

The Human Space Exploration Value Proposition (07)
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OPTIMIZING SCIENCE AND HUMAN SPACE EXPLORATION – LESSONS LEARNED TO
BENEFIT GLOBAL STAKEHOLDERS

Abstract

NASA and NASA partners are currently planning and devising the strategies and architectures for coming generations of human spaceflight exploration. The Constellation Program served as a platform for exploration ventures to the Moon and beyond. As such, technical engineering requirements, conceptual designs, and operations concepts were derived to establish viable mission architecture alternatives and design reference missions. Much focus was directed to transportation, vehicle design, and surface systems to support or enable operations. Much less attention, however, was given, at least initially, to the actual science and user objectives and integration of systems that would accommodate and enable those objectives, i.e. science and user requirements, and facilitate programmatic sustainability. Recognizing this shortcoming, the Optimizing Science and Exploration Working Group (OSEWG) and its broad agency Support Team members established, via systems engineering practices, candidate science requirements for the Exploration Program as a whole. These science related requirements established critical dialogue among national and international science and engineering communities, and enhanced the benefits of human exploration.

The integration effort was a very complex macro systems engineering challenge. The wide variety of often competing views from many different engineering and science disciplines, and communications between parties of varying technical culture within and outside of NASA, required a delicate balancing act to ensure that as many values, interests and concerns were addressed as possible. Assessing and trading the value of human performed space science activities and the associated mission definition impacts was an important component of this effort that directly informs how investments can be made to produce continuous value for stakeholders.

The presentation will share lessons learned of integrating and optimizing science and stakeholder needs including mission definition and planning, and codifying objectives and success criteria within the programmatic and technical framework of exploration systems. Additionally, application to emerging international exploration ventures and maximizing global stakeholder value will be discussed.