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# A VVT APPROACH FOR REDUCING SYSTEM DEVELOPMENT TIME GUIDED BY REQUIRED MATURITY AND ACCEPTANCE LEVEL: A CASE STUDY OF NANOSATC-BR2 PROJECT

**Abstract**

The use of small satellites platforms based on Cubesats standard is an increase demand for space science development, improving research, exploration and validation of new space technology in orbit. These space missions have grown by an average of 39 percent per year since 2010 with an expectation of more than 400 nanosatellite/microsatellite annual launches by 2022. Cubesats are no longer purely educational or experimental tool, quality assurance and proper metrics to achieve the compromise between reliability, cost and performance is currently mandatory. Due to the short duration of the nanosatellite development cycle using Cubesats and the low-cost project the traditional space standards for development and testing infrastructure are infeasible. Initiatives on standardization for CubeSats have been proposal as: TISEG (Test in Space Easy Guidelines), whose goal is optimize the communication between the payload developers and the integrators by standardize the payload integration; Cubesat Standard Handbook aims to improve the overall reliability of CubeSats and increase the level of cooperation among CubeSat community. Considering the significant time consuming of testing activities during the development of a space system, approximately 50 percent compared to other activities, and more than 50 percent of the total project cost, our research focuses on reducing the verification, validation and tests activities of Cubesats based projects. Although a well-defined platform specification exists, the system engineers still facing a serious setback, extending the project schedule from the kick-off to the effective launch. A paradigm change in VVT (Verification, Validation and Testing) process is required once the cubesats missions are carrying new technologies not enough mature on board. By the ISO 16290:2013 scale, TRL (Technology Readiness Level) – 6 corresponds to the appropriate technology readiness level for supporting the decision to go for implementation with acceptable risks. Reaching this level means a well-defined set of reproducible processes to demonstrate that the element meets a set of operation requirements in the real environment. However, the time or effort to move from one TRL to another is technology dependent being not linearly connected to the TRL scale. They can vary widely depending on the element and mission under consideration. Focusing on the integration of OBDH (On-board data handling) system with different payloads as case study of NanoSatC-Br2 project, the proposed VVT approach for reducing system development time is discussed. The process is guided by evidences of increase maturity level of each payload along its implementation phase and integration with OBDH system.