Ontologies to Support Repeatable and Valid Customer Requirements Generation

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Abstract:

Due to the growing complexity, sophistication, and interconnectedness of present day engineered products and services, the use of ontologies in engineering design is becoming more widespread. An ontology provides a standardized way of describing concepts in a domain of interest and the relationships between these concepts to better understand the domain as a whole. The benefits of using ontologies vary greatly depending on where and how they are implemented in the engineering space, however the field of complex systems and services can benefit from the level of specification that ontologies provide by reducing the ad hoc nature of some design activities. This paper presents the techniques involved in developing and using two different ontologies both in the aerospace and education domain, each yielding different results. Working with NASA Ames Research Center, this research has improved their customer requirement formulation process. In the education sector, the use of an ontology has helped better understand the parallels between design education disciplines and engineering design curricula. The ontologies explained in this paper were created using unique methodologies, Excel spreadsheets, Python programing, and Protégé Owl, an open source ontology editor. This thesis can be used as a stepping-stone for other engineers who want to achieve a more organized, effective, and productive engineering space.

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