SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Engineering - Methods, Processes and Tools (1) (4A)

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APPLIED MODEL-BASED SYSTEMS ENGINEERING TO CAPTURE, CONNECT AND COMMUNICATE THROUGHOUT THE LIFECYCLE

Abstract

Applications of model-based systems engineering (MBSE) is at the cutting edge of systems engineering research. This paper provides an overview of recent academic research and industrial applications of MBSE primarily in the space domain. Academic research topics will include a FireSAT Case Study, Agile/Scrum applications and an innovative approach to decomposing systems engineering products optimized for MBSE. The development of a complete system model for FireSAT will be described. Research into MBSE's use in modeling Agile/Scrum processes will then be summarized. Another result from recent academic work that will be highlighted is the development of an Essential Systems Engineering approach that condenses guidance from NASA's NPR 7123.1B to create a streamlined and tailorable approach to tackling project technical baselines by focusing on essential and assessment facets that can be summarized into lifecycle templates optimized for MBSE application. The paper then turns to some MBSE research application in government and industry beginning with a fully integrated cubesat case study based on real hardware and software being used for education and training. NanoMET is a fictitious mission that is built around the very real EyasSAT3 educational satellite system. The EyasSAT platform has served as a desktop education and training system for over a decade and has been widely used at the USAF Academy, National Security Space Institute, NASA, ESA and industry. The newer iteration of this platform, EyasSAT3 is based on a 3U cubesat planform. The NanoMET mission has been fully modeled using MBSE from start to finish. Discussion will focus on use of MBSE to develop a detailed test plan for the system. The paper concludes with discussion of ongoing lessons learned using MBSE for a systems engineering and project management development program at NASA/JSC with focus on model-based design reviews. Model-based reviews have been used in this program since the beginning and have proven to be an immense time saver. Techniques for implementing model-based reviews will be described as well as feedback from participants in the program.