Paper ID: 31356
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SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and Development (1)

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INTERNATIONAL PARTICIPATION IN A REASONABLE AND SAFE STRATEGY FOR HUMANS TO MARS

Abstract

The human exploration debate divides between the Mars constituency and the return to the Moon constituency. They make mutually converse arguments. The Mars advocates argue "if we stop to go back to the Moon, we'll never go to Mars in our lifetime." The Moon advocates argue "if we try to go to Mars, we'll never go back to the Moon in our lifetime."

This strategy starts from the radical proposition that everyone in the human space exploration debate is right. However they can neither all be right in same budgetary zero-sum game nor all at the same time. The only way to be right is in the correct temporal design and financial design strategy – not for what we can accomplish in any particular lifetime. This strategy identifies three major phases for human exploration:

1. Return to the Moon to conduct science and develop lunar resources, apply those resources to operations on the Moon, and to test exhaustively the systems necessary for the human exploration of Mars,
2. Crew rendezvous with an asteroid to conduct science and gain operational experience, and
3. Send humans to Mars, through multiple staging nodes at EML2 and Phobos, and return them safely to the Earth.

The essence of a successful campaign to send humans to Mars is to invest in the infrastructure necessary to make it technically repeatable, operationally reliable, acceptably safe, and economically sustainable. This infrastructure will consist of several staging nodes:

a. An Earth-Moon L2 (EML-2) propellant depot and assembly platform is the start and return point for robotic and human asteroid and Mars missions.

b. A Phobos base serves as an orbital platform for Mars descent/ascent vehicles. Phobos and Deimos are captured carbonaceous chondrite asteroids containing up to 13

c. Crew descent to the Mars surface to inhabit a pre-positioned base with a nuclear power plant, and use of that refueled descent/ascent vehicle to re-ascend to the Phobos base.

For international participation to succeed in contributing to this strategy, it is imperative to decompose each segment into discrete, non-redundant projects. This decomposition departs radically from ISS in which each major space agency built its own pressurized module, each to different standards. For the strategy to succeed, each project must conform to the same set of commonly agreed and inter-operative standards, but each system or subsystem should be unique, not duplicating any other.