

# A Comprehensive Ontological Framework for Enabling ICME

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### ABSTRACT

We present a comprehensive ontological framework for enabling various aspects of ICME methodologies for the purpose of standardizing the expression and communication of information and data. The framework includes ontologies for systems, components, manufacturing processes, materials, equipment, simulation tools, etc., and the relationships amongst them. The framework also includes ontologies for design processes (including simulation and decision workflows), which use the core ontologies to enable product design, and ontologies for knowledge engineering processes that leverage context appropriate knowledge into the design process. The core ontologies form a meta-modeling framework that can be used for capturing virtually any product design and manufacturing process used in the industry. Using a model-driven engineering framework, the ontologies are abstracted into meta-classes and classes, which can be instantiated to represent models, database schemas, workflows, knowledge representation structures and user interfaces. This enables capturing of product and process data and knowledge, creating and executing design and optimization workflows, developing process simulation chains and performing systems engineering. We are currently developing the framework using 3-4 foundational ICME problems to validate and refine the ontologies and to benchmark the value generated by them to the ICME methodologies. In this talk we shall present aspects of the ontological framework as well as touch upon the ICME problems being modeled using this framework.

### REFERENCES

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