

## Semantic Applications Enabling Reasoning in Product Assembly Ontologies – Moving Past Modeling.

In this paper, the authors postulate an approach to introduce reasoning capabilities into ontologies in the product assembly domain in order to truly exploit these logic-based and formal representations for product data. A model containing semantic applications with multiple reasoning units in logic reasoning layer of a layered semantic application architecture is proposed. Retrieval specifications and inference rules in SWRL/SQWRL are defined in these reasoning units. Besides, local-based user interfaces have been developed to allow product engineers to submit reasoning tasks and view querying retrievals or inference results. The approach and semantic applications are illustrated with two case studies in the product assembly domain. It is demonstrated that this approach not only enables existing product data to be queried and retrieved but also enables new product data, which is not explicitly expressed in the ontology models, to be derived. It is concluded that the reasoning mechanism exploits and extends the semantic representation made possible through the ontology and thus holds promise for improved knowledge discovery and understanding.