



# Undergraduate Project 2016-2017

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## **Project title: Ontologies for manufacturing**

### **Background**

This project is proposed in the context of the FIRST research project

Uber, Amazon, AirBnB, Netflix... The Internet has had many impacts on the economy. Not only on the consumer market, but widely across the service sector. There is a large amount of integration and automation to enable things like instant order confirmations. Work in these aspects of business processes is quite well established in the service sector.

Manufacturing is a key part of the economy. To remain competitive or become even more so, automation that supports innovation is also essential for the manufacturing sector. Advanced ICT supported manufacturing is currently gaining a lot of traction with initiatives such as Industrie 4.0 in Germany, Factory of the Future in Italy and the High Value Manufacturing Catapult the UK. Part of this development is advanced coordination of manufacturing allowing for increased flexibility and reduced costs. A virtual factory ensures exchange of data between smart machines, systems, software and design within the manufacturing chain. Manufacturing processes become more simple through plug-and-play techniques.

### **Project description**

In computer science and information science, an ontology is a formal naming and definition of the types, properties, and interrelationships of the entities that really or fundamentally exist for a particular domain of discourse. Building ontology or ontological models is a common solution to support interoperability [1], which allows sharing and exchange of different manufacturing data, service/assets, or processes from different virtual factory data resources.

## **Project aims**

The aims of this final year project are:

- Identify existing manufacturing ontologies
- Design a comparison framework for the ontologies
- Compare the ontologies based on the framework

## **Research question**

## **Artefact**

- Comparison framework
- Comparison outcomes

## **Evaluation**

- How easy is it to use the comparison framework?
- Are the results repeatable?
- How does the framework compare to other domains?

## **References**

- [1] Xu, L., De Vrieze, P. and Wei, L., 2014. Supporting Interoperability of Virtual Factories. In: Camarinha-Matos, L.M. and Afsarmanesh, H., eds. PRO-VE'14: 15th IFIP Working Conference on Virtual Enterprises 6-8 October 2014 Amsterdam, The Netherlands. 510-517.
- [2] Lin, H.K. and Harding, J.A., 2007. A manufacturing system engineering ontology model on the semantic web for inter-enterprise collaboration. *Computers in Industry*, 58(5), pp.428-437.
- [3] Lemaignan, S., Siadat, A., Dantan, J.Y. and Semenenko, A., 2006, June. MASON: A proposal for an ontology of manufacturing domain. In *IEEE Workshop on Distributed Intelligent Systems: Collective Intelligence and Its Applications (DIS'06)* (pp. 195-200). IEEE.
- [4] Tolio, Tullio, et al. "Virtual Factory: An Integrated Framework for Manufacturing Systems Design and Analysis." *Procedia CIRP* 7: 25-30. (2013)
- [5] Terkaj, Walter, and Marcello Urgo. Virtual Factory Data Model to support Performance Evaluation of Production Systems. *Proceedings of OSEMA 2012 workshop, 7<sup>th</sup> international conference on formal ontology in information systems, Graz, Austria.* (2012).