LUNAR DAYTIME: ARCHITECTURAL AND BEHAVIORAL EXPERIMENTS IN A SPACE ANALOG HABITAT. M. M. Cohen[1], D. C. Barker[2], S. De O. Bianco[1], S. Bishop[3], R. Gentile[4]. S. Haeuplik-Meusburger[5], P. De Leon[6]. [1]Space Cooperative Inc. marc@space.coop, [2]U. Houston, [3]U. Texas Medical Branch, [4]Moodfit, [5]Technical U. of Vienna, Austria, [6]U. North Dakota.

Figure 1. Multi-Purpose Research Station at the University of North Dakota, Grand Forks, ND

Introduction: The Lunar Daytime concept addresses the challenge to behavioral scientists and architectural researchers in conducting research in space habitats or habitat analogs to produce scientifically valid results. Historically, researchers were limited to largely qualitative surveys. Instead, the Lunar Daytime (LDT) team will demonstrate the efficacy of a modifiable environmental habitat analog laboratory capable of producing empirical, measurable, and quantitative data sets. To measure effects on crew performance and crew behavioral responses as a *dependent variable*, researchers must be able to make and control changes in the physical living and working environment as an *independent variable*.

Early Human-Tended Base: Lunar Daytime refers to modeling an early human-tended lunar base. Because this surface mission depends on solar energy for power, which is available only during the lunar day, the time limit to the simulation is 14 days, but may run shorter. This LDT context provides the mission scenario to conduct these comparatively short-duration habitat analog studies. A benefit of two-week long simulations is that it becomes possible to conduct multiple test runs within the same time and budget that a much longer (i.e. Mars mission) scenario would require.

Prior Analog Studies: The LDT team has conducted extensive studies of space vehicle and habitat design, done research in various analog habitats (e.g., MDRS, HERA, HI-SEAS, Concordia), and reviewed all the existing space habitat analog facilities. Unfortunately, none of the current facilities allow for the degree of modification necessary to experimentally address many of the critical issues surrounding creation of the optimally built habitat.

Major Objectives:

1) Create a space habitat analog research facility, specifically designed to accommodate desired modifications in the physical and perceptual living and working environment, and

2) Demonstrate the ability of such an environmental behavioral laboratory to simulate, investigate, and address critical factors that play important roles in human health and well-being in Isolated and confined environments (ICEs).

Multi-Purpose Research Station: To that end, the LDT Team plans to implement adaptive modifications in the Multi-Purpose Research Station (MPRS) at the U. of North Dakota (UND) in Grand Forks (Figure 1). MPRS currently consists of a five-module lunar/ planetary habitat analog complex originating from two NASA EPSCoR grants.

Customizable Module: The principal modification will be to design, build, and install a new module as a space habitat architectural and behavioral laboratory. The interior of this module will be highly customizable, based on the 1.05 m x 2.10 m ISS "rack functional unit" modularity. The module will be mobile so it can move to attach at different positions to the MPRS and move integrate with habitat analogs elsewhere.

Bibliography: Cohen, Marc M. (2012 September). Mockups 101: Code and Standard Research for Space Habitat Analogues (AIAA 2012-5153).

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