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STRATA SPACE - A LAYERED APPROACH TO SPACE HABITAT INTERIOR DESIGNS

Abstract

Future long-duration space habitats need to be designed to support not only psychological, physiological and safety needs of the crew, but to also provide comfort and emotional well-being. While the extreme environment of space can be mitigated through technological solutions, higher level astronaut needs require human centered design approaches. Furthermore, space missions are resource and volume limited, requiring sustainable designs. To address these, we can draw from novel terrestrial designs solutions. The Strata project started with a focus on how new opportunities in distributed manufacturing can be used for creating more sustainable consumption of products. By changing the perception of products from stand-alone, composed entities, to seeing them as connected layers of meaning and material with different life expectancies, Strata Pace Layer Products offers users a possibility for renewing and personalising their home without compromising the environment. For this we have developed a "Logic of Layers", separating products into fast and slow layers, looking at the criteria that each type of layer should fulfil to be more environmentally responsible, as well as offering personalised solutions. "Skin Layers" are fast, customizable and should be super-recyclable. These are the top layers of products that users frequently interact with, and often the layers in conventional products with the shortest life-expectancy that causes users to discard them. "Base Layers" are slow, and usually make up the inner parts of the product. They are resilient, long lasting, and robust. In between we have middle layers. This layered approach could be beneficial in volumetrically constrained space habitats. Through the terrestrial development of the Strata project, we looked at people's emotional attachment and connected meaning to layers of products, and found that people are emotionally attached and want to express themselves through the Skin Layers. While other layers also play a role, changing the skin layer would, for most people, be enough for a product to feel personal. In the context of space travel this would provide an interesting opportunity for astronauts to support some of the essential needs of comfort and well-being by offering them new ways to manipulate, personalise, co-create, modularize, and reconfigure their own space inside the spacecraft by spatially and temporally evolving it through the spaceflight in a sustainable way. In this paper we provide examples of space habitat interior designs using our Strata Pace Layer approach, illustrating how this solution can address the emotional connections between the crew members and their environment.