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USER INTEGRATED ANALYSIS OF COLLABORATIVE MBSE TOOLS FOR STUDENT CUBESAT TEAMS

Abstract

As the popularity of CubeSat Missions continues to rise within student teams, the demand for an efficient and collaborative engineering mindset becomes increasingly important. Model-Based Systems Engineering (MBSE) constitutes a promising approach to realize innovative, technically complex systems, by offering a basis for faster, simpler and more resilient information exchange within the student teams, as well as with collaborating professors and external stakeholders. This paper investigates various MBSE approaches that cater to the unique nature and needs of student teams. Some of these constraints include a varying degree of Systems Engineering knowledge and proficiency within the teams, frequent changes in team composition, a manageable learning curve of the deployed tools and financial constraints. Possible MBSE approaches are explored, each representing a combination of one or multiple MBSE tools combined with a proposed methodology.

Previous research at TU Delft has been focused on supporting and enabling Multidimensional Design Optimization (MDO) and Knowledge-Based Engineering (KBE) applications or did not consider the specific needs of larger teams of university students with up to 50 members. In contrast to this, the methodology applied for this paper relies on a strong integration of the targeted users, i.e. members of student-led projects, from within the environment of TU Delft for the requirements definition, concept generation, concept evaluation and final validation of the most promising MBSE approaches. This is achieved through interviews, surveys and interactive brainstorming working sessions.

This research focuses on student teams at TU Delft , considering the university-specific infrastructure like the Collaborative Design Lab, availability of software tool licenses and other constraints. In the last section of the paper, these university-specific aspects are reflected upon, providing a further understanding of how the conclusions can be adapted into another university context . By publishing the results, we look forward to connecting and sharing insights with student CubeSat teams from other universities across the world.