FICHE NAVETTE: DOCTORANTS IDEX

SECTOR: Higher Education Institution

LOCATION: France, Grenoble

RESEARCH FIELD: Knowledge representation and Semantic Web

RESEARCHER PROFILE:
   □ *First stage researcher,*

INSTITUTION: Univ. Grenoble Alpes, University of Innovation

One of the major research-intensive French universities, Univ. Grenoble Alpes[1] enjoys an international reputation in many scientific fields, as confirmed by international rankings. It benefits from the implementation of major European instruments (ESRF, ILL, EMBL, IRAM, EMFL[2]). The vibring ecosystem, grounded on a close interaction between research, education and companies, has earned Grenoble to be ranked as the 5th most innovative city in the world. Surrounded by mountains, the campus benefits from a natural environment and a high quality of life and work environment. With 7000 foreign students and the annual visit of more than 8000 researchers from all over the world, Univ. Grenoble Alps is an internationally engaged university.

A personalized Welcome Center for international students, PhDs and researchers facilitates your arrival and installation.

In 2016, Univ. Grenoble Alpes was labeled «Initiative of Excellence ". This label aims at the emergence of around ten French world class research universities. By joining Univ. Grenoble Alpes, you have the opportunity to conduct world-class research, and to contribute to the social and economic challenges of the 21st century ("sustainable planet and society", "health, well-being and technology", "understanding and supporting innovation: culture, technology, organizations" "Digital technology").

Key figures:

- + 50,000 students including 7,000 international students
- 3,700 PhD students, 45% international
- 5,500 faculty members
- 180 different nationalities
- 1st city in France where it feels good to study and 5th city where it feels good to work
- ISSO: International Students & Scholars Office affiliated to EURAXESS

MANDATORY REFERENCES:
CDP TITLE: Patrimalp
SUBJECT TITLE: Conceptual modeling of cultural heritage artifacts: description, transformation

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[1] Univ. Grenoble Alpes

[2] ESRF (European Synchrotron Radiation Facility), ILL (Institut Laue-Langevin), IRAM (International Institute for Radio Astronomy), EMBL (European Molecular Biology Laboratory), EMFL (European Magnetic Field Laboratory)

and creation processes.

Scientific department (laboratory's name): LIG & EDYTEM

Doctoral School's: Mathématiques, Sciences et technologies de l'information, Informatique (MSTII)

Supporter's names: *D. Ziebelin (LIG), E. Chalmin (EDYTEM)*

SUBJECT DESCRIPTION:

The Patrimalp project aims at an interdisciplinary approach to tangible, intangible and virtual heritage. Scientists from different disciplines (art history, archaeology, physics, geology, computer science, geography ...) will have to cooperate to construct the scientific tools necessary to describe and analyse heritage art objects (Mohen 1999 ; E-HRSI). To allow us to obtain an interdisciplinary dialogue, some of the challenges are for professionals to understand each other, to define the various objects of study and to agree on the study protocols of these particularly complex heritage objects.

The objective of this thesis is therefore to create a conceptual model to describe heritage objects and the transformation processes related to each object and each element of the object. This model dedicated to multiple disciplines will solve the interoperability problem from one discipline to another.

Thus the model is composed of several elements to represent the different kinds of information necessary for the representation of the heritage object:

- Description of the heritage object with its patterns motifs and ornaments
- Techniques and know-how necessary to create the object
- Cultural and natural environment: description of the context
- Materials and equipment: raw materials, processed materials, altered materials, equipment and tools
- Analysis techniques (diffraction, spectroscopy, image analysis, radiation).
- ...

The interoperability of models and processes remains a scientific challenge for knowledge representation languages. Considering the semantic interoperability between models requires the development of a knowledge representation language which reflects generic vs specific links, part vs whole elements and similarities between concepts.

This model will thus be able to describe the process used to create the heritage object, as well as how it was modified through time. It will take into account temporal granularity and time scales, which are a challenge in themself. Finally, it will be necessary to pinpoint the location of this item on a space scale which can vary from a micron to a geographic region.

