

## SPACE LIFE SCIENCES SYMPOSIUM (A1)

The International Space Station in LEO and the Deep Space Habitat in Cis Lunar Space as platforms for simulated Mars voyages (4)

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PAVING THE WAY TO WIDE USE OF MARS EQUIPMENT THROUGH INTEGRATED  
SIMULATIONS ON THE ISS

**Abstract**

When planning Mars voyages, we have to take complex psychosocial issues into account. One of the main changes will concern the overall number of participants to the mission. Due to the very long times of cruise, long term settlements will be most convenient, setting the place for large, expanding colonies of dozens, then hundreds of people. Among the crew, high level skills will be necessary to cope with the local environment and control the technical equipment. However, most of the people will only be trained to interact with specific systems and behave like unskilled, generic users of the remainders. Considering the long time frame, we will also have to consider elderly and young users. In order to reduce errors and support local decision processes, the equipment will need to implement proper ambient intelligence solutions, combined with simplified, intuitive interfaces. The necessary design work will need to be based on adequate user testing and simulation, considering the peculiar conditions of a Mars habitat in terms of gravity, radiation, living and psychosocial environment. While some basic analogues can be set up on Earth in confined test settings mimicking the voyage experience, the ISS would be the first and optimal test-bed, combining real environment variations with controlled, interlocking effects on human perception, decision, ease of access. Aboard the ISS, the test participants would be able to experience the stress conditions related to Mars exploration for a continued period of time, both individually and in crews. In this paper, we will describe some feasible, relevant experiments to be carried within the ISS4Mars project in order to analyze, develop and test the human factors of the technical equipment destined to Mars missions, with the goal to provide user-centric, accessible designs, capable of being safely used by any member of the crew, for the benefit of the Mars mission community.