

International Cooperation for Space Exploration (1)  
International Cooperation for Space Exploration (2) (2)

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AN INTERNATIONAL APPROACH TO THE COORDINATION OF TECHNOLOGY  
DEVELOPMENT EFFORTS ENABLING THE GLOBAL EXPLORATION ROADMAP

**Abstract**

The International Space Exploration Coordination Group (ISECG) is a voluntary, non-binding coordination forum of 22 space agencies. In 2018, ISECG released the latest version of the Global Exploration Roadmap (GER), reflecting an integrated exploration vision created from the policies and plans of 14 ISECG space agencies. The GER reflects the collaborative work of space agencies in planning human and robotic missions beyond low Earth orbit, beginning with the International Space Station and continuing to the vicinity of the Moon and its surface, focused on the long-term goal of sending humans to the surface of Mars in a sustainable manner. Robotic missions are included in the GER architecture as precursors and enablers to human missions.

Each step in expanding human presence beyond low Earth orbit relies on the readiness of new capabilities and technologies. As individual agencies may not have the resources to develop all these critical capabilities, appropriately leveraging global investments in technology development and demonstration is important. Although technology development is a competitive area, space agencies seek to inform their technology investment planning, create synergies and maximise their readiness to play a critical and visible part in the global exploration endeavour.

Space agencies participating in ISECG have identified a list of critical technologies related to the missions shown in the current architecture of the GER that are currently not available or which need to be developed or matured. These technologies can be considered technology “pulls” from the GER point of view, even if the performance characteristics are to be seen as targets and not as mission defined

requirements. These technology needs can be mapped to corresponding agency technology development activities; subsequently global technology gaps can be assessed.

The current list of 47 technologies has been identified as being critical to advance the ISECG mission scenarios in the current architecture. This list of technologies is building on a portfolio list of enabling critical technologies resulting from a human deep space exploration architecture analysis conducted by NASA and published in 2012. The list of technologies presented in this document is maintained by the ISECG/Technology Working Group and updated based on the evolution of the GER mission scenario.

The purpose of this paper is to share ISECG's approach to advance the coordination of technology development efforts and introduce the GER Critical Technology list to exploration stakeholders to inform the dialogue on priorities for technology development to enable the GER mission scenario.