



## Use of ontologies in systems biology and health

28 Octobre 2014 – 14h00-18h00

Institut des Systèmes Complexes Paris Île-de-France  
<http://www.iscpif.fr/>  
 113 rue Nationale - 75013 Paris (Métro Nationale ou Tolbiac)

**Register here to participate:** <http://doodle.com/z2iudtsaz8gxn29z>

### Tuesday October 28th 2014

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|--------|--|--|
| 14:00- | <b>Pierre Grenon</b><br>UCL, Centre for Health Informatics & Multiprofessional Education (CHIME)- London   | "Ontology-based Knowledge Representation for Physiology and Applications to Data Management" |
| 15:00- | <b>Marie Christine Jaulent</b><br>Laboratoire d'informatique médicale et d'ingénierie des connaissances pour la e-santé (LIMICS) - UMR S 1142 UPMC | « Interopérabilité des systèmes d'information en santé »                                     |
| 15:30- | <b>Jean Charlet</b><br>Laboratoire d'informatique médicale et d'ingénierie des connaissances pour la e-santé (LIMICS) - UMR S 1142 UPMC            | « Ontologies biomédicales pour le dossier patient informatisé »                              |
| 16:15- | <b>Coffee break/ Poster</b>  |  |
| 16:45- | Bin Yang & Jean-Gabriel Ganascia   |  |
| 17:15  | Laboratoire d'Informatique de Paris 6  | " Creating knowledge maps using Memory Islands "   |
| 18:00  | UPMC-Acasa group   |  |
| 17:15- | <b>Discussions</b>   |  |
| 18:00  |  |  |

Organization and contact: [veronique.thomas-vaslin@upmc.fr](mailto:veronique.thomas-vaslin@upmc.fr)

**Register here to participate:** <http://doodle.com/z2iudtsaz8gxn29z>

To know more ...

**Pierre Grenon** is a research associate at CHIME (<http://www.ucl.ac.uk/chime>), UCL in London. He has been an ontologist in the R&D industry and academia for a number of years. His work currently centres around the two poles of: i) knowledge representation and reasoning in physiology and 2) semantic integration using ontologies for the management of models and data in the physiological, medical and pharmaceutical domain.

**Abstract**

Ontology-based Knowledge Representation for Physiology and Applications to Data Management

Physiology is here conceived in the broad sense and, as such, there are numerous and varied resources gathering information, knowledge and data, about physiology. These resources are on a spectrum between the general (large protein-protein interaction databases) and the specific (individual patient records) with innumerable intermediate cases (clinical trials and population pharmacokinetic models, for example). Given this diversity, in order to allow for the management of these resources, information science applies itself to pursuing the goal of semantic integration which is to make all these resources accessible, inter-communicable and jointly reusable in a common platform or framework. Ontologies are a kind of theoretical artefacts designed to specify a description of a domain of reality. Ontology-based semantic integration is semantic integration using ontologies as the core stepping stone to bring together heterogeneous resources in a standardised, reusable and machine processable way. The landscape surrounding ontological engineering (the development of ontologies) and their application is broader than the central question of semantic integration of resources. In this presentation, we will survey this landscape in the context of physiological knowledge and data management and overview i) ontologies and ontological engineering, ii) the role(s) of ontologies in applications that provide support to resources and data management and how they get involved, as well as iii) the higher end visualisation of physiological knowledge and data through the ontological lenses.

**Relevant publications**

Pierre Grenon, Bernard de Bono. Eliciting candidate anatomical routes for protein interactions: a scenario from endocrine physiology. *BMC Bioinformatics* 04/2013; 14(1):131.

Bernard de Bono, Pierre Grenon, Stephen John Sammut. ApiNATOMY: a novel toolkit for visualizing multiscale anatomy schematics with phenotype-related information. *Human Mutation* 05/2012; 33(5):837-48.

Bernard de Bono, Robert Hoehndorf, Sarala Wimalaratne, George Gkoutos, Pierre Grenon. The RICORDO approach to semantic interoperability for biomedical data and models: strategy, standards and solutions. *BMC Research Notes* 08/2011; 4:313.

