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IMPLEMENTATION OF SYSTEMS ENGINEERING PRACTICES FOR UNIVERSITY-LEVEL SMALL SATELLITE PROGRAMS

Abstract

Student-led small satellite programs are becoming increasingly prevalent at many universities, creating the need for a functional management system that facilitates the success of such programs. Due to their lower complexity, small satellites can be designed, integrated and tested by student research teams that generally lack industry experience and associated systems engineering best practices, in contrast to commercial small satellite programs. This presents a challenge, and at the Missouri University of Science and Technology this has been largely mitigated through the creation of a resource management team used to lead their small satellite program. Starting with a well-defined mission objective and meticulous timeline is pivotal for the success of small satellite projects. Key aspects include defining a non-overlapping division of subsystems and leadership roles, the use of experienced mentors to provide guidance and formulating a detailed mission organization chart that permits concurrent student research on multiple missions. A dedicated onboarding process that focuses on the recruitment and engagement of new members promotes retention. However, it is equally important to efficiently manage the productivity of current members to achieve optimal operation. Common hurdles experienced in student-led teams include the retention of members and "brain drain" due to frequent student turnover. This paper summarizes an innovative systems engineering approach for university-level small satellite programs implemented at the Missouri University of Science and Technology, which can be further improved and emulated by new teams.