HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
How Can We Best Apply Our Experience to Future Human Missions? (2)

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STREAMLINING PAYLOAD INTEGRATION

Abstract

Payload integration onto space transport vehicles and the International Space Station (ISS) is a complex process. Yet, cargo transport is the sole reason for any space mission, be it for ferrying humans, science, or hardware. As the largest such effort in history, the ISS offers a wide variety of payload experience. However, for any payload to reach the Space Station under the current process, Payload Developers face a list of daunting tasks that go well beyond just designing the payload to the constraints of the transport vehicle and its stowage topology. Payload customers are required to prove their payload's functionality, structural integrity, and safe integration – including under less than nominal situations. They must also plan for or provide training, procedures, hardware labeling, ground support, and communications. In addition, they must deal with negotiating shared consumables, integrating software, obtaining video, and coordinating the return of data and hardware. All the while, they must meet export laws, launch schedules, budget limits, and the consensus of more than 12 panel and board reviews.

Despite the cost and infrastructure overhead, payload proposals have increased. Just in the span from FY08 to FY09, the NASA Payload Space Station Support Office budget rose from $78 Mto 96$M in attempt to manage the growing manifest, but the potential number of payloads still exceeds available Payload Integration Management manpower. The growth has also increased management difficulties due to the fact that payloads are more frequently added to a flight schedule late in the flow. The current standard ISS template for payload integration from concept to payload turn-over is 36 months, or 18 months if the payload already has a preliminary design. Customers are increasingly requiring a turn-around of 3 to 6-months to meet market needs.

The following paper suggests options for streamlining the current payload integration process in order to meet customer schedule needs and reduce costs for both the integration support teams and the developers, without reducing quality or compromising safety. Issues for the key integration areas of planning, training, verification, and safety are presented in a Root-Cause Analysis study, with plausible solutions provided that involve technology and tools already available to the ISS community. Although based upon the ISS process, the payload integration techniques outlined herein also offer an integration template for any space transport endeavor.