

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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PROJECT MANAGEMENT AND SYSTEMS ENGINEERING CHALLENGES IN THE EARLY
DEVELOPMENT OF THE PRESSURIZED ROVER**Abstract**

The Lunar Cruiser, a crewed pressurized rover, is a lunar surface mobility system jointly studied and developed by the Japan Aerospace Exploration Agency (JAXA) and Toyota Motor Corporation, targeting a launch in 2031. It is positioned as a core Japanese contribution to the U.S.-led Artemis program. The Lunar Cruiser enables astronauts to remain and travel on the lunar surface for extended periods without wearing spacesuits, and represents a globally unprecedented pressurized rover system designed for operation under extreme lunar environmental conditions. The project also constitutes a major crewed space system development effort for Japan, following the Japanese Experiment Module (JEM) on the International Space Station (ISS).

The project is currently transitioning from the conceptual design phase to the preliminary design phase, during which system requirements are being concretized while design maturity is progressively increased in parallel. The development process is fundamentally based on a phased space systems development approach, while selectively incorporating testing and evaluation concepts cultivated through terrestrial mobility development.

In addition to its high technical complexity, the Lunar Cruiser project is characterized by the fact that its project management approach itself can be regarded as a subject of study. Given the long development and operational timeframe, management practices that balance requirement stabilization with technology maturation are essential. Furthermore, the project involves collaboration between JAXA, which has led space system development in Japan, and Toyota, whose strengths lie in large-scale manufacturing and high-reliability design in the automotive industry. Effectively integrating these different industrial cultures

and development methodologies is a key challenge. The mission also requires international coordination involving NASA, necessitating governance structures that clearly define international standards, safety requirements, and organizational responsibilities.

This paper focuses on the Lunar Cruiser development at the phase transition from conceptual design to preliminary design, first providing an overview of the current development status. It then summarizes technical and organizational insights related to space system development and project management obtained through collaboration between the automotive industry and a space agency, and discusses approaches to collaboration for future international space exploration programs that are expected to intensify.