Dust Mitigation Technology to Enable Survive the Night Capabilities. K. K. John[1,2], A. M. Fritz[1]; [1]NASA Johnson Space Center, NASA Space Technology Mission Directorate

Introduction: As we return to the Moon, the lunar regolith (i.e. lunar dust) covering the surface will be an obstacle to nominal operations. Accounts from Apollo astronauts and analysis of hardware returned from the surface illustrate just how deleterious the dust can be. During Apollo missions, the lunar dust adhered to hardware mechanically and electrostatically.

Surviving the Night: Mitigating the lunar dust will be critical to surviving the night. Going hand-in-hand with other extreme environment considerations, dust mitigation is critical to mission success.

Technology Development: NASA has a series of technologies that may be available for hardware that needs to survive the lunar night. Many of these solutions are leveraging dust mitigation technology development efforts from NASA's Space Technology Mission Directorate (STMD), as well as efforts from ESDMD programs, industry, and academia.

Through a series of STMD programs (both internal to NASA and through partnerships), there are several technologies in development as considerations as dust mitigation solutions for hardware.

Within STMD, the Game Changing Development Program (GCD) has funded several internal dust mitigation projects including low to mid TRL development, demonstrations on CLPS landers of high TRL solutions, and creating standards and best practices for dust mitigation.

STMD dust mitigation efforts also include a series of partnerships for developing technologies and advancing the state of dust mitigation at NASA. This includes the Lunar Surface Innovation Consortium (LSIC), Small Business Innovation Research, Early Stage Innovations (ESI), Space Technology Research Grants (STRG), Announcement of Collaboration Opportunities (ACOs) and Tipping Points (TPs), and Challenges and Crowdsourcing, among others.

Dust Mitigation Solutions: Dust mitigation has considerations for power, thermal, mechanisms, and beyond.

These solutions generally fall into four swimlanes:

Dust Tolerant Mechanisms, Passive Dust Mitigation Capabilities, Active Dust Mitigation Capabilities and ,Dust Measurement Capabilities.

Working closely with other disciplines, there are a series of solutions that may prove beneficial. This presentation will discuss in more detail what some of these solutions are for payloads going to the surface.