

Online Semantic Knowledge Management for Product Design Based on Product Engineering Ontologies

This paper formulates an approach to use the semantic web for knowledge management in the product design domain to provide enhanced capabilities of authoring/updating, querying/reasoning, searching, and visualization of information. Engineering has unique challenges, due to the pervasive use of CAD models and underlying interoperability and integration issues. The authors propose a distributed model composed of a host hybrid-data repository, external public linked data sources, a semantic data management engine, and a web-based user interface layer. The hybrid-data repository consists of ontologies to preserve knowledge for the product design domain and a conventional product data base to utilize legacy design data. Near full integration with a web based environment is achieved. The importance of accessing product related CAD data that has been instantiated in ontology models, querying them, and then displaying the data on a web interface in real time with other legacy data, such as hand sketches and notes that have been scanned and relevant information from conventional relational databases public linked data sites, is a useful and transformational capability. The system clearly facilitates design and information management beyond traditional CAD capabilities and creates a foundation for important capability improvements in the domain.

Keywords: Engineering Ontology, Exhibit, JavaScript Object Notation (JSON), Knowledge Management, Linked Data, Ontology Query/Reasoning, Product Design, Semantic Web, SPARQL