



SeDIM: Semantic Data Integration for Manufacturing *Semantic AI-Solutions for Industry 4.0*

Use Case No 2

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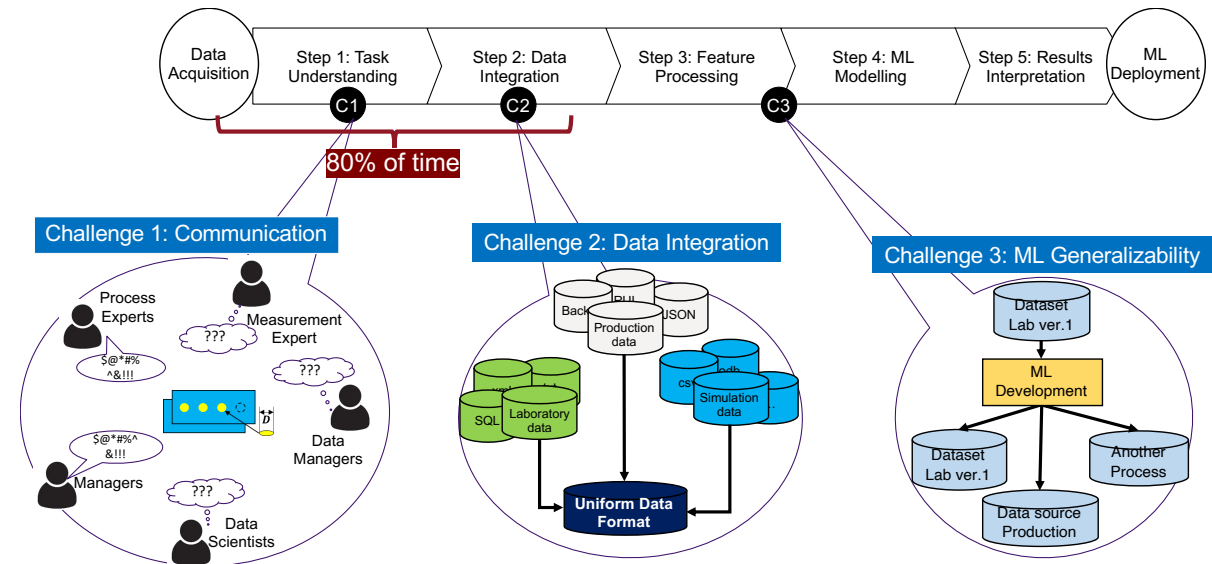
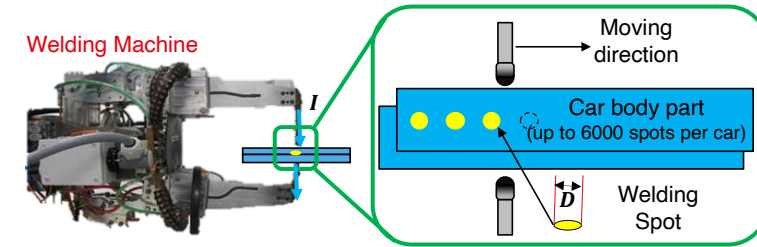
OntoCommons Workshop, March 2021



