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Models for Successfully Applying Space Technology Beyond Its Original Intent (2)

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PRACTICAL DESIGN EXAMPLES FOR HUMAN HABITATS IN SPACE, OFF-GRID, AND IN LOW-IMPACT COMMUNITIES

Abstract

All human habitat problems fall into three major categories- the environment, the habitat itself, and the occupants. By breaking these problems down into common themes and addressing them directly, we can build a common knowledge base for all three challenges faced by humanity. A crew living in space has the new problems of coping with radiation, microgravity, and vacuum. All the while, they are dealing the usual issues of eating, sleeping, and getting along with the rest of the occupants. By isolating the differences between space and earth habitats, we can create common architectural styles for each human habitat challenge where commonality is appropriate. We can then examine the differences, then isolate and modularize the secondary systems where possible. This simplifies experimentation and

testing of the physical and psychological design of a structure on Earth prior to attempting use in space. It also allows spin-off architectures for extreme environments, off-grid settlements, research bases, and low-impact communities on Earth. By isolating and testing each attribute of the system in parallel with control groups, we can scientifically refine the systems for human shelter regardless of environment. This paper will show numerous examples of architectures designed for space or space analog research bases. These designs can be both de-scoped to off-grid sustainable architecture, and scoped up for space habitat applications. Concepts such as internal greenhouses, enclosed permaculture, thermal protection, energy management, and radiation shielding are included for both minimal habitats and large bases. These systems can then be applied for disaster first responders, research bases in extreme environments, off-grid homes, and low-impact communities.