NASA wants to identify how virtual worlds (i.e., interactive games, avatars, social networks) could be used for long-duration space exploration missions. This subtopic is aimed at developing a virtual social support system for crews of such missions.

During these missions, the crews, by virtue of their distance from Earth, are separated from their significant others and will no longer have access to social support currently provided to the ISS crews. They are living in a confined and isolated environment devoid of normal Earth settings as they venture to distant destinations. Long communication delays between Earth and vehicle are also anticipated. Expanding the crew's social connectivity to friends, family, and colleagues back home through a variety of virtual platforms will help mitigate the stressors inherent to living and working in such an isolated, confined, and extreme environment.

During the actual mission, the tool could provide a more homelike "virtual world" to augment the constrained physical habitat the crew lives and works. It could also help the crews maintain connections and provide the needed social support. As a design tool, the insight gained into the crew members' interaction with the outside world would be valuable for developing new mission training regimens and design concepts for future long-duration missions.

The proposal shall describe:

- The virtual environment to be developed.
- Plans to provide adaptive systems to deal with communication latencies.
- How the tool could enhance and measure behavioral health and performance, including perceived closeness to home.
- Ways to assess habitability issues.

NASA Deliverables - Phase I deliverable shall yield a proof of concept that includes both an evidence review that
encompasses an assessment of current knowledge of virtual reality technologies and their use in supporting this topic.

In addition, the following deliverables shall be required:

- A requirements document for such a support system that fits the needs of a NASA exploration mission.
- A plan for evaluating the effectiveness of the tool as a behavioral health countermeasure, training, and habitability assessment.

The subsequent Phase II deliverable shall provide a prototype of specific modules that can demonstrate improved communication and perceived social support by utilizing these technologies.

**HRP IRP Risks** - Risk of Adverse Behavioral Conditions and Psychiatric Disorders; Risk of Performance Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team; Risk of an Incompatible Vehicle/Habitat Design

Technology Readiness Levels (TRL) of 4 or higher are sought.

Potential NASA Customers include:

- Behavior and Performance Element in Human Research Program: