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Space Architecture: Habitats, Habitability, and Bases (1)

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WINDOWS AS A KEY ELEMENT – THE SPACE BETWEEN

Abstract

Nobody would question the inclusion of windows in any building on Earth. Yet, in space the inclusion of windows is still subject to trade-offs. Windows weaken the structure and are expensive... On the other side the psychological importance of windows and having a view to Earth and outside is (albeit reluctantly) recognized. In any inhabited building, a window is one of the key architectural elements. Windows serve functional as well as provide pleasure. They regulate the relationship and experience between the inside and the outside, provide lighting, provide information regarding the external environment, provide access to complexity and variety and frame views. The design and integration of windows is a perfect exemplar of the demand for interrelated aspects of habitability in extra-terrestrial environments. They combine the aspects of the mission related requirements, the environmental constraints and the human psychosocial and behavioural factors. The design integration of windows into any structure is a multi-faceted challenge for architects, and is central to different traditions of building. People look through a window and see a context that is controlled by the window's proportion, geometry, size and placement. The perception and experience is directly connected to the architectural design and its integration with the psychological, social and philosophical needs of the viewers. In most terrestrial environments, the inclusion of windows is taken as a given with primary decisions being those guided by structural integrity and aesthetic preferences. However, the demands engendered by extreme environments, both terrestrial and off-Earth, place unique challenges on these considerations. In addition, in environments where planning mistakes can be lethal, resources to address mistakes are maximally limited and functionality must be multi-purpose, . we encourage spacecraft designers to take advantage of the multi-dimensional benefits by thoughtful design integration. Windows in all variations are one of the key elements for future space architecture. This paper will present and discuss the most important characteristics of these critical architectural elements in relation to their meaning for the crew and their inhabited space. Referring to the anthropological meaning of windows, this paper will discuss alternatives to real physical windows.