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IMPLEMENTING A LEAN OPERATIONAL SET-UP FOR GATEWAY ESA MODULES

Abstract

The Gateway will serve as a multi-purpose outpost orbiting the Moon that provides essential support for long-term human return to the lunar surface and serves as a staging point for deep space exploration. ESA, as International Partners to NASA, is developing various elements to support and enrich the Initial Gateway Capabilities for a Sustaining one, where the flight software autonomy is exploited as other relevant components. Along with the design of the various modules and systems/subsystems, the concept for operating such “vehicle” has also been shaped by NASA and its International Partners. Taking the basic and fundamental assumption that Gateway is intended to be a highly automated and autonomous vehicle (independent of crew or Earth for 21 days), ESA has elaborated first general principles to conduct operations of ESA Gateway module/elements. Whereas the underlining principle is efficiency, the goal is to keep the number of systems and interfaces to a minimum to reduce complexity and hence long term operational and sustaining engineering costs. Taking advantage of the past and recent ISS Columbus operations concepts, the subsequent principle for setting up and implementing European operations is to use, re-use existing ISS resources, processes and know how to support and conduct ESA Gateway elements, including payload and eventually experiment facilities on the moon surface. As the locus of control is NASA Mission Control Center at the Johnson Space Center, (Houston, TX), the European operations will work in support of NASA rather than in a lead role. A (European) Human Exploration Control Centre (HECC) will be established as single point for provision by ESA of services and data in support of the Gateway program where the operational responsibility for ESA Modules and Payloads should reside. Eventually, remote engineering support centres can be created as needed utilising possibly the NASA provided remote MCS system and connectivity via the HECC. Additionally, this centralised concept, should allow to have (near-real time) operational data storage at the HECC, while all data will be transferred to the (European) HRE Data Archive (HREDA) for long term archiving and retrieval by the scientific community. Within this paper will aim to provide an overview of the above-mentioned challenges for the future Gateway operations European set-up and implementation, referring to the past ISS lessons learned in operations concepts and the consolidation of a modern setting streamlining efficiency, highlighting state of art solutions/options, and discussing the establishment of core operations engineering competent teams.