**UPDATES FROM MOON VILLAGE WORKSHOPS AND STUDIES.**

B. Foing[1] et al [1]ESA/ESTEC & ILEWG (Bernard.Foing@esa.int)

**Summary:** We report on Moon Village workshops that gathered a multi-disciplinary group of professionals from all around the world to discuss their ideas about the concept. The workshop participants focussed on **Moon Habitat Design, science and technology potentials** of the Moon Village, and **engaging stakeholders**. We also report on technical and research studies, and activities that followed.

**Introduction:** The new DG of ESA, Jan Wörner, has expressed from the very beginning of his duty a clear ambition towards a Moon Village, where Europe could have a lead role. The concept of Moon Village is basically to develop a permanent station on the Moon with different countries and partners that can participate and contribute with different elements, experiments, technologies, and overall support.

ESA's DG has communicated about this programme and invited inputs from all the potential stakeholders, especially member states, engineers, industry, scientists, innovators and diverse representatives from the society. In order to fulfill this task, a series of Moon Village workshops have been organized first internally at ESA and then at international community events, and are also planned for the coming months, to gather stakeholders to present their ideas, their developments and their recommendations on how to put Moon Village into the minds of Europeans, international partners and prepare relevant actions for upcoming International Lunar Decade.

**Workshop:** Several Moon Village Workshops took place in ESTEC and other sites, organized by ILEWG & ESTEC. It gathered people coming from all around the world, with many young professionals involved, as well as senior experts and representatives, with a very well gender balanced and multidisciplinary group. Engineers, business experts, managers, scientists, architects, artists, students… presented their views and work done in the field of Lunar Exploration. Participants included colleagues from ESA, SGAC Space Generation Advisory Council, NASA, and industries such as OHB SE, TAS, Airbus DS, CGI, etc… and researchers or students from various Universities in Europe, America, and Asia.

The Workshops participants split in three working groups: **Moon Habitat Design, Science and Technology potentials on the Moon Village, and Engaging Stakeholders**. They were tasked to discuss ideas, and pilot projects with the aim to consolidate visions for Moon Village stakeholders and provide some recommendations to the ESA DG, Jan Wörner.

The **Moon Habitat Design** group discussed principles and concepts for a minimum base that would start with 4-10 crew, allowing a later evolution to 50 crew and elements contributed by Moon Village partners at large. Various aspects were assessed including habitats, laboratories, EVAs, pressurized vehicles, core modules, inflatable extensions, power systems, life support systems and bioreactors, ISRU using regolith, emergency, services, medical, escape, shelters.

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 should 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. We shall report on latest activities from these events, studies and field research.

**References:** [1] http://sci.esa.int/ilewg/ and https://ildwg.wordpress.com/