

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Utilization & Exploitation of Human Spaceflight Systems (3)

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COMMONALITY AND STANDARDS FOR DEEP SPACE EXPLORATION

Abstract

As human space exploration moves beyond low Earth orbit, the same needs and synergies that have driven extensive international cooperation on the International Space Station (ISS) will continue to make international participation and cooperation attractive. With multiple partners and international participation, close and efficient coordination of hardware and operations will be critical part of overall mission success. Smooth and effective interfaces between systems increase operational efficiency. Common designs and parts can dramatically reduce the amount of spares required, a benefit that increases greatly with overall distance from Earth. The early establishment of international interface agreements and voluntary standards would provide a firm foundation to increase efficiency and reduce costs. Setting common standards and interfaces will have dramatic benefits for future human space exploration.

Building on previous years' discussions of interoperability and commonality, Boeing's study this year focused on identifying which systems in a vehicle comprised of elements from several partners could potentially benefit the most from commonality. Parameters included which systems require the most mass overall, which systems would require the most mass to add specific interface/conversion hardware and which systems absolutely must have a common interface versus systems which do not require but would benefit from commonality. Boeing has also examined and defined a representative set of generic interfaces that should be considered whenever two elements are connected. Based on this study, a suggested order of importance for setting standards, system by system, is presented. This paper also describes current preliminary efforts aimed at defining interfaces for deep space exploration, including international discussion of interfaces among space agencies and NASA's inclusion of interface definition efforts in the NextSTEP contracts for cislunar vehicle concepts. The advantages of implementing common standards for design and utilizing common hardware and spares are shown and the progress and lessons learned on current standards efforts such as the International Docking System Standard are discussed.