

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Commercial Human Spaceflight Programs (2)

Author: Mr. Timothy Riley
Embry-Riddle Aeronautical University Worldwide, United States, tgriley@sandia.gov

HUMAN SPACEFLIGHT MISSION ASSURANCE IN AN EVOLVING COMMERCIAL LANDSCAPE

Abstract

As the commercial space transportation industry continues on its current trajectory, legacy assurance functions may not be appropriate for modern ground and flight systems. Commercial operators, seeking to maximize profit while minimizing investment risks, must rely on assurance functions to ensure hardware and software integrity, launch vehicle and spacecraft performance, and proof of architecture. Seemingly reluctant to model NASA legacy models, private entities, driven by entrepreneurial innovation and efficiency, may seek out more streamlined and less cumbersome and lengthy processes to provide a defined level of safety, while still achieving first-time quality, yet operating with higher tolerances for risk. While the launch vehicle and spacecraft configurations and operating models may differ significantly from the previous six decades of civil human spaceflight, the underlying needs of the ground and flight systems remain unchanged. Without stringent and defined levels of regulatory rigor to guide safety management systems, commercial operators are encouraged to self-regulate amongst the industry, and with the help of industry trade groups and to-be-developed industry standards. The Federal Aviation Administration Office of Commercial Space Transportation inserts itself as both a partner and a promoter, itself caught up in an historical and collective charge to move beyond conventional satellite delivery and earth orbital exercises. Learning the lessons from the past are important, but not repeating those lessons is critical to the near-term growth and vibrancy of the commercial space transportation industry. Integrating the key factors of mission assurance, while enabling agility and innovation, is key for the collective success of the industry, and ensures that any one entity's appetite for risk does not jeopardize the remunerative progress of each of the entrants into commercial space. This paper will analyze the juxtaposition of legacy civil and current commercial space systems approaches to accomplishing the elements of assurance that must be achieved in order to attract space flight participants, assuage creditors and insurance providers, and preclude onerous regulations and requirements. Mission assurance is tailorable and compatible with the fidelity and agility of commercial design, test and operations systems, and can be implemented with high reliability, scalability, and cost effectiveness necessary for competitiveness and success.