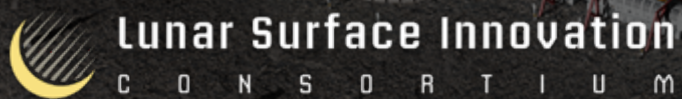


LSIC Surface Power Telecon

February 24, 2022

Begins at 11:03



Wesley T. Fuhrman, PhD
Johns Hopkins Applied Physics Laboratory
Space Exploration Sector

Wesley.Fuhrman@jhuapl.edu

Confluence Discussion:
<https://lsic-wiki.jhuapl.edu/display/SP/27+January+2022>

- Community Updates
 - Upcoming/recent events
 - Solicitations:
 - Watts on the Moon Phase 2
 - Tipping Point/ACO
- MOSA Working Group Update
 - James Mastandrea
- Subgroup Sessions: Format and what to expect in the breakouts



LSIC | Upcoming Meetings and Workshops



- **LSIC Spring Meeting: Keynote NASA Associate Administrator Robert D. Cabana**
 - Abstracts due March 4, 2022, Event May 4-5 (hybrid) <https://lsic.jhuapl.edu/Events/Agenda/index.php?id=200>
- **Nuclear and Emerging Technologies for Space (NETS)**
 - May 8-12, Abstracts submission past, registration open <https://www.ans.org/meetings/nets2022/>
- **53rd Lunar and Planetary Science Conference-Registration Deadline: Mar 11, 2022**
 - March 7-11, 2022 <https://www.aeroconf.org/>
- **2022 IEEE Aerospace Conference-Registration Deadline: February 27, 2022**
 - March 5-12, 2022 <https://www.aeroconf.org>
- **Advanced Power Systems for Deep Space Exploration: Late Summer 2022**
- **ISRU and E&C Regolith to Rebar held yesterday, LOTS of implications for surface power**
 - <https://lsic.jhuapl.edu/Events/Agenda/index.php?id=177>
- **More complete calendar on LSIC website: email me with additional events!**

NASA has identified two critical gaps for lunar surface power systems:

- 1. Power Transmission** that can deliver power from a remote generation source to critical mission operation loads where a) power loads are frequently or permanently immersed in extreme cold; and b) there are large variations in average power loads versus peak power loads. NASA has significant interest in both wired and wireless transmission, and the challenge seeks to incentivize and demonstrate both types of solutions.
- 2. Energy Storage** that can a) power mission operation loads when power generation is not available; and b) survive and operate in extreme cold environments.

<https://www.herox.com/WattsOnTheMoon>

Phase 2 of the competition will last approximately 30 months and award up to \$4.5 million.

Process is complex and involves multiple steps to be carried out by all participants in the proposal.

- Two step process. (for an initial vetting)
- **Topic 1. Cislunar/Lunar Surface Infrastructure & Capabilities**
 - Technologies that support global lunar utilization leading to commercial commodities and services for a robust lunar economy. Such infrastructure could include examples such as **long-distance lunar power distribution; survive and operate during lunar night**; in-situ Resource Utilization; lunar communications; autonomous construction...
- Funded Space Act Agreement
 - Cost sharing, more agency to industry

A space technology is at a Tipping Point if:

- TRL \sim >4 at time of submission of the Mini Proposal.
- Ground demonstration or flight demonstration will result in:
 - Maturation to TRL 6+
 - More able to bring technology to market
- There is a robust plan for commercialization

Schedule	
Mini Proposal Q	3/15
Mini Proposal due	3/31
Notifications	5/31
Final Proposal Q	7/14
Final Proposal due	7/28
Selections Notified	11/30
Funding	Jan 2023

Space Tech Solicitations (<https://www.nasa.gov/directorates/spacetech/solicitations>)

NASA Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) 2022 Phase I solicitation

Proposals due: March 9, 2022

Early Career Faculty 2022

Notices of Intent due: March 2, 2022

Proposals due: March 31, 2022

Announcement for Partnership Proposals (AFPP) to Advance Tipping Point Technologies

Mini proposals due: March 31, 2022

Final proposals due: July 28, 2022

Space Technology Announcement of Collaboration Opportunity (ACO)

Mini proposals due: March 31, 2022

Final proposals due: July 28, 2022

Watts on the Moon Challenge, Phase 2

Registration due: June 15, 2022 at 5 p.m. EDT

- **LSIC Modular Open System Approach (MOSA) Working Group**

- Goal:

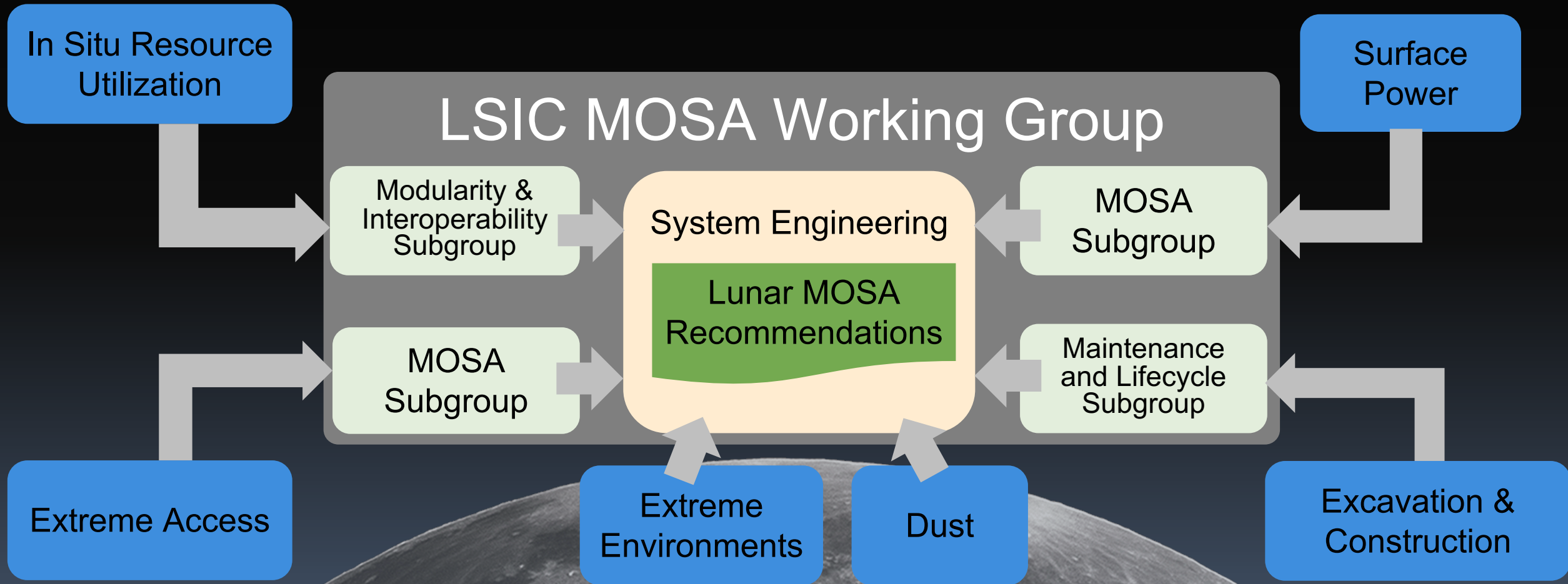
- Document community feedback on recommended lunar MOSA activities
 - Compile existing efforts and identify overlap
 - List systems that could benefit from MOSA
 - Perform system decompositions to find critical interfaces & what requirements are needed to ensure interoperability

- Plan

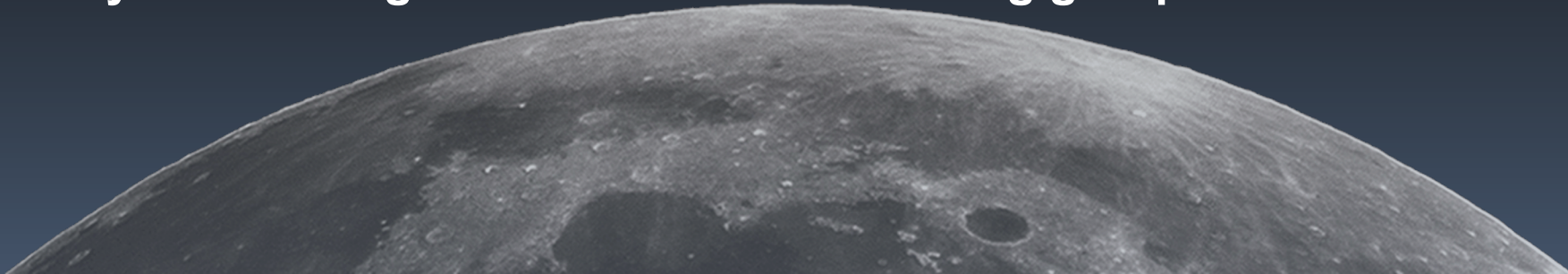
- Each LSIC focus group is participating and has a POC
 - Cross focus group participation is encouraged

- Points of Contact

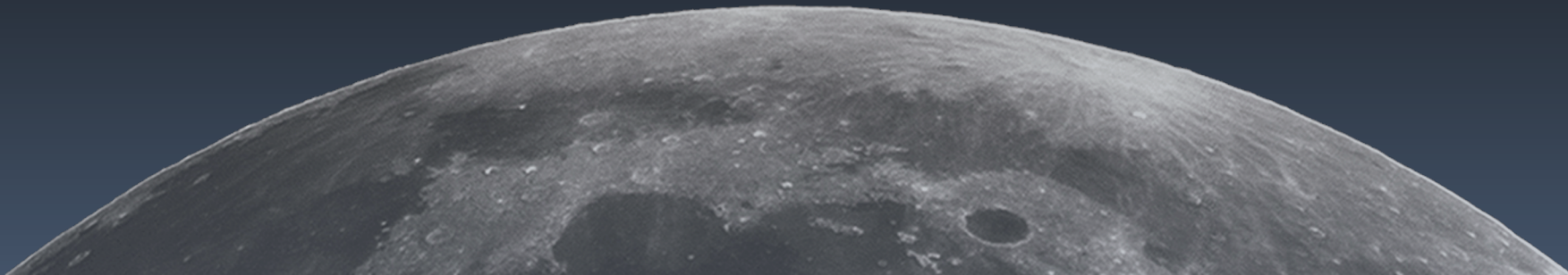
- Lead/Coordinator: James Mastandrea
 - Systems Engineer: Kristin Jaburek
 - Dust Mitigation: Jorge Núñez
 - Excavation & Construction: Cláudia Knez
 - In Situ Resource Utilization : Jodi Berdis
 - Surface Power: Samantha Andrade
 - Extreme Environment: Jamie Porter
 - Extreme Access: Angela Stickle



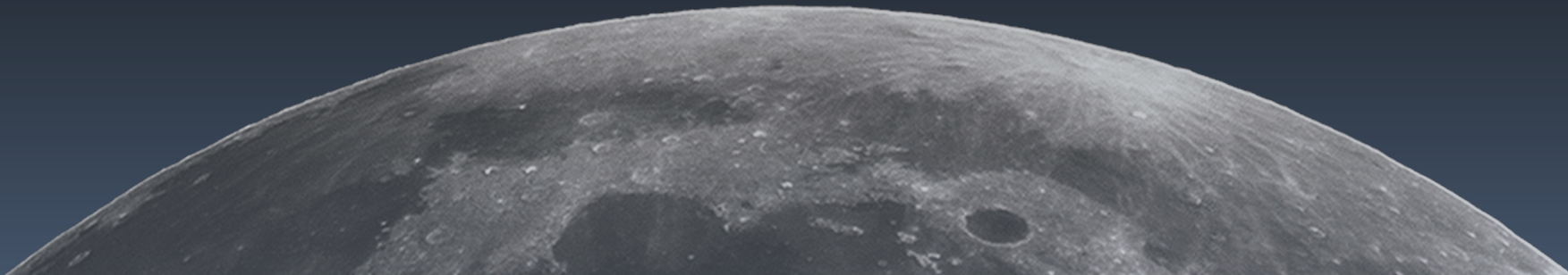
- Today's MOSA Questions
 - Within this capability area, what would you designate as a critical interface?
 - What is the boundary that interfaces with the larger system?
 - What are the existing efforts on standards/interoperability in this area? Are they applicable to the Moon?
 - **What do you want to get out of the MOSA working group?**



- **Breaking out now to 6 subgroups, each with an APL facilitator**
 - **Nuclear (including FSP, RPS, low-power technologies, etc.) – Wes Fuhrman**
 - **Rad-Hard Electronics - James Mastandrea**
 - **Transmission (cabled and power beaming) – Sean Young**
 - **Photovoltaics/Solar Power – Julie Peck**
 - **Fuel Cells - Jodi Berdis**
 - **Low-Temperature Battery Modules - Sam Andrade**
- **We will randomly distribute, THEN we can self-sort into other groups as necessary**



- **We will randomly distribute into breakout rooms, THEN we can self-sort into other groups as necessary**
 - **Hover over right hand side of breakout window and click “join” to move to a different breakout room**
- **We will use Miro to capture notes – take the time to contribute, these are very useful afterwards! Moderators, try to capture extra notes on stickies.**
- **Take the discussion where YOU think it needs to go, this session is for you!**
- **Now, let’s go into the breakout sessions!**





JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

