

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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ANALOG ROADMAP TO MARS: A PATH TOWARDS SUSTAINABLE HUMAN SPACE  
EXPLORATION**Abstract**

The recent announcement of NASA’s annual budget has stirred the human space exploration community. Short term plans to return to the Moon based on known technology have been replaced by ambitious plans to create the innovative technology necessary for a sustainable human space exploration, eventually intended to put humans on Mars. In addition to new technology, preparing for such an endeavor requires the implementation of a comprehensive framework of ground and space-based tests, both for the purpose of training and for the validation of systems and operational procedures.

In spite of the importance of analog studies, current activities are scattered and mostly uncoordinated. In order to remedy this fact, a comprehensive survey of 50 analog studies was undertaken, selected from the topics of physiology, psychology, robotics, extravehicular activities, gravity simulation, life support systems and space architecture. Critical analog studies have been identified as essential to the preparation of a future manned mission to Mars and these have been organized into a series of discrete, progressive steps including studies using existing and new analog sites on earth, and even advanced analog studies in low earth orbit, on the moon and beyond. A comprehensive analog roadmap has been created, aimed at providing policy makers and space agencies with recommendations for the implementation of a high fidelity analog study program with the end goal of preparing for an international mission to Mars.

The sustainable character of the new approach towards human space exploration in the US has been stressed on many occasions. Sustainability should not only be stressed for the end result, the exploration program, but also in the process leading to it. In order to achieve this for the developed roadmap, the commercialization aspects of future analog studies has been investigated, with emphasis on possibilities for commercial spin-offs as well as the prospect of offering analog sites as a commercial service.