

HUMAN EXPLORATION OF THE MOON AND MARS SYMPOSIUM (A5)
Strategies to Establish Lunar and Mars Colonies (1)

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INCORPORATING SCIENCE INTO HUMAN EXPLORATION OF THE MOON: AN INSIDER'S
PERSONAL VIEW

Abstract

The Constellation Program in NASA is into its fourth year of existence. Starting in late summer of 2005, the Program Office has been staffed and organized literally from nothing. At its birth, it was already behind schedule because some of its projects, notably the Crew Exploration Vehicle, had already started. Through a Herculean effort on the part of its leadership and staff, Constellation today is fully functional Program, receiving praise internally from NASA graybeards who had predicted confusion and lack of direction for at least the first four years. In the trade press, Constellation is widely criticized for the design of lunar transportation system, an architecture that it inherited from the earlier Exploration Systems Architecture Study (ESAS) under the leadership of former Administrator Mike Griffin. While the transportation architecture is a rich topic for analysis, here I choose to address another repeated concern both inside and outside NASA, i.e., that Constellation is just another bloated human spaceflight program, disinterested in and neglectful of the advancement of science. This understandable cynicism arises from the dearth of promised scientific return from the International Space Station over the 25-year existence of the program in comparison to the resources expended in its design and construction. The physical setting of a lunar surface outpost dramatically influences the major scientific themes for the facility. A low Earth orbit space station is primarily an enclosed laboratory, housing experiments whose themes connect to the microgravity environment. By contrast, a lunar outpost is a base station from which excursions are made to study the Moon itself. Obviously, experiments can also take place inside the lunar facility, just as measurements are made of the ISS external environment. Nevertheless, the core philosophy of exploration and discovery is much more an integral component of the design of the surface outpost and its supporting facilities. Consequently, the functionality of the outpost, as created by engineering design teams, connects more naturally to future scientific objectives. In April, 2006, I was asked to serve on the staff of the Constellation Program Manager as a detailee from a NASA/JSC planetary science organization. At that time, Constellation did not have project offices for lunar surface systems or for a lunar lander. My role was initially characterized as a communicator with the external science community and as a commentator on internal decisions affecting scientists and other future users of planetary surface systems. Over the past three years my office has accreted informal responsibilities as Constellation has formed project offices for lunar surface transportation and operations. In particular, I serve as a conduit for information and knowledge about the Moon and its environment; and I am active in advising and coordinating discussions on the nature of future science operations. For this paper, I wish to discuss three aspects of the integration of science needs into planning for human exploration: 1. Processes that have been established by NASA, outside the Constellation Program, to collect and assimilate points of view within the external community concerning future exploration and utilization of the Moon; 2. Willingness of Program Management and Project Management to solicit and accept external inputs and the processing of such information by the project engineering culture within the Constellation organizations; and 3. The influence that perceived science requirements have on engineering design choices for lunar systems and on emerging concepts for lunar surface operations.