

SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (4)

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CHALLENGES IN MODEL-BASED SPACE SYSTEMS ENGINEERING – CONSISTENCY

Abstract

The model-based development of cyber physical systems such as satellites requires models from different domains to be integrated simultaneously. Since these models are typically created by multiple stakeholders using domain-specific representations and differing formalisms, this process leads to a number of challenges, some of which are still open. This paper deals with one of the most essential ones: the consistency of and across models within a specification. With current European and American systems engineering standards for the development of space systems prescribing a number of phases with fixed milestones, the question how models are kept consistent over these phases also arises. In an attempt to answer the question as to what degree this is possible using currently available methods, the types of consistency issues that can arise when modeling are introduced first. A CubeSat developed at the Technische Universität München, MOVE, is used as a running example to illustrate the different types of consistency issues. Thereafter, the status quo of consistency management of cyber physical systems is discussed by presenting a review of methods from mechatronics and software engineering. We conclude the paper by identifying gaps in current practices and discuss further non-trivial consistency issues related to the design and development of systems, thereby providing a roadmap for future research.