

Handling Complexity of a Complex System Design: Paradigm, Formalism and Transformations

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Abstract : Current systems' complexity has reached a degree that requires addressing conception and design issues while taking into account environmental, operational, social, legal, and financial aspects. Therefore, one of the main challenges is the way complex systems are specified and designed. The exponentially growing effort, cost, and time investment of complex systems in modeling phase emphasize the need for a paradigm, a framework, and an environment to handle the system model complexity. For that, it is necessary to understand the expectations of the human user of the model and his limits. This paper presents a generic framework for designing complex systems, highlights the requirements a system model needs to fulfill to meet human user expectations, and suggests a graph-based formalism for modeling complex systems. Finally, a set of transformations are defined to handle the model complexity.

Keywords : higraph-based, formalism, system engineering paradigm, modeling requirements, graph-based transformations

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