SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Design and Technology for Small Satellites - Part 2 (6B)

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INTERFACE CONTROL PROCEDURES FOR UNIVERSITY SATELLITE PROGRAMMES

Abstract

Now that more and more universities have joined the CubeSat community and have a satellite of their own orbiting Earth, it can be expected that the planned successors will be of a higher complexity. The characteristics of university satellite projects make it hard to implement systems engineering techniques according to industry standards. This hindrance is attributable to a scarcity of resources, most notably manpower and budget.
An increase of complexity is seen already in numerous successors that universities are currently developing or flying by now. Aalborg University's CubeSat programme and Tokyo Institute of Technology's satellite programme are good examples of successors that are of higher technical complexity. Also Delft University of Technology's Delfi programme is currently developing a more advanced successor to its successfully launched Delfi-C^3. The Delfi-n3Xt satellite increases complexity by increasing the amount of scientific experiments, a more sophisticated Attitude Determination and Control Subsystem (ADCS) and a more robust Electrical Power Subsystem (EPS).
Within the other university satellite programmes technical complexity increments are of a similar origin. Successors often house more technically advanced subsystems as well as more challenging payloads and onboard experiments for external partners. Also, the number of these third-party experiments often increases throughout the programme. These developments ask for a robust and well-defined interface control approach. Interface control ensures the proper mutual development of satellite systems and coordination of simultaneously operating design teams. Well-defined and properly implemented interface control procedures prevent engineers from designing non complying components that are unable to be correctly incorporated into the satellite. Redesigns are thereby less likely.
Aside from the robustness requirement, interface control procedures have to be practically implementable. Most certainly this holds for projects with limited budget and manpower, such as most university projects. This paper proposes a set of interface control tools and procedures that can be directly implemented. Presented is an Interface Control Document (ICD) framework to specify and manage interface agreements, a Change Proposal Form (CPF) to correctly process design changes, and clear guidelines for setting up procedures for interface control. These tools and procedures are based on common industry practice, scaled down for university satellite programmes. By elaborating on the proposed tools for interface control the reader should be able to set-up an own set of tools, customized to its own project. Implementation of the interface control tools and procedures is illustrated with help of the Delfi-n3Xt satellite development where the procedures are currently in place.