ONLINE SEMANTIC KNOWLEDGE MANAGEMENT FOR PRODUCT DESIGN BASED ON PRODUCT ENGINEERING ONTOLOGIES

ABSTRACT
The influence of the Semantic Web is growing in many areas. In this paper, the authors present an online Product Design Semantic Knowledge Management System (PD-SKMS) in order to provide a novel approach for presentation, querying/reasoning, and instantiating/updating of knowledge related to product design in an engineering domain. A distributed model is proposed, which is composed of a host hybrid-data repository (HDR), external public linked data sources (EPLD), a Semantic data management engine (SDME), and a web-based user interface layer. Ontologies to preserve knowledge for the product assembly domain are set up as product semantic repositories (PSR) in the host hybrid-data repository. To utilize the legacy design data, a conventional product database (PDB) storing design data is also integrated into this repository. The SDME is able to supply querying/reasoning and instantiating/updating services on PSRs, as well as searching and updating services on PDB. Through web-based user interfaces, engineers on the Web can inquire/contribute design information from/to both PSR and PDB. Additionally, the capability of PD-SKMS is extended by querying on external public linked data sources. It is concluded that the product design environment, constructed on PD-SKMS, allows more knowledge questioners/contributors to be involved in product design tasks in a more interactive manner, and thus greatly improves traditional behaviors for design knowledge sharing and exchanging.