



Post doc subject:

Analysis of the impact of intermediate objects on the *agilisation* of project management methods

Post doc Advisor:

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Context of the study:

The planned work aims to concretize a collaboration initiated nearly a year ago around the notion of agility or even emergence. The notion of agility has indeed been at the heart of recent work carried out by Matthieu Bricogne (Bricogne, 2015), who drew inspiration from agile methods from software development (Sommerville, 2010) et manufacturing (Matthews et al., 2006), to propose evolutions in the way complex systems are designed. Indeed, (Sommer, Dukovska-Popovska and Steger-Jensen, 2014) insist that so-called classical design methods, named here as project-planned, are not intended to respond to unexpected changes. On the opposite, agility makes possible to respond to changes - anticipated or unexpected - in an appropriate and time efficient way, or even to take advantage of them as opportunities.

The concept of agility is also a subject of interest for Isabelle Cailleau. Initially used in teaching, the studies carried out on industrial case studies have highlighted the limits of the predictability assumption induced by traditional project management methods. More specifically, it is difficult to specify the need at an early stage and the context changes throughout the design of the system. Moreover, innovation implies technical and organisational unpredictability and formalization, induced by traditional methods, remains very costly. In cases where agility has produced convincing results, it can be seen that the circulation of "intermediate objects" (IO) in the sense of (Vinck, 2011) seems to play a decisive role. In addition, their digital realization involves technological properties such as transformation, manipulability, modelling, networking, etc. (Crozat *et al.*, 2011). They open up new possibilities that can be observed in the ability of digital IO to facilitate the agility of interactions (continuous transformations by actors, action framing, circulation, etc.).

This concept was used in the design of mechanical products in the late 1990s (Mer, Jeantet and Tichkiewitch, 1995). It then referred to "a drawing, a model, a prototype, a broken product, a list or a screenshot" (Kooli-Chaabane, Boly and Yannou, 2014) and therefore systematically to the product we were trying to design. It is also based on an interactionist approach based on the sociology of science and the ethnography of design processes. It highlights that IO can contribute to the emergence of common representations and even participate, through their properties, not only in the emergence of technical solutions but also of ad hoc organizations. This is why it seems to us today appropriate to invoke it again, by integrating the implications of digital materialization, in order to identify the conditions for the emergence of agile project organization modes capable of supporting the design of increasingly complex SoS.

In this work, the SoS notion is mobilized in two ways. First, the expected product of the design project is a multidisciplinary system that should generally be part of a SoS, e.g. a manufacturing facility for the factory of the future. Second, the organization of the design project is considered as a SoS, facing complexities and unpredictability. Agile co-construction based on IO, referring 1) to the system to be designed, but also 2) to the organization of the design project, is envisaged to provide emerging solutions to the challenges mentioned above.



HR EXCELLENCE IN RESEARCH

Post doc description:

In this context, the postdoctoral candidate will have to determine the operational indicators necessary for the dynamic management of the project. He/she will have to propose processing and representation methods for these indicators that will promote the appropriation and self-organization of the team in charge of designing the SoS. To this end, these indicators and any other object intended to facilitate *agilisation* will be designed as full-fledged actors in the design process. The impact of these IO will then have to be assessed.

Although no formal agreement has been concluded at this stage, various companies that are particularly advanced in the field of project management *agilisation* have been identified and should be mobilised for the studies conducted.

Relation with the Labex research axes: this postdoc proposal initiates collaboration between Costech and Roberval laboratory within the 4th MS2T research axis (Dynamics of Systems of systems: emergence and agility) and with the 3rd research axis of the EUR (Dynamic in SoSs: robustness and agility). The work will also take place within the “T2 - Factory of the future” technological axis, because the preferred field of study will be manufacturing companies involved in this initiative, leading to their production methods transformation.

The duration of this postdoc position is 12 months.

Candidate's profile:

While having advanced knowledge in industrial engineering and multidisciplinary system design (mechatronics, cyber-physical system), the candidate must demonstrate at least a very particular sensitivity for the human and social sciences.

Documents required to apply:

Send to matthieu.bricogne@utc.fr and isabelle.cailleau@utc.fr

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

Location:

Roberval Laboratory, FRE CNRS-UTC 2012

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References:

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