

10th IFAC conference New challenges for management and control in the Industry 4.0 era Nantes (France) June 22th-24th, 2022

Invited session: The future of Interoperability in the enterprise of the future

Code:

Organizers: Farouk BELKADI (Centrale Nantes – LS2N Laboratory)

Hervé Panetto (University of Lorraine – CRAN Laboratory)

firstname.lastname@ls2n.fr ; firstname.lastname@univ-lorraine.fr

Within the perspective of the intelligent enterprise and industry 4.0, many developments have taken place in recent years, at both on technological and organizational aspects. These developments can be summarized in the following points:

- (1) Proliferation of information systems for all the company's businesses departments with an increasing demand to ensure digital continuity throughout the whole value chain;
- (2) Variety of information system types and development standards commercialized through conventional licenses, open source, Software as a Service, Cloud based and specific offers;
- (3) Emergence of new types of communicating technological systems: cyber-physical systems, sensing devices, Internet of Things, cloud, and virtual/augmented reality.
- (4) New types of information systems for managing large amounts of data and decision aid, using Artificial Intelligence and knowledge engineering techniques;
- (5) Permanent (re)structuring of company processes to adapt to new commercial opportunities and competitive constraints via innovative product and/or service offers;
- (6) Growth of collaboration and partnership practices between companies, while keeping autonomous and flexible mode of functioning;
- (7) Need for modular and reconfigurable workshops for product customization (mass customization) implying an important challenge of automation of industrial processes.
- (8) Strong requirements on security and real time data sharing, without loss or redundancy.

All Industry 4.0 technologies tend to be integrated in a global digital chain, at all managerial and operational levels. By the way, the structure and consistency of this digital chain is in constant evolution. For example, CAD/CAE (Computer Aided Design/Engineering) tools dedicated to product representation should be connected to virtual factory tools and other CAM (Computer Aided Manufacturing) tools for manufacturability analysis and process simulation within a global PPR approach. New Internet of Things technologies have improved significantly the communication and monitoring capabilities of cyber-physical systems in conjunction with legacy enterprise information systems. The large amount of data harvested in this way is exploited in digital twin software that provides real-time simulation for the control and diagnosis of production systems by taking into account the current state of manufacturing resources. However, a connection with MES (Manufacturing Execution systems) and ERP (Enterprise Resource Planning) information systems is needed to couple the diagnostic and analysis functions with the planning and execution functions to provide a closed loop control. This observation is also applicable for virtual/augmented reality technologies to assist operators in certain manufacturing and maintenance tasks. This tools require product/resource models generally stored in PLM (Product Lifecycle Management) systems.

Therefore, the need to integrate heterogeneous ICT tools has not only revolutionized the role and operating modes of enterprise information systems, but has also challenging the conventional vision of the interoperability concept. This conducts also to other evolution challenges coming from organizational and productivity constraints. Indeed, since the technological evolutions of Industry 4.0 have given to the company new competitive levers that make it more intelligent and connected, agile operational structures relying on automation and flexible processes are required to support such new ways of doing.

Similarly, the new paradigms of economic sustainability are pushing companies to establish privileged collaborations along a development project in order to better exploit the capacities of internal and external resources. These collaborations can be permanent or temporary in virtual organizations or extended enterprises. But in both cases, the main issue remains the integration of each partner (or supplier) in the main project, and consequently the degree of sharing and access to information. This translates into a fundamental requirement for a dynamic interoperability strategy that manages the level of data connection according to the integration strategy of partners in the collaborative process.

Considering all the above aspects, the aim of this invited session **is to discuss the impact of new technological and organizational evolutions related to industry 4.0 and smart enterprise paradigms on interoperability strategies and developments**. Contributions on the following topics are at the kernel of this session:

- New standards and models for semantic and technical interoperability in the era of industry 4.0
- Special connectors for digital twin and digital shadow systems
- Impact of interoperability issues on real time management of big data assets
- Cloud solutions and interoperability
- IoT as an interoperable solution for the factory of the future?
- Agile collaborative processes as organizational connectors in context of Product-Service Systems and other sustainable development projects.
- Dynamic connector infrastructures to support the rapid evolution of technologies ...

The above list is not exhaustive. All relevant contributions on this domain of interest are welcome. The originality of the session is to address the question of interoperability challenges from both technological and organizational perspectives.

Papers must be submitted electronically using the IFAC PaperPlaza Conference Manuscript Management System: www.ifac.papercept.net . All submissions must be in PDF format, written in English, and prepared according to the IFAC format. The name and the code of the invited session should be selected during the submission process.