 and will start beginning of 2011 for three years. Kolflow aims at building a social semantic space where humans collaborate with smart agents in order to produce knowledge understandable by humans and machines. Humans are able to understand the actions of smart agents. Smart agents are able to understand actions of humans. Kolflow targets the co-evolution of content and knowledge as the result of interactions of humans and machines.

9. Dissemination

9.1. Animation of the scientific community

9.1.1. Program Committees

Olivier Corby:

The First International Workshop on Querying Graph Structured Data, EKAW 2010, ICCS 2010, IC 2010 & IC 2011.

Fabien Gandon:

2nd International Workshop on Advanced Enterprise Architecture and Repositories - AER 2010, <http://www.iceis.org/iceis2010/Workshops/aer/aer2010-cfp.htm>

3rd Workshop on Collective Intelligence in Semantic Web and Social Networks CISWSN 2010 <http://resources.smile.deri.ie/ciswsn2010/>

1st International Workshop on Consuming Linked Data, COLD 2010, <http://people.aifb.kit.edu/aha/2010/cold/>

13th International Conference on Database Theory and Extending Database Technology <http://ldb.epfl.ch/EDBTICDT/>

10eme Conférence Internationale Francophone sur l'Extraction et la Gestion des Connaissances, EGC 2010, <http://www.projets.rnu.tn/egc2010/>

ESWC 2010 PhD Symposium, <http://www.eswc2010.org/calls/phd-symposium>

IEEE Information Visualization Conference 2010 (IEEE InfoVis 2010),

<http://vis.computer.org/VisWeek2010/infovis/index.html>

Conference Intelligent Semantic Web, Applications and Services 2010 (ISWSA2010),

<http://iswsa.ipu.edu.jo/iswsa2010>

Journées MARAMi 2010, <http://www.irit.fr/MARAMI2010/access.php>

8th International Conference on Practical Aspects of Knowledge Management, PAKM 2010, <http://www.ischool.drexel.edu/PAKM2010/>

17e congrès francophone AFRIF-AFIA Reconnaissance des Formes et Intelligence Artificielle, RFIA 2010, <http://rfia2010.info.unicaen.fr/>

ACM Symposium on Applied Computing (ACM SAC 2010), "Semantic Web and Applications (SWA)", <http://www.acm.org/conferences/sac/sac2010/>

3rd international workshop Social Data on the Web (SDoW2010) <http://sdow.semanticweb.org/2010>

5th Workshop on Semantic Wikis (SemWiki 2010) <http://semwiki.org/semwiki2010/>

1st Workshop on Semantic Personalized Information Management, SPIM 2010 <http://www.dai-labor.de/spim2010/>

Second International Workshop on Trust and Privacy on the Social and Semantic Web, SPOT 2010, <http://spot.semanticweb.org/2010/>

Web Science Conference 2010, <http://www.websci10.org/>

Atelier Web Social, EGC 2010, <http://eric.univ-lyon2.fr/~social-web/WebSocial-2010/>

9th International Workshop on Web Semantics (WebS 2010), <http://www.faw.jku.at/woess/webs/webs.html>

IEEE/WIC/ACM International Conference on Web Intelligence (WI'10), <http://www.yorku.ca/wiiat10/>

2nd edition of the workshop "Web Intelligence and Virtual Entreprises" that will be associated to the PRO-VE'10 conference <http://www.pro-ve.org>

Alain Giboin:

Member of the organizing committee of DeVINT'2010, Huitième journée *Déficients visuels et NTIC*, Sophia Antipolis, France, May 20, 2010, <http://devint.polytech.unice.fr/>

Member of the organizing committee of the Colloque *Ergonomie des activités collectives (finalisées) : de l'analyse à la conception* dans le cadre des Journées scientifiques de Nantes, Université de Nantes, June 6, 2010.

Co-responsible of the teaching module *Coordination interpersonnelle* of the Ecole d'été du GDR CNRS *Psycho Ergo Théories et méthodes contemporaines en ergonomie cognitive*, Le Croisic, France, June 28 to July 2, 2010.

Isabelle Mirbel was program committee member for CAISE (International Conference on Advanced Information Systems Engineering) 2010.

9.1.2. Journals and Publishers

Olivier Corby was reviewer for : eHealth 3rd International ICST Conference on Electronic Healthcare for the 21st century, Data & Knowledge Engineering (DKE) Journal.

