



Lunar Surface Innovation

C O N S O R T I U M

LSIC Excavation and Construction Monthly Meeting

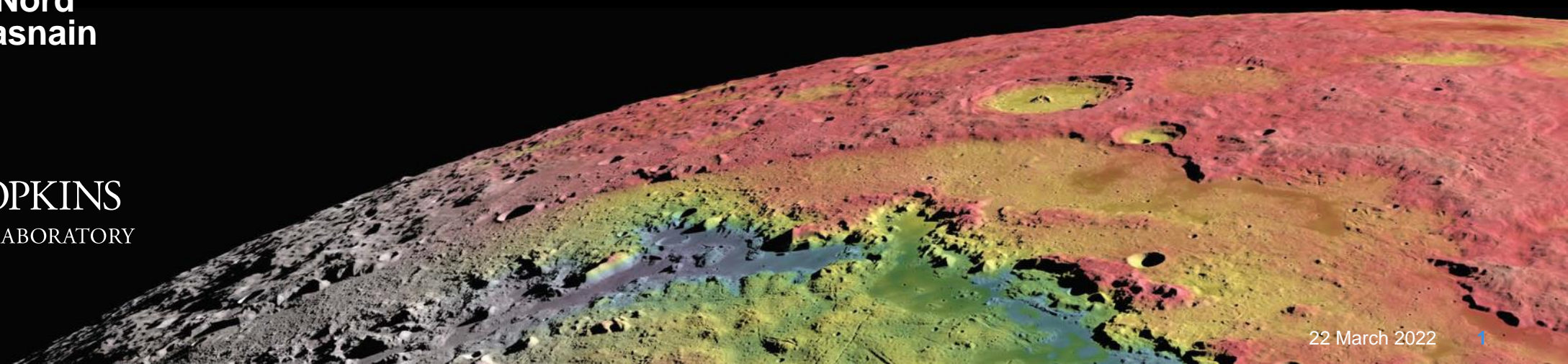
<http://lsic.jhuapl.edu/>

March 23, 2022

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Friendly Reminders

- Recordings will be posted on our website.
(<http://lsic.jhuapl.edu/Focus-Areas/Excavation-and-Construction.php>)
- Please post your questions in ‘**chat**’ .
- Mute yourself if you are not speaking.

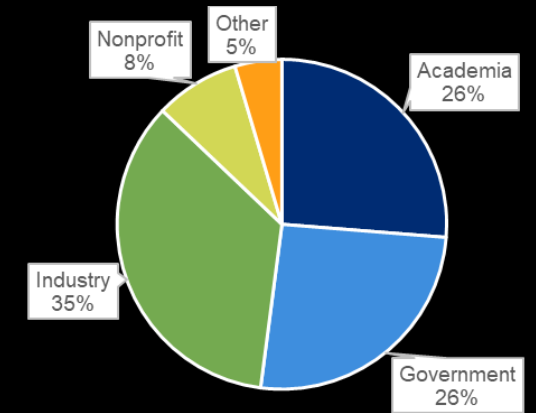
Today's Agenda

- Focus group updates.
- James Mastandrea (JHU/APL) : Overview of LSIC's new initiative on Modular Open Systems Approach (MOSA).
- Jason Schuler (Kennedy Space Center, NASA) : Overview of NASA's ISRU Pilot Excavator (IPE) project.
 - A robotic excavator that will demonstrate excavation and delivery of up to 10 metric tons of regolith on the lunar surface.
- **NEW:** 30-minute networking sessions after the meeting.

- Joint E&C - Dust monthly meeting next month on April 27th , 2 PM Eastern
- **Theme: Designing E&C Systems and Operations for Dust Tolerance.**
- Invited talks and panel discussions.

Regolith to Rebar Metals Workshop Summary

- Virtual Workshop held last month on 23 February, 2022.
- Initial efforts to bring supply and demand aspects of in-situ derived metals.
 - Speakers from companies and NASA leadership.
- Main Takeaways:
 - Need for a Lunar Proving Ground where new concepts can be tested rapidly.
 - Enable system level demonstrations.
 - Industry-government initiative.
 - Need a lunar commercialization study like the one done for LEO.
 - Need to develop lunar surface manufacturing capabilities.
 - A follow-up workshop, *'Rebar to Roadways'* to discuss supply and utilization of infrastructure elements and their commercialization.
- There will be a breakout session second day (May 5th) at LSIC spring meeting.



- Overall registered: 434
- Overall attended: 239
- ~40% of attendees and registrants were non-LSIC members.

