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Author: Mr. Tracy Gill
NASA John F. Kennedy Space Center, United States

Mr. Michael Ching
National Aeronautics and Space Administration (NASA) / Stellar Solutions Inc, United States
Dr. James Clawson
National Aeronautics and Space Administration (NASA) / Stellar Solutions Inc, United States
Ms. Alexandra Cross
Stellar Solutions, United States
Ms. Elisabeth Moore
National Aeronautics and Space Administration (NASA), United States
Mr. Mark Dillard
NASA, United States
Mr. Paul Kessler
National Aeronautics and Space Administration (NASA), United States
Mr. Douglas Craig
NASA, United States

NEXTSTEP HABITAT RISK REDUCTION FOR GATEWAY

Abstract

This paper will provide an overview of the Next Space Technologies for Exploration Partnerships (NextSTEP) habitation prototype and test efforts and how they provide risk reduction benefits to the NASA Gateway Program from multiple perspectives. The Gateway is envisioned as an outpost orbiting the Moon that provides vital support for a sustainable, long-term base for human return to the lunar surface, as well as a staging point for further deep space exploration. Implementation of this outpost will foster U.S. industry and international partnerships and enable multi-discipline utilization. In advance of formal establishment of the Gateway program, NASA has been developing campaign strategies, architectures, habitat systems, and subsystems through a number of targeted development projects. The NextSTEP-2 Phase 2 habitat contracts were awarded to five commercial partners to develop their concepts for a Gateway system and provide a high fidelity, full scale ground prototype for independent habitability testing. These partnerships provided valuable risk reduction benefits to the future Gateway from multiple aspects to include business and process, leveraging and stimulating commercial industry and technologies, innovative technology development and application, common standards and interface development and architecture and systems/subsystems analysis. The partnerships were established through a Broad Agency Announcement (BAA) solicitation and contracting process which provides more flexibility in developing desired capabilities versus the traditional requirements driven acquisition. This foreshadows the Gateway acquisition approach. The NextSTEP contract work has enhanced the experience base of both NASA and its industry partners in design, development, and testing of space habitat systems and is providing a foundation from the transition from a prototyping effort to an implementing program. Each contractor developed a different architecture approach incorporating diverse technologies along with the associated detailed lower level requirements, trade studies and functional allocation to implement their concept. These activities are executed concurrently with NASA's internal reference architecture development and

have provided additional aerospace industry expertise that informs and in many cases validates the NASA efforts. A consistently managed set of ground test evaluations occurs at the end of the contract, but the design process has allowed ongoing development to inform and evolve the Gateway architectural concepts through a series of design analysis cycles. The rapid prototyping and design cycles of the various concepts follow universal ground rules and assumptions driven by mission objectives. In addition, the industry partners' early review and inputs on draft common interfaces and standards have resulted in more robust and universally acceptable standards.