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ASTROLAND AND CYBERHUT: TRANSFERRING CONCEPTS AND IDEAS FROM A SUBSURFACE MARS ANALOG TO A SUSTAINABLE, EFFICIENT AND SELF-SUFFICIENT SMART HABITAT FOR MARS AND EARTH

Abstract

In the last 2 years at Astroland we have developed, operated and tested the first permanent Mars cave analog extreme environment in a real cave near Santander, Spain. Based on the lessons learned during a number of internal Mars analog missions and field test campaigns in terms of habitability and human factors and well-being we have designed and manufactured a new modular and self-sufficient habitat prototype called CyberHut.

The habitat is designed from a double perspective point of view: on one side as the centrepiece of our analog missions, to be improved and refined iteratively based on the requirements and challenges of simulated Mars, with the final objective to produce the ideal habitat on Mars. On the other hand, the CyberHut can be deployed as a stand-alone or modular habitat on Earth to create bigger complexes and offer an alternative view on classic housing.

Witt the CyberHut concept we aim to refine the final design of a habitat on Mars by iterating its design and functionality on Earth in analog and everyday environments. In this way we want to capitalize also on the requirements for a sustainable and comfortable life without the constraints of an extreme environment making the final version of the habitat not only a shelter for survival but also for thriving and enjoying. For that, the CyberHut is a full multi-functional Smart House focused on three fundamental attributes: security against natural and technical hazards, health, thanks to a preventive medicine station, filtered atmosphere free from environmental pollution, electromagnetic protection; and modular habitability, allowing for an internal structuring of the spaces.

In this paper we will discuss the initial requisites for the CyberHut as an analog facility, the transfer of habitability and operational concepts to an 'earthly' version and the lessons learned from there to improve the (simulated) Martian one.