SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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AGILE MISSION ASSURANCE FOR LAUNCH VEHICLES

Abstract

New launch systems are being developed and built with different paradigms and processes with increasing levels of automation and process control utilizing state of the art electronic systems. Shorter cycle times and more dynamic processes are being implemented for engineering, qualification and manufacturing, resulting in an increased throughput and economies of scale. Launch however remains a risky business and government agencies often implement a mission assurance program to mitigate and eliminate risk. Rapid development and an increase in the number launches will drive the need for more efficient mission assurance processes for fleet monitoring and space flight worthiness verification. Mission assurance agencies therefore will need to be agile in their ability to respond to program changes while maintaining high confidence in the assessments made.

A robust launch vehicle mission assurance program operates through enforcement of mission assurance standards and lessons learned. This robust approach is readily adaptable based on the customer risk tolerance. An agile mission assurance process however is different from just adapting current practices. An agile process utilizes methods that improve the efficiency, effectiveness and responsiveness of mission assurance throughout the lifecycle by utilizing new processes, tools, and activities to reach the same high confidence assessment, without increasing risk.

This paper describes a vision and implementation of a life cycle agile launch mission assurance process that supports customer and contractor needs for timely assessments. Examples include: a) an in-line hardware pedigree review process to catch issues earlier during build and to avoid late finds, b) use of cloud computing services to enable responsive turnaround of trajectory analyses reducing Monte Carlo simulation run times from weeks to days; c) process improvements to expedite model development and perform analytical assessments; d) use of data analytic techniques on quality, non-conformance and issue system databases to look for repetitive issues, interdependencies, and trends; and e) development of a responsive coupled loads analyses approach that enables swapping of secondary payloads as late as one month before launch without imposing risk to the primary payload. Through use of these agile mission assurance processes, agencies will be better situated to support customers in achieving high reliability while leveraging new launch capabilities.