

Development of the Ontology of Engineering Design Complexity

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Abstract : As engineered systems become more complex, the difficulty associated with predicting, developing, and operating engineered systems also increases, resulting in increased costs, failure rates, and unexpected consequences. Successfully managing the complexity of the system should reduce these negative consequences. The study of complexity in the context of engineering development has suffered due to the ambiguity of the nature of complexity, what makes a system complex and how complexity translates to real world engineering attributes and consequences. This paper argues that the use of an ontology of engineering design complexity would i) improve the clarity of the research being performed by allowing researchers to use a common conceptualization of complexity, with more precise terminology, and ii) elucidate the connections between certain types of complexity and their consequences for system development. The ontology comprises concepts of complexity found in the literature and the different relations that exists between them. The ontology maps different complexity concepts such as structural complexity, creation complexity, and information entropy, and then relates the to system aspects such as interfaces, development effort, and modularity. The ontology is represented using the Web Ontology Language (OWL). This paper presents the current status of the ontology of engineering design complexity, the main challenges encountered, and the future plans for the ontology.

Keywords : design complexity, ontology, design effort, complexity ontology

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