

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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TOWARDS A MOON VILLAGE: ENABLING TECHNOLOGY AND PRECURSOR MISSIONS

Abstract

Moon Village Workshops at ESTEC and with community in 2015-2016 gathered a multi-disciplinary group of professionals from all around the world to discuss their ideas about the concept of a Moon Village.

The Science and Technology team has identified key technologies and possible major scientific disciplines for a Moon Village and ranked them by importance and by Technology Readiness Level (TRL). In terms of basic technologies and objectives, rover exploration, life support systems, navigation and surveying technologies resulted to have the highest importance and readiness. Technologies for the development of the habitats (materials, modules connections, power supply, alternative energy technologies and energy storage) ended up on having high importance with medium-low technology readiness. Technologies intended to help the astronauts or improve techniques had low-medium importance together with low-medium TRL (e.g. space lift to transfer resources, bio cybernetic augmentation “Exoskeleton”, jumping rover, telescope).

The Science and Technology group analyzed the importance and readiness level of technologies needed for lunar robotic landers and for the Moon Village. The current ESA lunar exploration activities focus on the contribution within ISS operations barter of the ESA service module to bring Orion capsule to the Moon starting with an automatic demonstration in 2018. It is encouraged to consolidate this path for using the service module for crewed missions EM2 and EM3 giving also the possibility of an ESA astronaut, together with advanced technology, operations and science utilization. They noted the interesting contribution of instruments, drill, communications, and landing in support to Russian lunar polar lander missions Luna 27.

Building on previous studies (EuroMoon, lunar polar lander) ESA could develop a mid-class lunar lander (affordable in cost 300 Meu class), demonstrating the expertise at system level for a platform, that could carry innovative competitive robotic payload contributed and already with advance development from member states and international or commercial partners. With teleoperations from Earth and cis-lunar orbit, this will advance progress towards the next steps of Moon Village and beyond.