To compare and to represent our needs we will consult established models such as EDM Europeana (Europeana Data Model) [EDM 2017] -which allows an organization to publish its data, making it semantically interoperable. However, our proposed scheme deals with process descriptions of building and restoring the object which is not present in EDM, as EDM is dedicated to "the life of cultural objects". It can express "cultural object centred" descriptions or "event-oriented" description, according to the use made of the cultural object. For example a series of events such as the creation, the purchase the classification, and the restoration of the cultural object may be shown. The EDM model is a consensual model to describe both library, museum and archive data, by taking into account the diversity of local models of different institutions, by describing specific needs of a domain, by avoiding the loss of local data and by keeping the levels of detail contained in the original local data. These multiple requirements explain the necessity to distinguish cultural objects from their numerical representations and their metadata and to authorize several models for the same object (which can potentially contain contradictory information). Cultural objects must also be compatible with the objects of which they are composed, with contextual resources, possibly named with the local vocabulary concepts.

To sum up, the model built during the thesis needs to be compatible with EDM and ISO 21127 standards on cultural objects, it will focus on environmental and cultural contexts, components, processes, the changes through time and trajectory with time and space of these objects.

Deliverables

Step 1 using existing technologies: Technical proposition: The three models and ontologies will be implemented in a tool using knowledge representation technology (SKOS, OWL and RDF graph) [W3C 2006], to ensure interoperability of this model with open and linked data models. These techniques allow the publication of information in the web of data.

- From a semantic point of view, the heritage object model must take into account: its numerical representation of the concepts with the different academic domains related to its study; its contextual information (history, museums, heritage …)
- From an implementation point of view, the model will cover notions of abstraction, composition, disciplinary vocabulary, and temporality.
- From a deduction and inference point of view, the model will propose deduction rules and inference mechanisms to allow information retrieval and inference between different disciplines by taking into account the spatial and temporal granularity.

Step2 providing new models and tools: This multi-domain ontology will be built and used to index the resources and data sets in different sites (as linked data architecture); the model will include transformation process medialization and transformation rules.

Step 3 implementing of the multipoint of view model in the Patrimalp integrated patrimonial platform.

5 references to support the work
Mohen, JP. 1999. Les Sciences du patrimoine : Identifier, Conserver, Restaurer. Odile Jacob, Sciences et art. 385p.
E-RHIS : institution européenne de recherche pour les sciences du patrimoine, http://www.erihs.fr
[EDM 2017] http://pro.europeana.eu/share-your-data/data-guidelines/edm-documentation
[W3C 2006] https://www.w3.org/RDF/
SKOS: https://www.w3.org/2004/02/skos/
OWL : https://www.w3.org/TR/owl-features/
https://www.w3.org/2006/07/SWD/SKOS/skos-and-owl/master.html

ELIGIBILITY CRITERIA
Applicants:
- must hold a Master's degree (or be about to earn one) or have a university degree equivalent to a European Master's (5-year duration), with multidisciplinary interest.

The ideal candidate holds an MS degree in computer science or a related field and is able to consider both theoretical and practical implementation aspects in her/his work. Fluent English communication and interest for developing software solutions. The candidate should have experience and commitment to work on one of the following fields:
* semantic web technologies, linked data and data integration
* knowledge representations and ontology engineering
* spatial and temporal knowledge representation and reasoning

Applicants will have to complete online an application form and send their cv, last diploma, and a short presentation of their scientific project (2 to 3 pages max) via email to BOTH supervisors : Danielle.Ziebelin@imag.fr AND emilie.chalmin-aljanabi@univ-smb.fr
Letters of recommendation are welcome.

Selection process
Application deadline: **27/06/2018** (June 27th) at 17:00 (CET)

Applications will be evaluated through a three-step process:

1. Eligibility check of applications in 27/06/2018 (June 27th)
2. 1st round of selection: a Review Board will evaluate the applications June 30th. Results will be given in 01/07/2018.
3. 2nd round of selection: shortlisted candidates will be invited for an interview session, on July 01th – 10th of July 2018 weeks.

TYPE of CONTRACT: temporary-3 years of doctoral contract
JOB STATUS (Full time or part time): Full time
Hours per week: 35
Offer starting date: 01/10/2018
Application deadline: 27/06/2018 at 17:00 (CET)
Salary: between 1769 € and 1989.80€ brut per month (depending on complementary activity or not)