**Web site**

<http://apinatomy.org/>

<http://open-physiology.org>

**Marie-Christine Jaulent**, PhD in Artificial Intelligence and fuzzy logics, is a research director at INSERM and lead the Inserm-LIMICS team. Her main domains of interest include the development of methods to represent medical knowledge and to develop decision support systems, tools for collaborative work modelling as well as qualitative approaches for data mining (terminological reasoning). She has been involved in several EU R&D projects, the most recent being the “semantic health net” network of excellence, the PROTECT project, the EHR4CR project and the SALUS project.

**Abstract**

As the adoption of electronic health records (EHRs) increases, there has been a growing potential of exploiting this data both for enabling better care and also for enabling clinical research and public health studies through secondary use of EHR. One of the key challenges to be addressed to fulfil this great potential is enabling semantic interoperability. In this talk, I will address the integration challenge for querying and aggregating EHRs from disparate resources in the context of 2 European projects : 1) to allow health care systems to better address the rise of antimicrobial resistance and improve their management (the Debug-IT project) and 2) to allow the reuse of data collected in EHR for clinical research (EHR4CR project)

#### Relevant publications

- 1) Bousquet C, Sadou E, Souvignet J, Jaulent MC, Declerck G. Formalizing MedDRA to support semantic reasoning on adverse drug reaction terms. *J Biomed Inform.* 2014 Jun;49:282-91.
- 2) Assélé Kama A, Choquet R, Mels G, Daniel C, Charlet J, Jaulent MC. An ontological approach for the exploitation of clinical data. *Stud Health Technol Inform.* 2013;192:142-6.
- 3) Ouagne D, Hussain S, Sadou E, Jaulent MC, Daniel C. The Electronic Healthcare Record for Clinical Research (EHR4CR) information model and terminology. *Stud Health Technol Inform.* 2012;180:534-8.
- 4) El Fadly A, Rance B, Lucas N, Mead C, Chatellier G, Lastic PY, Jaulent MC, Daniel C. Integrating clinical research with the Healthcare Enterprise: from the RE-USE project to the EHR4CR platform. *J Biomed Inform.* 2011 Dec;44 Suppl 1:S94-102.

**Jean Charlet** is originally a computer scientist from École Centrale de Paris, full-time researcher at the Assistance Publique—Hôpitaux de Paris and works with the INSERM U1142 research laboratory on “knowledge engineering in e-Health” in Paris. His main domains of interest include methods to build ontology from textual corpora, formal ontologies, Electronic Health Record and non formal annotation on the EHR, and epistemological reflections about structuration of medical knowledge.

#### Relevant publications:

Describing localized diseases in medical ontology: an FMA-based algorithm. Charlet J, Mazuel L, Declerck G, Miroux P, Gayet P. *Stud Health Technol Inform.* 2014;205:1023-7. PMID: 25160343

Dhombres F., Vandenbussche P., Rath A., Olry A., Hanauer M., Urbero B. et Charlet J. OntoOrpha : an ontology to support edition and audit of rare diseases knowledge in orpha- net. In Proceedings of the International Conference on Biomedical Ontology, pages 241–3, Buffalo, NY, USA, juillet 2011. Barry Smith, University at Buffalo, Buffalo, NY, USA. [poster].

Cormont S., Vandenbussche P.-Y., Buemi A., Delahousse J., Lepage E. et Charlet J. Implementation of a platform dedicated to the biomedical analysis terminologies management. In Actes AMIA Annual Fall Symposium 2011, Washington, DC, novembre 2011. AMIA.

[Representation of knowledge in respiratory medicine: ontology should help the coding process]. Blanc FX, Baneux A, Charlet J, Housset B. *Rev Mal Respir.* 2010 Sep;27(7):741-50. doi: 10.1016/j.rmr.2010.06.012. Epub 2010 Aug 9. French. PMID: 20863975

Charlet J. The management of medical knowledge : between non-structured documents and ontologies. *Annales des télécommunications*, 62(7-8) :808–26, 2007.

