RESULTS OF THE TWELFTH COMMUNITY WORKSHOP FOR ACHIEVABILITY AND SUSTAINABILITY OF HUMAN EXPLORATION OF MARS

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The Twelfth Community Workshop for Achievability and Sustainability of Human Exploration of Mars (AM-XII) was held on 5-7 May 2026 at the *American Institute of Physics* facilities in Washington DC, sponsored by *Explore Mars, Inc.* The workshop brought together 37 hand-picked experts to focus for the first time on integrating engineering, science, human health and performance, and planetary protection into a single approach to designing and implementing a human mission to Mars. The goal was to develop concepts of how these four disciplines would need to work together to select and operate an actual landed mission.

Our approach was to examine interactions between these areas for missions to two example potential landing sites for the first mission in order to have concrete discussions of mission details. One site was selected to focus more on *in situ* resources. This site is in the Phlegra region of Mars and is thought to possibly have near-surface ice present. The other focused more on maximizing the science return without regard to resources. We used Jezero Crater, site of the *Perseverance* rover mission, due to the wealth of available data and the high science value. The goal was not to evaluate possible landing sites or to enumerate landing-site characteristics, but to use these as example sites to allow a concrete discussion of the mission and operations. With these two sites as examples, we developed concepts of how these four disciplines can work together during an actual landed mission, with possibly different mission architectures and precursor knowledge, and identified recommendations that would help NASA to plan an integrated mission.

Human Mars exploration faces several fundamental challenges that must be solved by the four disciplines working together:

- Planning for a successful human mission must integrate input from the four component disciplines from the beginning; adding areas later is very ineffective when some designs have already been determined.
- Integration across disciplines can not be done in a single meeting or interaction between groups, it must be an ongoing process of frequent interaction and exchange.
- Implementing “Moon to Mars” requires a strategic approach of looking at the entire program rather than only the next mission in the queue; identifying relevant activities for the Moon now allows for development of appropriate feed-forward to Mars missions.
- Precursor landed and orbital missions (e.g., *Curiosity* and *Perseverance* on the surface, *Mars Reconnaissance Orbiter* and *Mars Express* from orbit and Mars sample return) have tremendous value and are necessary for defining science, planning mission ops, and determining surface geotechnical properties for a safe human landing.

The participants made specific recommendations for NASA in integrating these disciplines:

- NASA should coordinate early with the engineering/architecture, science, health and human performance, and planetary protection communities so that all aspects have input into architecture and mission planning and to ensure that there is an integrated mission concept and design.
- Either a NASA task force with broad community representation or a community group chartered through a NASA advisory group should be commissioned to stand up quarterly or semi-annual workshops modeled on AM XII. The goal of such a recurring event would be to continue to drive toward an actual integrated mission concept and specific landing-site recommendations.
- NASA should begin development of the mission architecture now to enable identification and development of areas within these four disciplines that require long lead time.
- NASA should fly a high-resolution imager to support landing site hazard analysis and mission planning; *MRO* and HiRISE are well beyond their design lifetimes, and HiRISE data quality has become degraded.
- These recommendations need to be implemented now in order to keep human missions from always being a generation in the future.

Thank you to our Sponsors of The Twelfth Community Workshop for Achievability and Sustainability of Human Exploration of Mars

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About Explore Mars, Inc.:
Our Vision: Advancing human exploration of the Moon, Mars and beyond no later than the 2030s, for a sustainable and inclusive future for us all.

Our Mission: Explore Mars is a global community where innovators, pathfinders, and policymakers of all ages collaborate to establish a human presence on Mars no later than the 2030s. We envision a world where the human drive to explore and discover propels us into a thriving, inclusive, and environmentally responsible existence on Earth and beyond. We connect people and organizations, pushing the boundaries of the space ecosystem to welcome stakeholders who are passionate about building a peaceful and prosperous multiplanetary future for decades to come.

The Achieving Mars (AM) Annual Workshops, hosted by Explore Mars, Inc., a 501(c)(3) non-profit, bring together leading experts from disparate fields, and offer the opportunity for the broad community of technologists, scientists, engineers, and policy experts to contribute to the expansion of human presence beyond the Earth.

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