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DEVELOPMENT (D3)

Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and  
Development (1)

Author: Mr. John C. Mankins

ARTEMIS Innovation Management Solutions, LLC, United States, mankinspacetech@gmail.com

AN INTERNATIONAL DESIGN REFERENCE ARCHITECTURE FOR THE MOON VILLAGE

**Abstract**

Humanity is now extending activities to the Moon, including exploration, human presence and discovery and potential development of key resources, such as lunar polar ice. Planning methodologies that take uncertainty into account in a structured fashion provide insights that allow thoughtful preparations in the face of that inevitable ignorance. The “Moon Village” represents an overarching concept for an assortment of prospective activities on and near Earth’s Moon. It is not limited to a specific project, location or organization. During the past three years, the potential steps that might be taken toward a permanent human expansion to Earth’s Moon have been changing rapidly – driven in in significant measure by evolving government plans related to the Moon, and also by commercial activities.

Without narrowing scope to a particular implementation (for example, a specific “Moon Base” at in a particular location), but to still provide a consistent framework for the conduct of studies, research and development and business investments, an “International Moon Village Reference Architecture” analogous to what are sometimes called “Design Reference Missions”) has been developed by the Moon Village Association (MVA) Architecture Concepts and Considerations Working Group. This Reference Architecture encompasses activities in several “zones”, including the South Polar Region of the Moon, low lunar orbit, cis-lunar space and Earth orbit. The systems and activities associated with these zones are examined in three timeframes: 2025 (just following current plans for a human lunar return), 2035 (following the availability of low-cost lunar transportation systems and 2045 (when extensive lunar surface operations may have emerged).

The paper concludes with a discussion of the common threads that span the various scenarios and timeframes, and will highlight the most distinct aspects of each; it will also identify some potential “signposts” that can be watched for that would indicate which path humanity will be taking to its lunar future.