

SPACE SYSTEMS SYMPOSIUM (D1)  
Space Systems Engineering - Methods, Processes and Tools (2) (4B)

Author: Ms. Tara RuthAnn Sprinkle  
United States, trs0011@uah.edu

Dr. Christina Carmen  
University of Alabama in Huntsville, United States, christina.carmen@uah.edu  
Ms. Deborah Fraley  
Quantum Research International, Inc., United States, dfracley@quantum-intl.com

AN UNCONVENTIONAL STUDY: UTILIZATION OF THE NASA SYSTEMS ENGINEERING  
HANDBOOK TO PROCESS AND DOCUMENT THE PRODUCT REALIZATION OF A  
SMALL-SCALE PROJECT

**Abstract**

The National Aeronautics and Space Administration (NASA) Systems Engineering (SE) Handbook is a valuable guide to conduct the engineering design process, large and small. Many NASA space initiatives since the 1995 conception of the handbook have been large, billion-dollar, projects. The International Space Station (ISS) and Space Launch System (SLS) are two large projects with budgets of 150 and 35 billion, respectively. However, the future of NASA may encounter a different cultural and political climate. Today's society is looking to the private sector for future large missions to space, instead of relying solely on the world's space agencies. Further, the new political administration of the United States (US) is urging NASA to "explore the rest of the solar system by the end of the century". The Solar System is expansive and will require multiple small missions, such as probes, to varying locations. Thus, as we look to the future of NASA systems engineering methodologies, standardized processes and documentation must be scrutinized in application to a tighter budget and timeline project. The University of Alabama in Huntsville (UAH) is currently completing multiple senior design projects using the NASA Systems Engineering Handbook in its Product Realization design classes. This study will follow a current Product Realization senior design team during a one year timeline to design and manufacture a Science, Technology, Engineering, and Mathematics (STEM) tool on a modest budget. Throughout the design process, industry specialists have been brought in to critique the design and project feasibility. Clear communication is crucial for the limited available time allotted with industry specialists. Therefore, feedback and opinions in conveying information pertaining to specific documentation will be noted. In summation, findings will be compiled to determine which, if any, processes and documentation were not agile enough to convey to the industry specialists within the provided time limits. Findings will be used to proposed process modifications, if any, for small scale missions designed in less than a year. Further, retail cost approximations will be included with projected timelines correlating to potential solar system missions. Through this yearlong study, the goal is to ensure small scale projects in NASA's future are not prohibited by a process formulated for longer duration projects.