

Post doc subject: Towards System of Information Systems: a proactive Product Lifecycle Management approach

Post doc Advisor:

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Context of the study:

The post doctorate is part of the project activities of the Laboratory of Excellence (LABEX) at the University of Technology of Compiègne in France on the Control of Technological Systems of Systems (MS2T) (www.utc.fr/labexms2t).

Product Lifecycle Management (PLM) is a business strategy that aims to create, manage and share design, manufacturing, maintenance and recycling information of industrial product throughout its life cycle, from the ideas to the end of life (CIMdata, 2002). PLM is associated with a set of applications related to product development process (CAD/CAM/CAE...) and supporting information systems (PDM, ERP, CRM, SCM...).

All the enterprise information systems of PLM strategy were long seen as "integrable" in the sense of (Chen et al., 2008), i.e. it would be possible to gather all the information and all the functions in a single PLM system. But these systems meet specific business needs and are very different one from each other. In addition, each company has its own goals, its own semantic, its own processes and best practices... The IS therefore remains autonomous, with its own functions, an independent evolution and they are geographically remote. The vision of a meta-system managing all PLM systems is becoming less and less accepted in the scientific community and the ongoing works focus on federative approaches where each IS maintains its independence and exchanges with other IS dynamically. Moreover, in an extended enterprise context, these PLM systems must cooperate and the IS set will evolve as the project runs, the partners involved evolve ... joining or leaving the extended enterprise. In this context, these IS can be seen as a system of systems (SoS) (Bilal et al., 2014). It remains to give to this SoS a key feature of SoS, proactive cooperation capacity. The problem that arises is how to allow this interaction between information systems through information flow management and distributed use of this information. This research is related to the topic 1.2 of the 1st axis is Labex "Distributed information processing".

Post doc description:

Therefore we propose to expand existing approaches including both a goal oriented Multi-Agent System (MAS) (Barthes, 2011) and business processes (Fückner et al., 2013) to enable a proactive approach for PLM in their information and services exchange. The studied process will be a collaborative design process, used both at the macro level (collaboration process between two collaborating companies) and micro (process of services and information exchange between two engineers collaborating on designing a product). The agents will then be used to support these business processes and search for information and the most appropriate services throughout the PLM. This approach will allow both to address the interoperability issues at the technical level (use of agents) and organizational level (business process definition). At the semantic level, the proposal is based on a network of product design ontologies that rely on the model Product Activity Resource Organization (PARO) (Le Duigou et al., 2012; Arduin et al., 2015). We propose to enrich our product design ontologies with recent works lead in the Roberval laboratory (digital simulation (Blondet et al., 2015), manufacturing machining (Danjou et al., 2015), mechatronics design (Zheng et al., 2014)) using MEMORAe approach (Abel et al., 2004), in particular by including mechanical and design rules.

The post doctorate duration is 12 months. The research will include:
State of the art on MAS in PLM context
Definition of the MAS architecture and the collaborative PLM business processes
Implementation of MEMORAe ontologies linked with OMAS and ARAS PLM platforms

Candidate's profile:

Knowledge or competences required in:

- Multi-Agent System
- Product Lifecycle Management
- Collaborative Design Business Process
- Ontology

Documents required to apply:

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- Curriculum vitae
- Motivation letter
- At least two references and/or recommendation letters
- A statement of research experience and interests

Location:

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