

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Advanced Systems, Technologies, and Innovations for Human Spaceflight (7)

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ANALOGUE MARS AND LUNAR OUTPOST AND HABITAT DESIGN CONSIDERATIONS, WITH
FURTHER LESSONS LEARNED FROM EXISTING MARS AND LUNAR HABITATS

Abstract

For some time, the Mars society has been operating two Mars analogue research stations—the Mars Desert Research Station (MDRS) in Hanksville, Utah, United States; and the Flashline Mars Arctic Research Station (FMARS) in Devon Island, Nunavut, Canada—with the aim of contributing to the larger international effort to go to Mars. The time is ripe to implement the many lessons learned through these largely amateur previous efforts by designing an entirely new next-generation analogue outpost. The author, also the founder of the OpenLuna Foundation, has extensive experience with these two research stations, and outlines many of the lessons learned, as well as items to be prioritized in the design of this next-generation outpost. Issues covered include the size and use of space in a given facility, the time required for maintenance of the facility, and ways of decreasing both of these, e.g., well-thought-out initial design with appropriate materials and sufficient training and documentation (including documentation of repairs). Items lacking in the original hubs include devices for increasing the automation of common and time-consuming chores, such as dish-washing and reporting, as well as more reliable power and communications for the support of experiments and equipment along with complete documentation of these capabilities. Advanced automation, power management, dust management, air recycling, water and waste management and recycling, including biological life support systems, will also be addressed. Designers who are focused on the technological requirements of a facility often overlook considerations that they believe might be needless luxuries when the users are to be highly trained and motivated individuals. It turns out that despite high levels of training and motivation, morale remains an issue. Luxuries are hard to leave behind, especially when no good reason can be found for excluding them. Some examples include greenhouses and green space for fresh food and improved atmosphere, common space to work in in the presence of others, fitness facilities, fresh food, saunas and other physical comforts, and even small animals as pets. The practicality and efficacy of including these comforts will be examined. An operational demonstration facility may be made available near the congress.