Fabien Gandon acted as a reviewer for the following journals, books and reviews:

IEEE Internet computing, <http://www.computer.org/portal/web/internet/home>

IEEE Transactions on Systems, Man, and Cybernetics, <http://www.ieeesmc.org/publications/index.html>

Data & Knowledge Engineering (DKE) Journal <http://www.elsevier.com/locate/datak>

Numéro spécial Revue Document Numérique sur les *Applications à base de SOC hétérogènes* <http://dn.revuesonline.com/>

Journal of Web Semantics, <http://www.elsevier.com/locate/websem> Two chapter reviews for *Virtual Community Building and the Information Society: Current and Future Directions*

Guillaume Erétéo was reviewer for the 11th Knowledge Engineering and Knowledge Management EKAW Conference.

Isabelle Mirbel is reviewer for Revue Ingénierie des Systèmes d'Information (Hermès).

9.1.3. Conference Organization

Olivier Corby will participate to the organization of a Workshop at IJCAI 2011 on *Second IJCAI International Workshop on Graph Structures for Knowledge Representation and Reasoning*

Fabien Gandon was co-organizer of PhiloWeb 2010, <http://web-and-philosophy.org/>

9.1.4. Review

Olivier Corby was reviewer for a Research Project of Région *Pays de la Loire*.

Fabien Gandon

ANR committee of the program CONTINT 2010

Evaluation committee of the project Web Intelligence (Rhône Alpes Region), October 14th.

Isabelle Mirbel was reviewer for the ANR CONTINT program

9.1.5. Invited Talks

Fabien Gandon

at Hypios (Paris, March 3rd); La Cantine (Paris, Silicon Sentier, May 19th); Ateliers Paris Web 2010 on *Web Sémantique, un baptême technique*;

University of Pau, CST UPPA, on *Prochain Arrêt, Web Physique*, February 11-12

Urfist et Médiacitain (le CRFCB) *Web Sémantique*, 6/04/2010.

Freddy Limpens

was invited at the DICEN symposium on tagging to present our collaborative approach to folksonomy enrichment

was also invited for a seminar at LIRMM, in Montpellier, to present our work on the combination of tagging and ontologies

Freddy Limpens, Nicolas Delaforge took part to the first conference on Web and philosophy, PhiloWeb 20107.

9.1.6. Standardization & Working Groups

Olivier Corby is member of SPARQL 1.1 W3C WG.

Fabien Gandon

W3C standardization activities: paper accepted and presented at the W3C Workshop on RDF Next Step to push some of our results in the next version of RDF [28]; Intervention at the eGov session of the technical plenary to present the DataLift project.

Member of Social Web W3C Incubator Group.

Editor of the RDF Schema and GRDDL profile for the Open Graph Protocol of Facebook.

Alain Giboin

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".

Isabelle Mirbel is a member of the IFIP Working Group 8.1 : Design and evaluation of information systems.

9.1.7. Misc.

Fabien Gandon acted as a consultant for GDF Suez DSI.

9.2. Teaching

Olivier Corby

Responsible of a Master Course at Polytech Nice on Semantic Web (45h)

Master Course at Polytech Nice on Knowledge Engineering (3h)

Licence Pro Course at IUT Nice on Semantic Web

Master Course for University of Danang in Vietnam in collaboration with University of Nice, on Semantic Web

Guillaume Erétéo

Course at SKEMA/CERAM Business School on *Social Medias*.

Fabien Gandon

Course on semantic web at University Gaston Berger, Saint Louis du Sénégal (18H).

Invited intervention Ecole Centrale de Paris *Web Sémantique ou comment les ontologies pourront favoriser l'échange des connaissances sur le web du futur*

Course on Semantic Web at EPU (Ecole Polytechnique UNS, Master 2 IFI) 45 hours plus several student projects.

Course on Knowledge Engineering, at EPU (Ecole Polytechnique UNS, Master 2 IFI) (32H).

Course on Semantic Web, License Pro., IUT, UNS (24H).

Introduction Course CERAM/SKEMA Business School on *Semantic Web* (3H x 2) January and October

Alain Giboin

EPU 3rd year, Parcours Interaction Homme Machine at UNS (University of Nice-Sophia Antipolis): (1) Module *Conception et évaluation des IHM* – Contribution to the organization of the module, lectures, participation to tutorials, and assessment of students' GUI projects. (2) Module *Paradigmes d'interaction Post-WIMP et évolutions des interfaces* : lecture on *Ergonomie des interfaces Post-WIMP*.

EPU, Module *Knowledge Engineering*: lecture on *Langages d'interaction*.

Freddy Limpens

Course in Master 1 in Computer Science at UNS on Web 2.0 technologies.

Noureddine Mokhtari

Licence MASS 2 at UNS, Creation of Web (10h) ;

Licence Info 1 at UNS, Introduction to the Web, (24h);

Licence Math/Math-Info 2 at UNS, GUI, (24h);

Licence Info 1 at UNS, Introduction to Object Oriented Programming (3h).