LSIC Spring Meeting (Hybrid Format , May 4th and 5th)

Wednesday, May 4, 2022 -Thursday, May 5, 2022

LSIC Spring Meeting

Online and in person at Johns Hopkins Applied Physics Laboratory, Laurel, MD

Abstracts Due: March 4th, 2022

Registration Deadlines: April 6, 2022 (for in-person); April 25, 2022 (for virtual attendance)

The LSIC 2022 Spring Meeting will concentrate on understanding NASA's plans and technology investments relevant to building a sustained presence on the lunar surface. The meeting will include invited speakers, panels, posters, and breakout discussions.

Keynote Speaker



Robert D. Cabana

NASA Associate Administrator

EVENT DETAILS

Date: Wednesday, May 4, 2022 - Thursday, May 5, 2022

Time: 10:00 am - 6:00 pm EDT

Time Notes: Eastern Time

Location: Laurel, MD

<https://lsic.jhuapl.edu/Events/Agenda/index.php?id=200>

Tipping point

“The proposal submission process is complex and involves multiple steps to be carried out by all participants in the proposal.”

- Advancing new capabilities to a point that industry will complete and qualify them without further Government investment
- Two step process. (for an initial vetting)
- Topic 1. Cislunar/Lunar Surface Infrastructure & Capabilities
- Funded Space Act Agreement. Cost sharing: small company: 10%. Larger: 25%

A space technology is at a Tipping Point if:

- TRL)~>4 at time of submission of the Mini Proposal.
- Aground demonstration or flight demonstration will result in:
 - Mature to at least TRL 6, and
 - The Lead Entity much more able technology to market.
- The partner has 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

Subgroup Networking

- Sub-groups

- **Autonomy, Maintenance, Site Planning & Site Prep (WBS 4.1, 4.3, 4.6)**
- **Additive Manufacturing, Raw Materials (WBS 4.2)**
- **Horizontal & Vertical Construction (WBS 4.3 & 4.4)**
 - **LLP, Berms, Roads, Habitats**
- **Outfitting**

- Sub-group lead goals

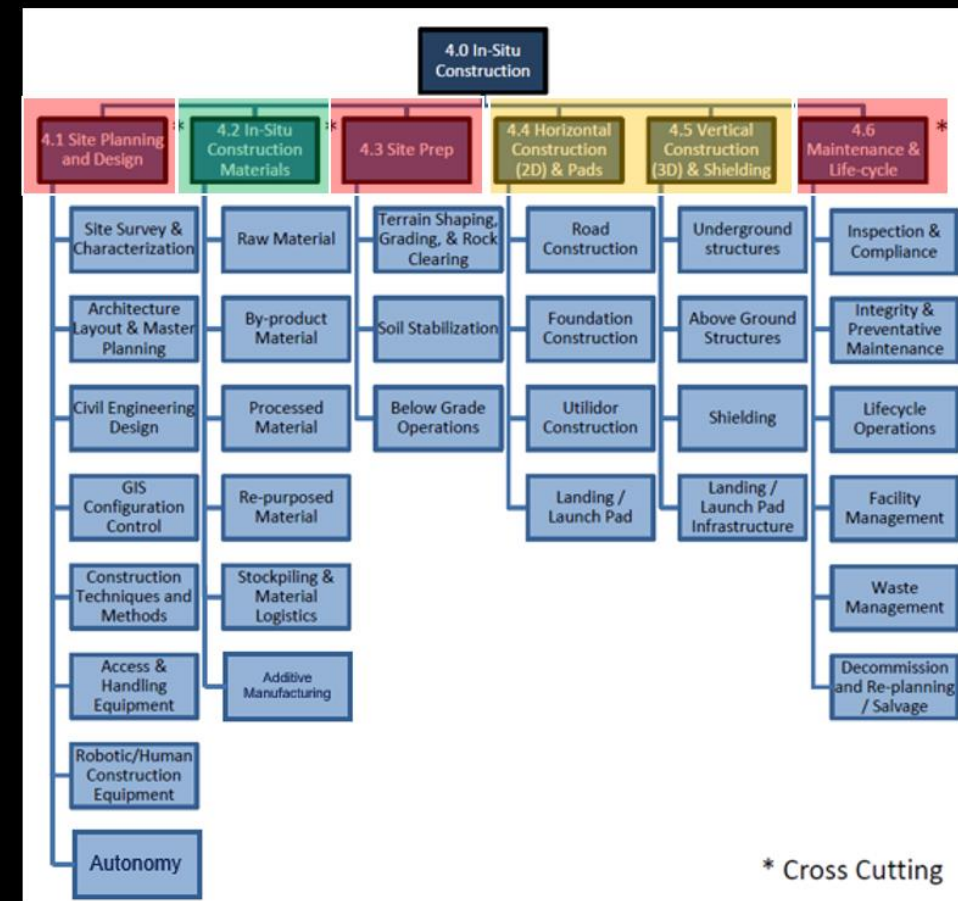
- Under the guidance of the APL F&G lead, facilitate a discussion in specific topics related to Excavation and Construction