Robert Bosch GmbH, Bosch Center for AI

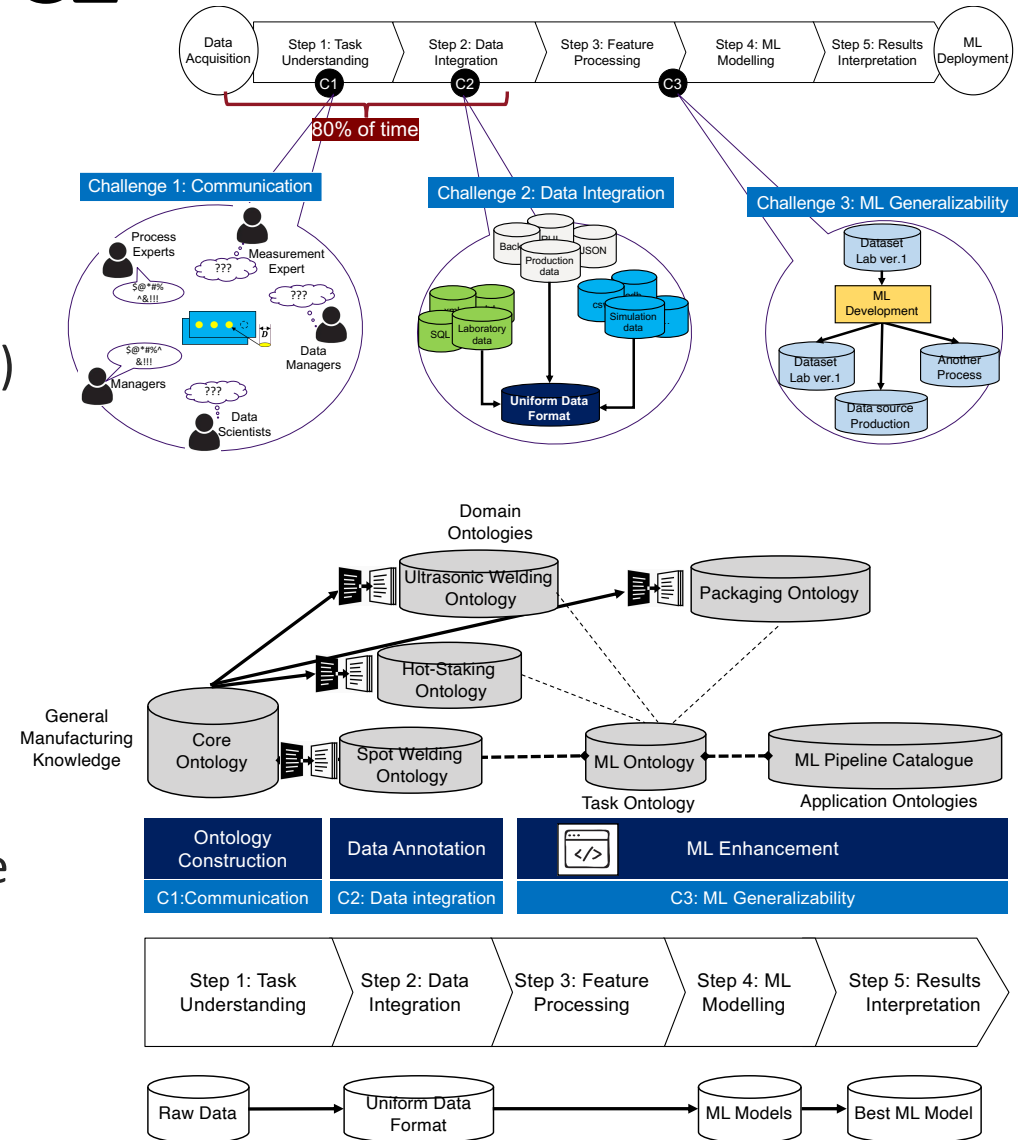
- The Bosch Group is a leading global supplier of technology and services with 394,500 associates worldwide (as of December 31, 2020). Its operations are divided into four business sectors:
 - Mobility Solutions, Industrial Technology, Consumer Goods, Energy and Building Technology
- As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source.
- The Bosch Group’s strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help.
- Involved partners: University of Oslo

- AI is one of the central pillars of Industry 4.0 and IoT, it empowers manufacturing by representing physical equipment and processes with data and models such Digital Twins, that in turn allow for production simulation, process monitoring, analytics and optimization.
- We address this by offering an abstraction layer powered with ontologies that mediates between the stakeholders involved in AI-solution development in enterprises, e.g., data scientists, domain experts, and the industrial data.
- With the help of symbolic AI methods that account for Knowledge Graphs, ontologies, and rules, the abstraction layer will formally capture manufacturing domain knowledge, analytical routines, ML modules and pipelines, as well as the tasks that ML solutions aim at solving.



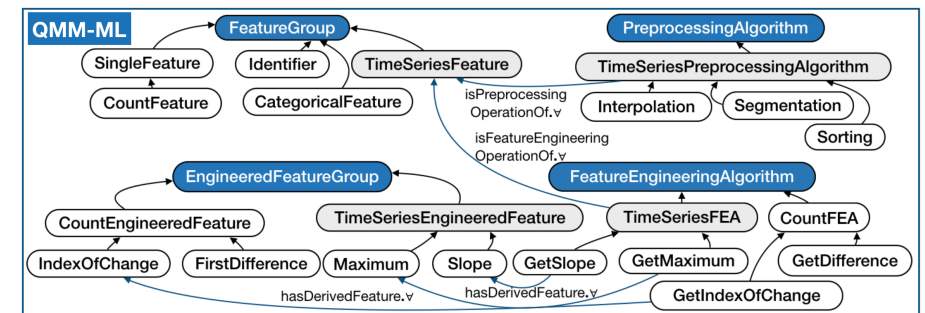
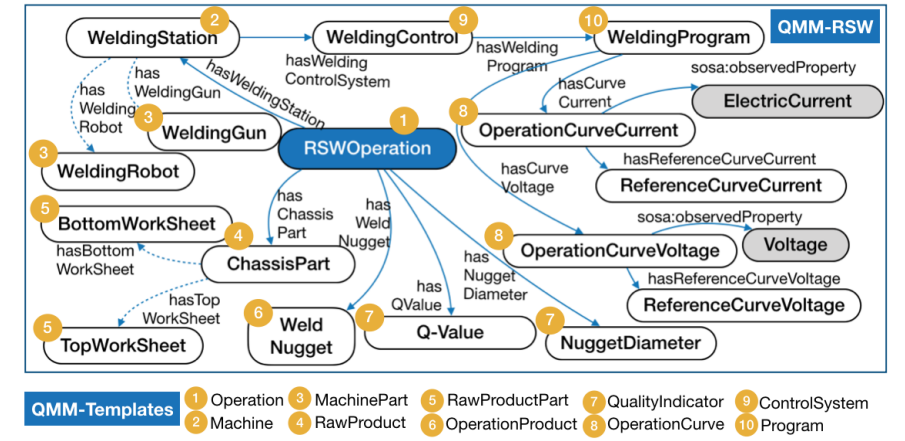
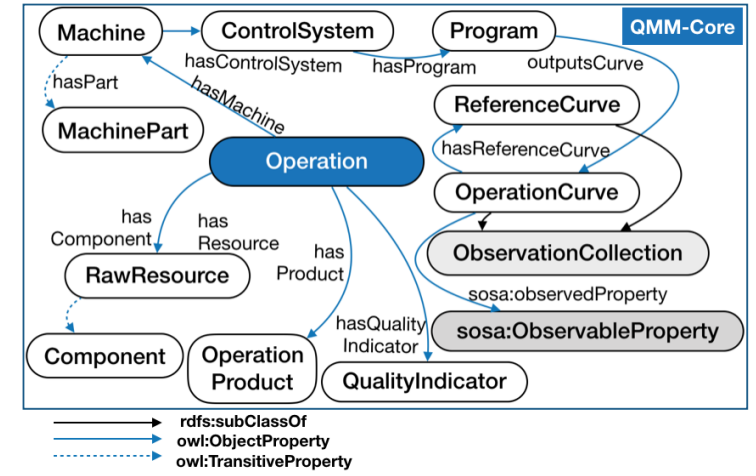
Ontology use in the UC2

