IAF SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

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LONG-TERM ARCHITECTURE DEVELOPMENT FOR THE MOON AND MARS

Abstract

Developing an enterprise-level architecture encompassing future human-robotic science and exploration at the Moon and Mars requires a visionary approach that ensures NASA is responsive to national priorities and global science and technology advancement objectives. While the goal to send the first woman and next man to the Moon is well understood, NASA is still formulating a long-term infrastructure at the Moon and working to narrow the trade space for the first human missions to Mars. This paper will focus on the formulation and current status of engineering and design applications for a long-term and robust lunar architecture that will implement the Artemis Base Camp concept, including pre-formulation activities such as modeling and simulations, terrestrial and space-based analogs, and procurement and partnership considerations. Authors will demonstrate how an enterprise-level Moon-to-Mars architecture approach fosters commonality of requirements and standards across individual mission elements, as well as multi-destination systems and operations, to reduce risk and encourage healthy competition in the growing space market. Among the Artemis Base Camp elements discussed will be multiple surface mobility elements, a fixed, anchoring surface habitat, fission surface power, and an in-situ resource development pilot plant. The narrative will clearly illustrate the direct evolution of the base camp elements to a minimal Mars architecture concept, and also outline unique development efforts that will be required in the next decade to make it possible to send humans to the Red Planet as early as the 2030s.