9.2.1. Jury

Olivier Corby

Jury member PhD Thesis Laura Mastella, Ecole des Mines de Paris (ENSMP) *Exploitation sémantique des modèles d'ingénierie: application à la modélisation des réservoirs pétroliers*. March 2nd, 2010

Fabien Gandon

Jury member (examineur/examiner) of the HDR defense of Olivier Curé *On the relationships between databases and ontologies in the context of the Web of Data*, Paris Est, October 11th.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Damien Cram *Découverte interactive de chroniques : application à la co-construction de connaissances à partir de traces*, Université Claude Bernard Lyon 1, September 30rd.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Claudia Marinica, *Association Rule Interactive Post-processing using Rule Schemas and Ontologies - ARIPSO*, Université de Nantes, October 26th.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Charbel Rahal, *Wikis sémantiques sur réseaux pair-à-pair*, Université Henri Poincaré, Nancy 1, November 9th.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Julien Subercaze *Un modèle d'agent sémantique. Application aux communautés virtuelles de connaissances*, INSA de Lyon, December 6th.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Mohamadou Thiam *Annotation Sémantique de Documents Semi-structurés pour la Recherche d'Information*. Universités Paris 11 Orsay et Gaston Berger du Sénégal, December 9th.

Jury member (rapporteur/ reviewer) of the Ph.D. defense of Nacim Chikhi *Calcul de centralité et identification de structures de communautés dans les graphes de documents*. Université Paul Sabatier Toulouse, December 17th.

External advisor for PhD dissertation of Julita Bermejo-Alonso, School of Engineering at the Universidad Politecnica de Madrid (Spain), *Ontology for Autonomous Systems: OASys*, June 9th.

First year Ph.D. validation for Christophe Thovex, Université de Nantes.

Isabelle Mirbel was jury member of the Ph.D. thesis of Jorge Luis Perez Medina, University of Grenoble, *Approche orientée services pour la réutilisation de processus et d'outils de modélisation*.

9.2.2. PhD Thesis

Freddy Limpens defended his PhD Thesis on *Multi-points of View Semantic Enrichment of Folksonomies*, October 25th, 2010, University of Nice - Sophia Antipolis.

Noureddine Mokhtari defended his PhD Thesis on *Extraction And Exploitation of Semantic Annotations from Text*, December 15th, 2010 University of Nice - Sophia Antipolis.

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Major publications by the team in recent years

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- [2] O. CORBY, R. DIENG-KUNTZ, C. FARON-ZUCKER. *Querying the Semantic Web with Corese Search Engine*, in "Proc. of the 16th European Conference on Artificial Intelligence (ECAI'2004), Prestigious Applications of Intelligent Systems", Valencia, Spain, R. L. DE MANTARAS, L. SAITTA (editors), August 22-27 2004, p. 705-709.
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- [6] A. DELTEIL, C. FARON-ZUCKER. *A Graph-Based Knowledge Representation Language*, in "Proceedings of the 15th European Conference on Artificial Intelligence (ECAI 2002)", Brighton, Lyon, France, F. VAN HARMELEN (editor), IOS Press, July 21- 26 2002, p. 297-301.
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Publications of the year

Doctoral Dissertations and Habilitation Theses

- [14] F. LIMPENS. *Multi-points of View Semantic Enrichment of Folksonomies*, University of Nice - Sophia Antipolis, October 2010.
- [15] N. MOKHTARI. *Extraction et exploitation d'annotations sémantiques contextuelles à partir de texte*, University of Nice - Sophia Antipolis, December 2010.

Articles in National Peer-Reviewed Journal

- [16] M. ZACKLAD, A. GIBOIN. *Applications à base de SOC hétérogènes : Thésaurus, ontologies, folksonomies (introductory article)*, in "Document numérique", 2011, to appear.
- [17] M. ZACKLAD, A. GIBOIN. *Systèmes d'Organisation des Connaissances (SOC) hétérogènes pour les applications documentaires*, in "Document numérique", 2011, to appear.

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- [18] A. BASSE, F. GANDON, I. MIRBEL, M. LO. *Frequent Graph Pattern to Advertise the Content of RDF Triple Stores on the Web*, in "Proc. Web Science Conference", Raleigh, NC, USA, April 2010, <http://www.websci10.org/>.
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- [22] O. CORBY, C. FARON-ZUCKER. *KGRAM: une machine abstraite de graphes de connaissances*, in "Proc. EGC, Extraction et Gestion des Connaissances, RNTI E-19", Hammamet, Tunisia, January 2010, p. 423-428.
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