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TOWARDS A MODEL-BASED DESIGN REVIEW:THE NANOSATC-BR3 CUBESAT STUDY CASE

Abstract

The latest nanosatellite from the NANOSATC-BR CubeSat Development Program, the CubeSat NANOSATC-BR3 (NCBR3), is the third CubeSat of the Program and is in its concept studies phase of development in early 2022. NCBR3 mission has the purpose of capacity building, studying space radiation at SAMA region, and validating new technologies in space. The Project relies on the NASA life-cycle phases and uses the systems engineering approach of the same space agency. According to NASA, after establishing the Concept Studies (Pre-Phase A) and as the last step of Concept and Technology Development (Phase A), it is suggested a Mission Definition Review (MDR). This review has the intention to estimate whether the proposed architecture is responsive to the performance and the functional requirements, as well as if requirements have been allocated to all functional elements of the mission. A successful and well-conducted MDR reinforces the project decisions and contributes as a baseline for the system acquisition strategy. In previous NANOSATC-BR missions, the reviews were organized through the traditional process known as document-based that includes extensive paperwork. The use of documents revealed that several ambiguities may happen, also bringing difficulties to configuration control in a Project involving students, professors, technicians, and scientists. With that in mind, this work proposes a method to perform Project reviews in a Model-centric approach, using the MDR of a CubeSat Project as a use case. The authors use a Model-Based Systems Engineering (MBSE) open-source software with an embedded Systems Engineering method. With the support of MBSE, the stakeholder analysis information can be broken down into operational and functional layers, allowing a global understanding of the mission. The results showed that using MBSE may promote a well-structured Review and also facilitate the review process between all stakeholders with different backgrounds.