Building medical ontologies by terminology extraction from texts: an experiment for the intensive care units. Charlet J, Bachimont B, Jaulent MC. *Comput Biol Med.* 2006 Jul-Aug;36(7-8):857-70. Epub 2005 Sep 29. PMID: 16198328

Ontology proposed under creative commons licenses :

Dhombres F., Aymé S., Rath A., Olry A., Vandenbussche P. et Charlet J. OntoOrpha 2011. Orphanet Ontology of Rare diseases. Available under Creative Commons license "Attribution-Non-Commercial-No Derivative Works 3.0 UK" at : <http://bioportal.bioontology.org/ontologies/1586>. Details of this license are accessible at : <http://creativecommons.org/licenses/by-nc-nd/3.0/>.

Baneux A. et Charlet J. OntoPneumo 2011. Reengineering of an ontology developed in Pneumology domain. Available under Creative Commons license "Attribution-Non-Commercial-No Derivative Works 2.0 UK" at : <http://purl.oclc.org/NET/spim/ontologies/public/OntoPneumo/>. Details of this license are accessible at : <http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>.

Charlet J. et Mazuel L. OntoRéaChir 2010.. Reengineering of an ontology developed in Surgical intensive care domain. Available under Creative Commons license "Attribution-Non-Commercial-No Derivative Works 2.0 UK" at : <http://purl.oclc.org/NET/spim/ontologies/public/OntoReaChir/>. Details of this license are accessible at : <http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>.

Charlet J. et Mazuel L. OntoMénélas, 2009. Reengineering of project Ménélas Ontology developed in cardiac Surgery domain. Available under Creative Commons license "Attribution-Non-Commercial-No Derivative Works 2.0 UK" at : <http://purl.oclc.org/NET/spim/ontologies/public/OntoMenelas/>. Details of this license are accessible at : <http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>.

**Bin Yang, and Jean-Gabriel Ganascia**, ACASA Team, LIP6 laboratory, University Pierre and Marie Curie  
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**Abstract:** Knowledge maps are useful tools for managing and sharing the large-scale hierarchical knowledge that have recently started to be widely applied. In this paper, we discuss how knowledge maps can be generated by using Memory Islands. Memory Islands is our work on progress visualization technique, which was inspired by the ancient "Art of Memory". It consists of automatically creating the spatial cartographic representation of a given hierarchical knowledge (e.g., ontology) and with the help of its interactive functions, the users can navigate through the artificial landscape, to learn from the knowledge and retrieve them. We present some preliminary results of representing different hierarchical knowledge to show how the knowledge maps created by our technique work.

**Relevant publications:**

Yang, B and Ganascia, J-G,: Memory Islands: an approach to cartographic visualization, In: Classification & visualization: inter-faces to knowledge: proceedings of the International UDC Semi-nar. Edited by Aida Slavic, Almila Akdag Salah, Sylvie Davies. Wurzburg: Ergon Verlag, pp 137-152. (2013)

Yang, B and Ganascia, J-G,: Creating knowledge maps using Memory Islands, In: proceedings of Knowledge Maps and Information Retrieval (KMIR) workshop at ACM/IEEE Digital Libraries 2014, London, UK. (2014)

Yang, B and Ganascia, J-G,: Cartographie des connaissances dans les humanités numériques par l'Îles de mémoires – une démonstration, In: l'atelier Visualisation d'information, fouille visuelle de données et nouveaux challenges en Big data, Open data, Humanités numériques at IHM 2014, Lille, France. (to appear)

**Web site for Memory Islands:** <http://www-poleia.lip6.fr/~polyle/>

Poster

**The autoimmune diseases ontology**

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<http://www.i3-immuno.fr/en/#People/WB>

**Abstract**

Autoimmune diseases are diverse and complex, this poses some problems for diagnosis and for seeking for common feature. We propose here to build an ontology of autoimmune disease:

- To develop a systemic approach for the study and the understanding of the autoimmune pathologies
- To standardize the vocabulary between the different actors: physicians, biologists, clinicians, computer scientists...

- To put in place an integrative system of computer assisted diagnosis tool.