

SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES,
CONCEPTS AND TECHNOLOGIES (D3)

Strategies and Architectures to Establish a “Stepping Stone” Approach to our Future in Space (1)

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STEPPING STONES FOR GLOBAL SPACE EXPLORATION

Abstract

A growing number of nations is currently engaging in, or planning for, robotic and human space exploration programs that target the Moon, Mars and near-Earth asteroids. Ambitious plans to build new space infrastructure, transport systems and space probes will require international cooperation to create a sustainable long-term space exploration program. How can the space community learn to cooperate on truly international level while engaging newly emerging space-faring nations in a meaningful way? We propose a stepwise approach to this new level of cooperation in space exploration that will create effective and efficient partnerships for the future. Expertise obtained from worldwide Moon/Mars analog tests campaigns could serve as a basis to create a truly international terrestrial exploration testbed where established and emerging space actors (e.g. scientists, engineers and space entrepreneurs) from many different cultures learn to work together. International science-based exploitation of the International Space Station represents a logical step during its prolonged lifetime (beyond 2020). In preparation for larger endeavors, we propose a system-of-systems approach with small exploration missions (e.g. small satellite missions, small orbiters and landers) conducted in synergy with several stakeholders. Collaborating on small missions, such as a worldwide CubeSat program, can improve and ease technology transfer rights as well as the development of interfaces that are all major prerequisites and building blocks for future space exploration programs. The paper concludes with recommendations for coordination mechanisms in each of these areas that will prepare for a truly global space exploration program.