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INTERIOR CONFIGURATION CONCEPTS FOR THE GATEWAY IHAB

Abstract

The Lunar Orbital Platform–Gateway (LOP-G) is currently being designed and developed by the International Space Station Partners. LOP-G is planned as a lunar-orbit space station thus providing in the future, a staging point deeper into space for exploring the moon, Mars and other parts of the solar system. Elements such as the ESPRIT module and the International Habitat (iHab) module are foreseen to be designed and built by European partners. Therefore, the European Space Agency (ESA) issued invitations to tender for the first conceptual design phases for these LOP-G elements. This paper focusses on the architectural aspects, the design and integration of crew systems for iHAB within a given envelope of a module.

As part of the Phase A/B study for ESA, two European industry consortia are working on two extensive parallel concept studies for iHAB to prove the feasibility (Phase A) and develop the preliminary element definition (Phase B).

One team has come together under the lead of Airbus, comprising Thales Alenia Space, Sener, Quinetiq, Space Applications Services, Crisa and LIQUIFER Systems Group to advance NASA's iHab layouts towards a design definition.

The iHAB will provide four astronauts for up to 30 days with life support, exercise facilities for crew health, science research facilities and stowage.

Based on a preliminary set of requirements for the interior architecture, detailed 3D models depicting possible internal configurations have been developed and trade-offs conducted. The models allow designers and engineers to understand how the various internal elements such as crew quarters, sleeping and personal hygiene facilities, exercise devices, science research containers, airlock hatches and stowage bags can best be accommodated in iHAB. Such models are necessary inputs for performing volumetric and spatial configuration trade-off assessments for the various elements.

The paper will discuss the design process and iHAB configuration options which led to the final design requirements and recommendations. Main design considerations are directed towards private and common spaces such as work, exercise and leisure areas. Within an overall interior volume of 78m3 all these different programmatic functions need to be incorporated. Some of the facilities offer deployability and transformability to increase the possibilities for spatial usage and still allow multiple pathways necessary to transition from one module to another.

The iHAB studies are considered as vital input for the European Ministerial meetings at the end of 2019 to define the next budget allocation for LOP-G for the coming years.