35th IAA SYMPOSIUM ON SPACE AND SOCIETY (E5)
Space Architecture: Habitats, Habitability, and Bases (1)

Author: Prof. Justin Walsh
Chapman University, United States

Prof. Fred Scharmen
Morgan State University, United States

LEARNING FROM LOW EARTH ORBIT - THE ACTUAL PRESENT AND POSSIBLE FUTURE OF SPACE STATIONS

Abstract

Space habitat designers have surprisingly little information about the lived experiences of astronaut crews and the usage of space station architecture and facilities. We use archaeology, studying the relationship between humans and their material culture, and the methods of architectural design research, which similarly seeks to learn more about how people use spaces and objects, to study the International Space Station and provide insights to improve future habitats. Here, we discuss our findings about how life is lived in space now, and offer some recommendations about how it could be lived in habitats to come.

Systematic documentation shows disjunctions between the planned and actual usage of space station facilities. For example, the Maintenance Work Area in the Node 2 module is used primarily for storage, not maintenance. Crew-created visual displays indicate a strong desire to personalize living and working spaces. Designers of future space habitats should consider ways to accommodate personal modifications that can improve crew well-being.

The decentralized management scheme for the ISS has led to imbalances in the distribution of people around the station. A centralized management scheme would enable more efficient use of spaces and equipment by a wider range of crew members. We have also observed the regulated, documented, and scheduled nature of life on the station, and the small degree of autonomy that ISS crew members have in relation to objects.

Standards now being developed for new habitats such as the Commercial LEO Destinations Stations, like building codes and regulations on Earth, mediate between the designers of built environments and their users. As initial statements about responsibilities and governance, the Outer Space Treaty and the Artemis Accords are analogous to the Declaration of Independence or the Magna Carta. In the US, an intermediary regulatory layer, occupied by the Constitution and its Bill of Rights, establishes expectations about how people can live. A bill of rights for life in space could guide the design of agency-owned habitats like Gateway, as well as privately-owned ones like CLDS, with basic crew rights to safety, health, comfort, autonomy, freedom, and privacy. Agencies and governing bodies such as UN COPUOS should develop such a bill of rights to clarify the needs which will govern future habitats.

Our investigations of these phenomena on the ISS can create better lives in space. They demonstrate the importance of integrating perspectives from the social sciences and post-occupancy studies into habitat design and mission planning.