

## 2017 EUROMOONMARS ANALOG HABITAT PREPARATION AND SIMULATION AT ESTEC

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**Introduction:** The 2017 EuroMoonMars analog habitat was intended to provide a knowledge about what is the minimum and necessary equipment needed when arriving on the Moon using off the shelf and cheap components and where the focus should be put on. Even though the purpose is neither to test new equipment and technologies nor to perform some human and psychological experiments, high technologies experiments are developed and tested to increase the coherence of the data collected.

**Context:** ILEWG has developed, since 2008, "EuroMoonMars", an evolving pilot research programme starting with a Robotic Test Bench (ExoGeoLab) and a Mobile Laboratory Habitat (ExoHab) at ESTEC. An autonomous Laboratory (ExoLab) has been added later [1].

**Technical improvements:** For EuroMoonMars 2017 ESTEC tests, the ExoHab, ExoLab and ExoGeoLab are located in different areas adding complexity to the simulations. An efficient communication system is developed to cope with this issue, using mainly walky-talkies and Wi-Fi. A collaboration with former Google Lunar XPrize participant PuliSpace provides a Rover to connect with ExoGeoLab so it can be operated either locally or from a dedicated mission control in Hungary.

The ExoHab has been rearranged so that it could be possible to work simultaneously at 5 people at least thanks to the clear definition of functional areas. ExoHab represents the "first house" of the MoonVillage. As such, it is used to centralize every aspect of the mission (communication, science, life) [2].

The ExoLab has been rearranged into ExoLab 2.0 with a redefinition of the functional areas. Keeping in mind that it should be a modular laboratory based on standard space container, the whole layout has been thought to be dismountable and reusable in similar containers. Thus, highly modular magnetic walls capable of supporting heavy charges have been developed using off the shelf components as well as modular furniture.

All those improvements made possible the EuroMoonMars simulation on the 21<sup>st</sup> of July 2017.

**EuroMoonMars Simulation:** In the frame of the simulation, the participants of the EuroMoonMars workshop held at ESTEC contributed by taking different roles from Astronauts in ExoHab, ExoLab, in the Lunar Orbiter, as well as Ground Controllers at the Mission Control Centre.

Some protocols have also been developed to clarify each task [3]. What was planned for the workshop was:

- Landing on the Moon, setting of the Astronauts in ExoHab and ExoLab.
- Medical check of crew members.
- Biological experiments.
- EVA including interactions with ExoGeoLab lander and sample gathering.
- Geological experiments.
- Medical experiments.
- Leaving the Moon Base

In-between, incidents have been triggered by the Mission Control Centre to test the emergency protocols and equipment.



**Figure 1:** Mission control of the EuroMoonMars 2017 simulation at ESTEC

**Acknowledgements:** we thank ILEWG EuroMoonMars programme and the participants to EuroMoonMars 2017 workshop and simulation.

### References:

- [1] Foing B et al (2017) LEAG 2017 – 5073 [2] Blanc A et al (2017) LEAG 2017 – 5072 [3] Authier L et al (2017) LEAG 2017 – 5071