IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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JHU/APL'S SYSTEM INTEGRATION SUPPORT OF NASA'S LUNAR SURFACE INNOVATION INITIATIVE

Abstract

The National Aeronautics Space Administration (NASA)/Space Technology Mission Directorate (STMD) Lunar Surface Innovation Initiative (LSII) aims to spur the deployment of technologies needed for lunar surface exploration and accelerate the technology readiness of key systems and components. It is well-recognized that in order to achieve sustained operations on the surface of the Moon, new technologies must be deployed, especially regarding power systems, in situ resource utilization, dust mitigation, excavation and construction, and access and operations in extreme environments. As with all technology, development is a process starting with an idea and maturing through higher fidelity versions until it is fully developed, tested, verified, and ready to be deployed. The LSII activities at NASA are implemented through a combination of unique in-house activities, competitive programs, and public-private partnerships. This work is spread across institutions including commercial companies, academia, government laboratories, and research institutions. To optimize LSII effectiveness, it is important to harness the creativity and energy of these efforts, align them to common goals, and maximize the investments each stakeholder is making in development. The Johns Hopkins University Applied Physics Laboratory LSII team supports NASA's STMD in their technology role of enabling a sustainable human presence on the lunar surface in the following four areas. • Running of the Lunar Surface Innovation Consortium • Providing science and engineering integration expertise • Lunar simulant analysis portal support • Technology Research opportunity support

LSII activities are thematically grouped into the six capability areas:- • Dust Mitigation • Excavation and Construction • Extreme Access • Extreme Environments • In-Situ Resource Utilization (ISRU) • Surface Power As a systems integrator JHU/APL readily facilitates access to essential engineering, research, and development capabilities in support of NASA goals. JHU/APL can undertake technical analyses and other engineering support to address the acquisition, technical, and operational needs of NASA LSII, and can contribute to strategic activities such as technology road mapping, and the assessment of national capabilities in support of NASA's future solicitations. JHU/APL provides a "Systems of systems" approach to combining technologies from multiple entities across academia, government and private industry. JHU/APL also provides engineering, integration and test support to nontraditional NASA partners, start-ups and small businesses One example of a system integration task was conducting landing site analyses for the CLPS delivery that will carry STMD's PRIME1 instrument. We conducted

illumination analyses of their south polar region to help determine a landing site and time which enables all payloads on the lander to complete their goals.