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EARLY ASSESSMENT OF NEW TECHNOLOGY ADOPTION TO REDUCE COMPLEXITY IN THE DESIGN OF SPACE SYSTEMS

Abstract

A significant challenge in the design of space systems is dealing with the complexity stemming from the adoption of new technologies at the early stages of the process, where the level of knowledge is not sufficient to converge towards a robust solution. Technology insertion can have a meaningful impact on the architecture of the system, and consequently, in its cost, schedule, and overall performance.

This paper presents an approach for assessing architectural alternatives in the conceptual design of space systems, with a view to reducing complexity originating from different sources. The proposed framework places the evaluation of early technology insertion into the context with other technology management processes, such as risk and complexity assessment. Specifically, we foresee the use of the method at the conceptual design stage, where the subsystems can be represented by a set of integrated models that are conceptually viable and better represent the expectations of the stakeholders. We define complexity, and the boundaries to answer to the question "How can concurrent processes for the conceptual design of space systems be improved by taking into account FOM-based technology roadmaps?". Finally, we discuss the implementation of the strategy, with an early proof of concept application for a CubeSat design research project.