SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and Development (1)

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SELF-DEPLOYABLE HABITAT FOR EXTREME ENVIRONMENTS (SHEE) - AN INVESTIGATION OF DESIGN AND CONSTRUCTION PRINCIPLES

Abstract

Self-deployable autonomous habitats are needed, in particular, in extreme environments where there is no infrastructure and heavy machinery available. Self-deployable habitats will mitigate construction safety risks and reduce costs due to their subsystems coupling and compact transportation size. Robotic construction integrated into architecture is currently at a very low level of technology readiness. The understanding of self-constructible and fully self-sustainable habitats for space also provides a knowledge base for terrestrial applications. The potential of SHEE in terrestrial applications lies in the support and protection of humans exposed to natural disasters. The utilisation of rapidly self-deployable habitats that do not require any infrastructure for their operation may become an essential part of a post-disaster management. The paper will show case studies for such deployable habitats. Further, it will examine the necessary ingredients for designing and constructing self-deployable autonomous habitats on moon, Mars and in extreme terrestrial environments.

The SHEE habitat test-bed (EU-FP 7 - N: 312747 - co-funded project) will be composed of a deployable (flexible) structure surrounding a rigid core structure. The habitat will feature a robotic deployment mechanism, power generation system and a life support system. The test bed will be conceived as a

temporary living module for two people. The folding capability of the habitat will allow interdisciplinary research and tests of various technologies in different analogues in Europe and worldwide.