- Expectations

- Support confluence discussion between monthly meetings (1 post per month)
- Develop the content for a breakout discussion at a monthly meeting (1 x per year)
- Suggest speakers for monthly meetings
- Support a Core Leads meeting 4x year (Sub-group leads + APL Leads)

- Interested?? Email Athonu Chatterjee

Athonu.Chatterjee@jhuapl.edu

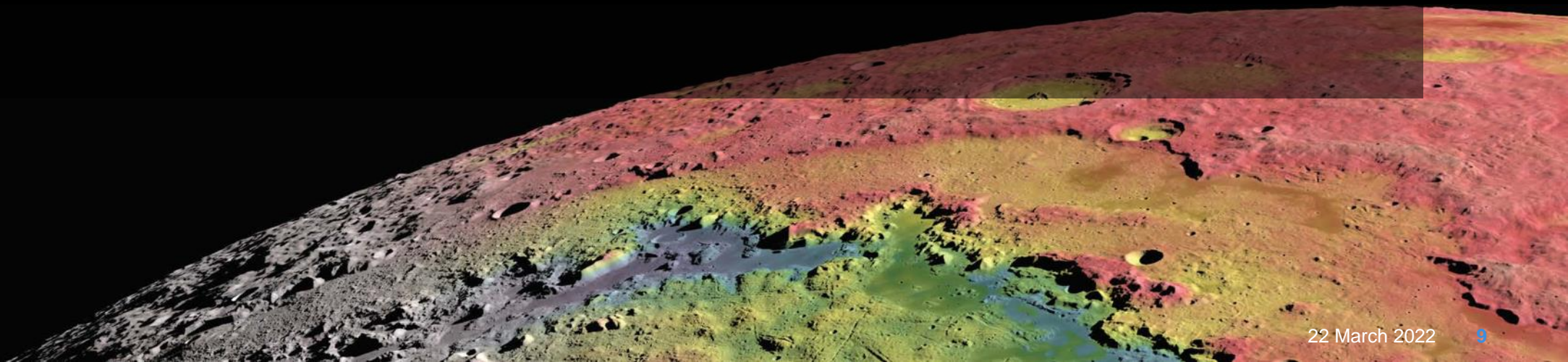


Subgroup Networking

- We will breakout into different subgroups
- Each subgroup will have a different room that you can join (or Andrea can help move you)

Subgroup Activities/Networking

- Brief Introductions (Name, Institution, What do you work on?)
- What would you like to see the subgroup accomplish this year?
- What are your interests in this subgroup?
- What is/are the biggest challenge(s) you see in your technology area?



Today's Talks

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LSIC | MOSA Working Group

- **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

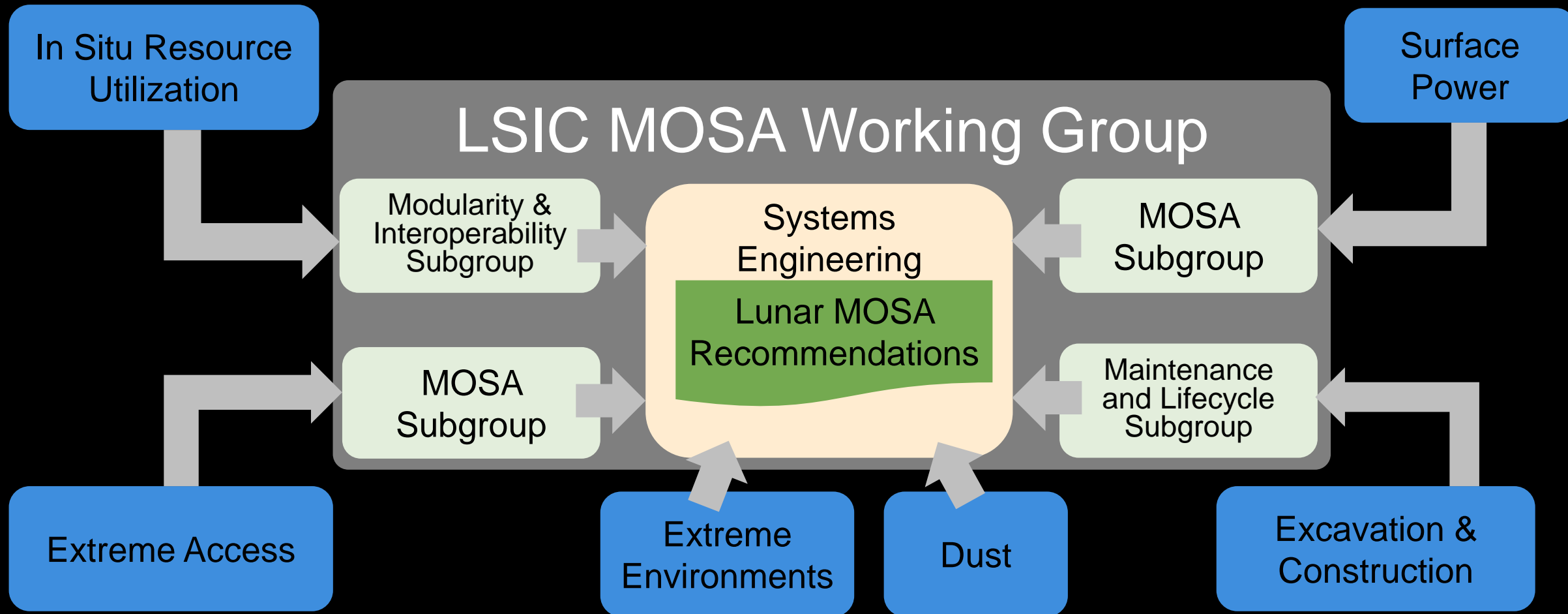
- Each LSIC focus group is participating and has a POC
- Cross focus group participation is encouraged