- Purpose of ontology application in the use case
 - To offer an abstraction layer capturing data, expertise, routines and better enable (development of) AI solutions
- Indication of the technical challenges
 - In the context of OntoCommons, the challenges are:
 - development of high quality ontologies
 - Enable interoperability of our abstraction layer with other ontology-based solutions
 - High quality templates or other means to enable end-user development/extension of high quality ontologies



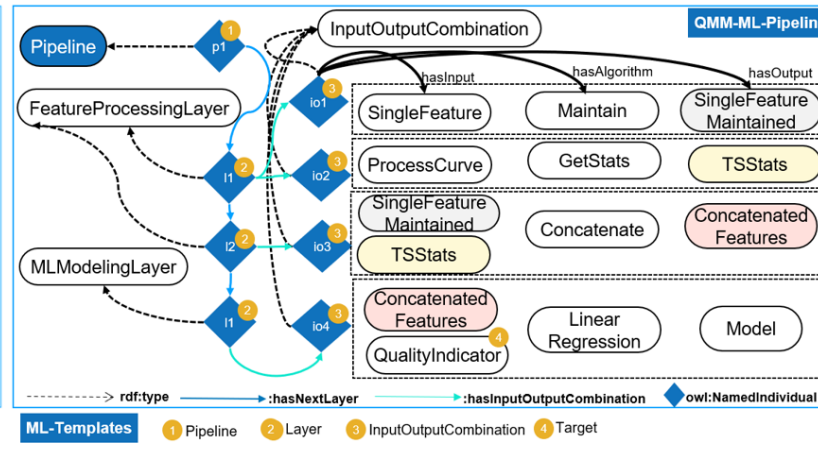
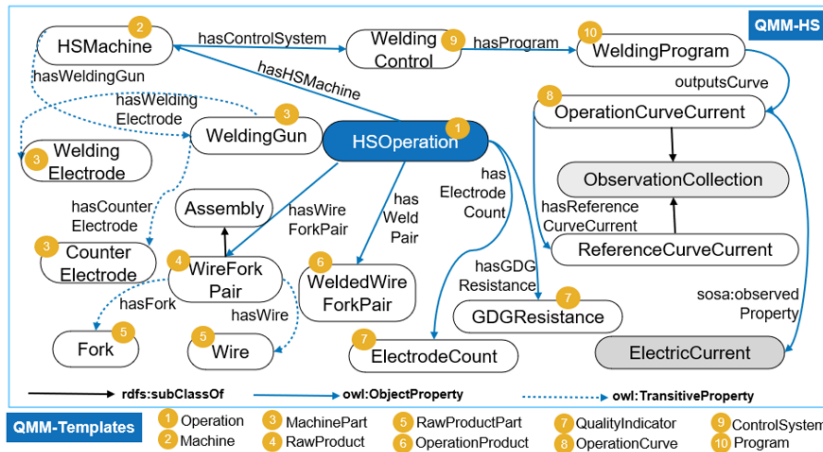
UC2 requirements

- Description of the use case requirements and its challenges/highlights
 - regarding implementation of the ontology (focus on Shall and Should requirements)
 - Alignment with international standards
 - Best practices for industrial modelling with ontologies
 - Approaches to modularization
 - Optimal modelling languages (OWL2 RL, QL, etc)
 - Regarding tools
 - User-oriented onto development tools
 - Ontology templates – tools to define, instantiate
 - Ontology visualization tools
 - other



Main expected benefits

- List the main benefits (business or others) that you expect to get from OntoCommons demonstrator case
- Improving the ontologies we use towards a better quality
- Aligning our ontology with various standards
- Aligning and verifying our ontology against best practices
- Improving our ontology-based solution via the improvement of the underlying ontologies





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