**2023 JSC Hackathon Challenge – Crew Entertainment System**

**Common Habitat Background**

The Common Habitat Architecture is a plan for exploration of the inner solar system using habitats constructed from the Space Launch System Core Stage’s Liquid Oxygen Tank. Just like Skylab in the 1970s, the SLS LOX tank would be manufactured as a habitat and launched as a payload. This habitat has an internal design that allows it to be used on the Moon, on Mars, in deep space, and in other destinations across the inner solar system, though the primary focus will be on the Moon, Mars, and deep space.

On the Moon and Mars, it will be combined with other elements to form a surface Base Camp. In space, it is combined with other elements to form the Deep Space Exploration Vehicle. The Common Habitat features a galley and wardroom volume on the upper deck. This multipurpose space facilitates crew meals and both social and mission-related gatherings of the crew. It also serves as a crew meeting space and can be reconfigured for social activities including lounging, movie watching, and games. It is the primary location within the Common Habitat architecture for all eight crew to gather on a regular basis, for both social and mission-specific purposes. Crew will live in the Common Habitat for missions ranging in duration from 1 to 5 years.

The papers *Internal Architecture of the Common Habitat* and *Vertical Translation System for the Common Habitat Architecture* along with the video LunarBasecamp2\_Final.mp4 will help give a sense for the area and can serve as the starting point for this work. These will be made available to participating teams.

**Crew Entertainment System Task**

While the Galley and Wardroom is the designated location for the Crew Entertainment System, no actual content or functionality has actually been identified beyond a notional video projection system.

The purpose of this hackathon challenge is to develop a Crew Entertainment System that will maintain the psychological health of an eight-person crew during missions in the Common Habitat ranging from 1-5 years in duration.

The following details govern the galley and wardroom section of the Common Habitat:

* The wardroom shall use eight Multi-Gravity Crew Seats. The design of the MCGS is not publicly available yet. For purposes of this challenge, substitute generic bar stools with arm rests.
* The wardroom shall be reconfigurable to support different crew activities including crew meetings, stationary recreation (e.g., board games), lounging, movie watching, and dynamic recreation (open floor space for games requiring moving within a small area).
* The wardroom shall include a projector, speakers, microphone, and wide projection screen.
* The wardroom includes a deployable / reconfigurable table system sized for eight crew to dine together. This table may be a single table surface, or it may subdivide into two table surfaces.
* The wardroom table includes built-in interfaces for computer display and control, video communication, and audio communication.
* The wardroom table is mounted to the tops of two stacks of four mid deck lockers. If desired, two, three, or four lockers may be substituted for a double, triple, or quad-height locker.

The following guidelines apply to the Crew Entertainment System:

* All Crew Entertainment System activities must promote social interaction among the crew.
* Games must include (but are not limited to) both physical activity games and table games, subject to the following definitions:
  + Physical activity games are those where the participants are not seated, and some level of physical motion is involved. All seats and tables are stowed. (Frisbee, miniature golf, and dodgeball are terrestrial examples.)
  + Table games are those played where the participants are seated, and the table is used as a surface. (Card games, monopoly, and scrabble are terrestrial examples.)
  + Traditional video games are not included in this activity. In general, if a crew member could play the game in a single player mode alone in their crew quarters that game falls outside the scope of this exercise.
  + Avoid the use of existing games and attempt to come up with new game ideas.
* The Crew Entertainment System shall include (but is not limited to) all of the following:
  + For each gravity environment (microgravity – 0g, lunar gravity – 1/6g, and Mars gravity – 3/8g)
    - No less than two physical activity games that are played by two persons.
    - No less than two physical activity games that are played by four persons.
    - No less than two physical activity games that are played by eight persons.
    - No less than two physical activity games that can be played by a variable number of crew, no less than two and no more than eight persons.
    - No less than four entertainment activities that are not games and involve more than one crew member.
  + No less than eight table games. Each table game must be playable in 0g, 1/6g, and 3/8g.
  + No less than four games that do not meet the definition of physical activity games or table games and are playable in 0g, 1/6g, and 3/8g.
* Games must be viable regardless of crew gender, age, body size, and nationality – all of which will vary across the different crews assigned to Common Habitat missions (within astronaut selection criteria).
* All Crew Entertainment System items (excluding permanently mounted items such as the video projector) must stow within six of the eight mid deck lockers beneath the wardroom table when not in use.
* The Crew Entertainment System shall include both fixed audio speakers and wireless headphones. Headphones are stored with individual crew member personal items in their crew quarters and do not need to be accounted for in this design challenge.

The hackathon solution must include the following:

* Describe all crew games, including rules and other details of game play.
* Describe masses and both stored and deployed dimensions for all game equipment.
* For each game, discuss any reconfiguration needed to prepare the galley and wardroom area for game play.
* Sketches, CAD models, and videos are encouraged, subject to the abilities of the hackathon team.
* All material used by the hackathon team must be free of any copyright restrictions.
  + Use only models, photos, or images created during the project unless you have obtained the right from the copyright owner for their use – do not blindly download images from internet websites.
    - Images on .gov websites are often (but not always) public data; check before assuming.
  + Include documentation of any usage permissions.