

## **QUERYING AND REASONING WITH PRODUCT ENGINEERING ONTOLOGIES – MOVING PAST MODELING**

**ABSTRACT:** Much of the work in ontologies for product engineering has focused on the modeling of these ontologies. A key characteristic of an ontology model is that it uses a logic-based and formal specification to represent the information model, thus allowing querying and reasoning. In order to take advantage of this, we seek to move past ontology modeling and focus on developing meaningful reasoning mechanisms that are applicable for the domain of product engineering – a) to allow the user to make basic inferences such as checking consistency for definitions of concepts, b) to query and retrieve existing product data information, and c) to derive new product data information not explicitly expressed in knowledge bases. A typical semantic application architecture consisting of knowledge base layer, logic reasoning layer, and application interface layer is adopted. Reasoning units are deployed in the logic reasoning layer of this architecture. These reasoning units act on the knowledge base for product engineering, specifically, the domain of product assembly constraint. SWRL & SQWRL are used to define the retrieval specifications and inference rules. User interfaces are also developed to help users submit the reasoning tasks, view the results, and thus assess the knowledge base indirectly and transparently. It is concluded that the reasoning mechanism exploits and extends the semantic representation made possible through ontology and holds promise for improved knowledge discovery and understanding.