

Making the Moon Habitable: Science, Research, Technology & Innovation

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1. Introduction

We shall discuss the science goals, innovation, status of upcoming missions in the context of Making the Moon Habitable and elaborating the concept of a Moon Village with the goal of a sustainable human presence and activity on the lunar surface [1-3] as an ensemble where multiple users can carry out multiple activities.

Multiple goals of the Moon Village include planetary science, life sciences, astronomy, fundamental research, resources utilisation, human spaceflight, peaceful cooperation, economical development, inspiration, training and capacity building.

2. Previous projects

The Moon represents a prime choice for political, programmatic, technical, scientific, operational, economical and inspirational reasons. COSPAR and its ILEWG International Lunar Exploration Working Group (created 20 years ago) have been supporting opportunities of collaboration between lunar missions and exchange on future projects [4-8]. A flotilla of lunar orbiters has been deployed for science and reconnaissance in the last international lunar decade (SMART-1, Kaguya, Chang'E1&2, Chandrayaan-1, LCROSS, LRO, GRAIL, LADEE).

De facto, collaborative opportunities and elements of a Robotic Village on the Moon exist, as China landed in 2013 the Chang'E3 and its Yutu rover, and from 2017 other landers are planned (GLXP, Chang'E 4&5, SLIM, Luna 25-27, LRP, etc.). A number of human missions with Orion & ESA service module to lunar orbit, as well as private missions for humans and cargo are also planned.

3. Current missions for MoonVillage

We shall discuss roadmaps and technical studies held in international groups [4- 15] such as COSPAR, ILEWG, ISECG, IAF, IAA or national and regional groups (eg LEAG). We shall discuss the upcoming international and private lunar robotic and human missions and how they can address science, research, technology, innovation and infrastructures to enable the vision and implementation of a Moon Village.

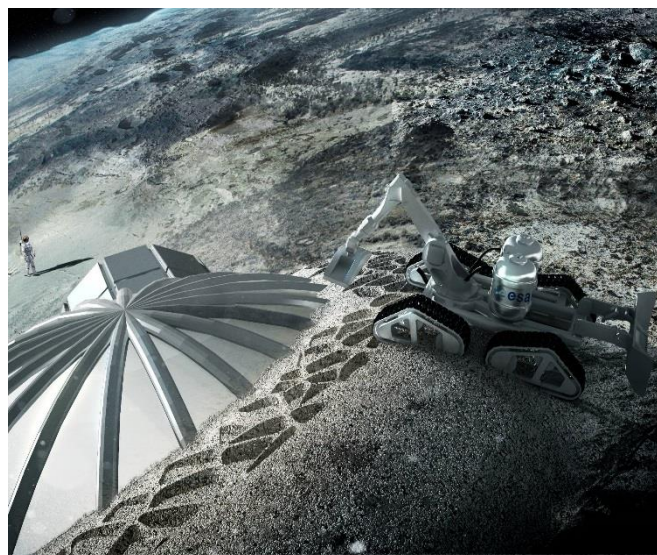


Figure 1: possible step towards the MoonVillage using robotic with 3D printing to consolidate inflatable domes against radiation and meteorites before the arrival of astronauts.

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Figure 2: enthusiastic public endorsing the MoonVillage concept after a talk given during ESTEC open day, and being asked who wants to become MoonVillagers.

5. References

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Short Summary

How to make the Moon Habitable and design a Moon Village with sustainable human activity on the lunar surface where multiple users can carry out multiple activities including planetary science, life sciences, astronomy, fundamental research, technology, resources utilisation, human spaceflight, peaceful cooperation, economical development, inspiration, training and capacity building.