- Points of Contact

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



LSIC | MOSA Working Group



Collecting Feedback from the Community


1. What are the existing efforts on standards and interoperability in E&C? Are they applicable to the moon?
2. Within E&C what would you designate as a critical interface? What is the boundary that interfaces with the larger system?
3. What do you want to get out of the MOSA working group? Are there any interoperability barriers to your technology development?

LSIC | MOSA Working Group



Updates on Confluence

LSIC Home
Created by Andrea Harman, last modified on Mar 12, 2022



Confluence Training Sessions
If you're just getting to know Confluence, please contact [@Andrea Harman](#) for support and training.

Focus Areas

Dust Mitigation (DM)	Excavation & Construction (E&C)	Extreme Access (EA)
Extreme Environments (EE)	In Situ Resource Utilization (ISRU)	Surface Power (SP)

Working Groups

[MOSA](#)

Visit LSIC's external website here: lsic.jhuapl.edu
Visit LSIC's LinkedIn site here: <https://www.linkedin.com/groups/13861869/>
LSIC's code of conduct for members is available [here](#).

Existing Interoperability Standards & Programs

Existing Interoperability Standards & Programs

Created by Kristin Jaburek, last modified on Mar 18, 2022

The following existing standards and programs have been collected from LSIC Community through Focus Group and Subgroup meetings. Thank you for your input. Anything we missed or understood incorrectly? Drop a comment on this page and let us know.

Existing Interoperability Standards & Programs

Category	Existing Standards & Programs	Link
Communications	International Deep Space Interoperability Standards - International Communication System Interoperability Standards (ICSIS)	https://www.internationaldeepspacestandards.com
Communications	Interoperability Plenary (IOP)	https://www.interoperabilityplenary.org/home.aspx

Focus Group Suggested Items for MOSA

Focus Group Suggested Items for MOSA

Created by Kristin Jaburek on Mar 21, 2022

The following suggested items to consider for MOSA efforts were gathered from the Surface Power Focus Group during the February 24, 2022 Telecon.

Category	Focus Group Suggested Items to Consider for MOSA Efforts
Voltage/Frequency/Current	AC Frequencies, Rated Power Levels, Standard Voltage Power Sets for Different Applications, Long Distance Power Transmission Voltage Standards, Acceptable Power Losses, Cell Voltage Monitoring, Power Management, Power Electronics, Interfaces to High Voltage Arrays, Tolerance to Multiple Power Sources, Customer Power Delivery Standards

Who's Who is Lunar Interoperability

Upcoming Telecon

Artemis' Graphical User Interface Standards

- Chad Thrasher
NASA's Artemis Campaign Development Division
Systems Interoperability Lead
- Date: April 6th at 11:00AM ET



Backup

LSII System Integrator - APL

A key tenet of LSII is to implement a multitude of novel collaborations across industry, academia, and government in order to successfully develop the transformative capabilities for lunar surface exploration.

Origin of the APL Task

- NASA was investigating using a University Affiliated Research Center (UARC) to bring efficiencies to development
- LSII initiated a tasked APL, to assess system integration role for the Lunar Surface Innovation Initiative
- APL established a Lunar Surface Consortium with academia and industry representatives, as well as NASA experts, that span a broad range of capabilities to execute timely studies, tasks, and/or acquisitions

The Consortium will assist NASA in

- Identifying lunar surface technology needs and assessing the readiness of relative systems and components
- Making recommendations for a cohesive, executable strategy for development and deployment of the technologies required for successful lunar surface exploration
- Providing a central resource for gathering information, analytical integration of lunar surface technology demonstration interfaces, and sharing of results

