

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)

Human Space Endeavour - Overview (1)

Author: Dr. Jennifer Rhatigan

National Aeronautics and Space Administration (NASA), Johnson Space Center, United States,
jennifer.l.rhatigan@nasa.gov

Mrs. Kathy Laurini

National Aeronautics and Space Administration (NASA), United States, kathy.laurini-1@nasa.gov

Mr. Bernhard Hufenbach

European Space Agency (ESA), The Netherlands, Bernhard.Hufenbach@esa.int

Dr. Junichiro Kawaguchi

Japan Aerospace Exploration Agency (JAXA), Japan, Kawaguchi.Junichiro@jaxa.jp

Dr. Jean-Claude Piedboeuf

Canadian Space Agency, Canada, Jean-Claude.Piedboeuf@asc-csa.gc.ca

ADVANCING THE GLOBAL EXPLORATION STRATEGY: RESULTS FROM THE LUNAR
ARCHITECTURE WORKSHOPS

Abstract

Purpose: In The Global Exploration Strategy: The Framework For Cooperation, international space agencies expressed their common interest in “creating a common language of exploration” to “enhance mutual understanding among partners and to identify areas for potential cooperation.” It was in this spirit that in July 2008 the members of the International Space Exploration Coordination Group (ISECG) agreed to collectively explore ideas and plans for human exploration of the Moon. From the latter half of 2008 through early 2009 interested agencies participated in a series of Lunar Architecture Workshops to begin the process of discussing human exploration of the Moon in the international community.

Methodology: Workshop participants have begun to study the means by which lunar exploration objectives can be met, examining the many kinds of spacecraft and other systems that can be developed over time to enable human exploration of the moon. These systems are often referred to as architecture elements, and the members of the ISECG that participated in the workshops have considered how the innovative utilization of these elements can provide the necessary functions for lunar exploration – including habitation and life support, transportation, and scientific investigation. A critical aspect of the successful functioning of these elements, if they are to be provided by multiple international space agencies, is the interfaces that enable the necessary level of interoperability. Participants have begun to formulate recommendations regarding these interfaces, highlighting the importance of standards, which can promote robustness across a global exploration architecture.

Results: Three Lunar Architecture Workshops, open to all ISECG members, were conducted between September 2008 and February 2009. During the workshops, participating agencies reviewed their respective lunar exploration objectives and, where applicable, the status of ongoing or completed lunar exploration studies. The workshops gave participants the opportunity to share plans, look for common themes and objectives and begin the multilateral process of examining coordinated lunar exploration. Together, the group identified common objectives for exploration of the Moon, such as science of and from the Moon, preparation for human Mars exploration, and engaging the public through the course of lunar exploration. The group also considered International Space Station lessons learned, opportunities for private industry, as well as other strategic considerations which may impact lunar exploration architecture.

Through the course of the workshops, participants considered how to best satisfy the lunar exploration objectives of the international community, ultimately identifying three distinct scenarios worthy of more detailed analysis: polar outpost missions, sortie missions, and extended-stay missions. These scenarios provide the framework for the continued development and analysis of the international exploration of the Moon. Each scenario requires at a minimum the provision of crew and cargo transportation, communications from the Moon to Earth, and support for extravehicular activity. Participants discussed the key parameters of potential architecture elements in order to understand how they may be utilized in each scenario.

Conclusions: This multilateral lunar architecture study is planned to continue through mid-2010, with a goal of developing a reference lunar surface architecture which may be used to inform subsequent decision milestones of individual agencies.