



Lunar Surface Innovation

C O N S O R T I U M

LSIC ISRU Focus Group Monthly

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

<http://lsic-wiki.jhuapl.edu/> (“Confluence” sign-up required)

November 24, 2021

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Agenda

- 3:00 – General updates
- 3:05 –3:20 - Moon to Mars Oxygen and Steel Technology (MMOST) presentation.
 - Mark Berggren, Pioneer Astronautics
- 3:45 - Discussions on ASCEND and LSIC Fall Workshop
- 4pm – Optional breakout groups (WaterIce Prospecting, O₂-Metal Extraction, ValueChain Analysis, Facilities) to the extent the Zoom can remain open.

Updates

- The ISRU FG can be used to connect potential employers and potential employees.
- Remember: “Who’s Who in ISRU” at <https://lsic-wiki.jhuapl.edu/display/ISRU/Who%27s+Who+in+ISRU>

Thematic Meeting joint with Excavation & Construction

- “From Regolith to Rebar – what solid by-products result from O₂ extraction and how can they be used in lunar construction?”
- Date: TBD; looking like February.

Topical Discussion

Moon-to-Mars Oxygen and Steel Technology (MMOST)

Mark Berggren

Senior Engineer, Pioneer Astronautics

Discussion Time!

Open discussions

ASCEND

LSIC Fall Workshop on Robotics and Autonomy

Goal: develop a list of major take-aways.

Possible guide for future FG discussions

● LIVE

Industry is thinking Space Robotics

ASCEND



John Grunsfeld, former NASA administrator and astronaut: “Make it so easy that a robot could do it”..in reference to OSAM and in-space manufacturing and repair

Andrew Rush, CEO and COO of Redwire: “People are so much more forward leaning when it comes to risk”

Lisa May, CTO of Lockheed civil space: “And then you need a robot to....”.

ASCEND Meeting – November, 2021.



Major Take-Aways from an ISRU perspective (from Karl):

#1: ISRU will be enabling to a space economy.

Lunar or cis-lunar. What time scale? How much? Where?

#2: The resources exist on the Moon. Lots of interest in mining the water ice.

What should the FG be doing in response to this desire????.

3: Leverage robotics and to the extent possible, autonomy.

Expand cross focus group collaborations. And?

LSIC Fall Meeting – Nov 3-4, 2021.

Autonomy and Robotics for enabling a Sustained Lunar Presence



Major Take-Aways from one “Break-the-ice” themed discussion group:

1: Design for maintenance and repair from the beginning.

STMD leadership is very interested in this topic.

#2: Design for standardization, where needed, and interoperability especially in terms of component exchange and interfaces.

Given different companies will be building various components, this will require early planning to ensure it occurs.

#3: Infrastructure needs will change with time..

Plan for it.

#4: There are lots of autonomy-related things we can test on the Earth, but a few things do really need to be tested on the Moon.

Identify them, minimize them, and develop plan to execute those you have to.

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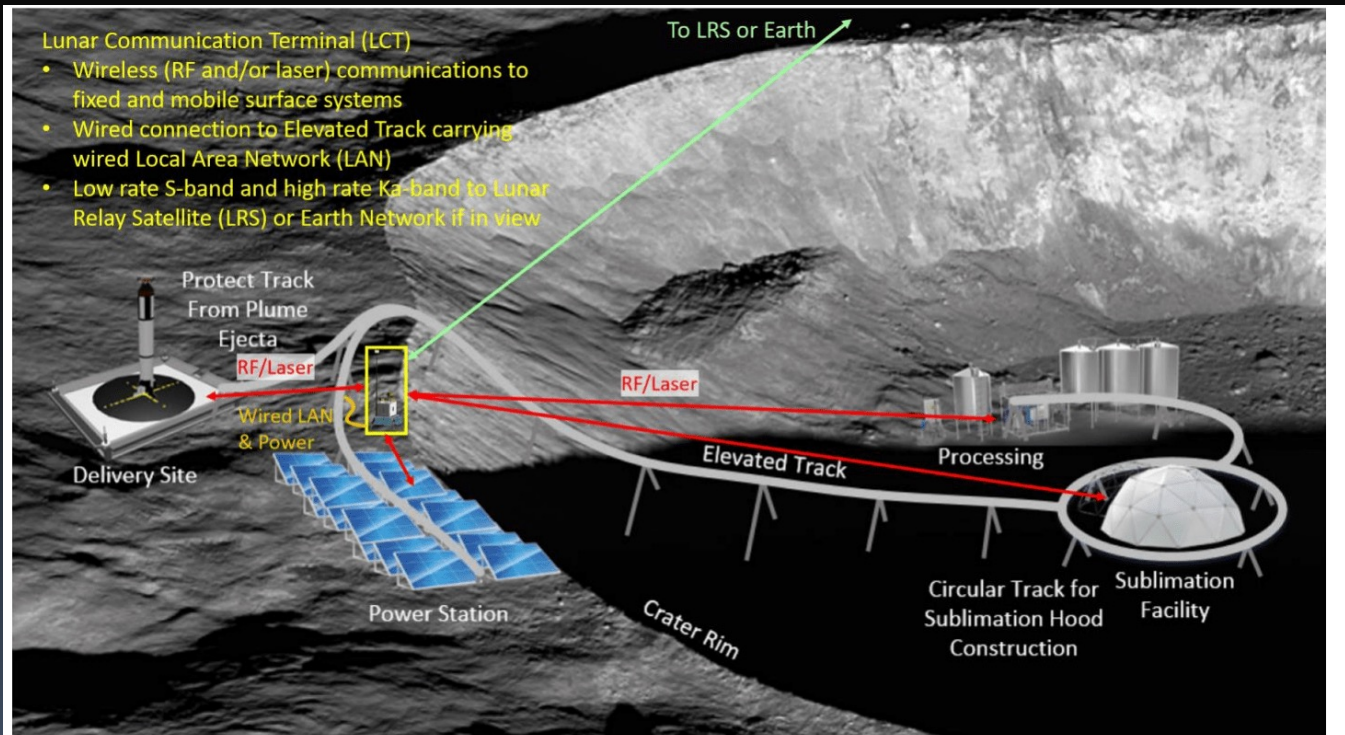


Figure 45: Lunar Surface Comms Concept Featuring Wired LAN and Lunar Comms Terminal

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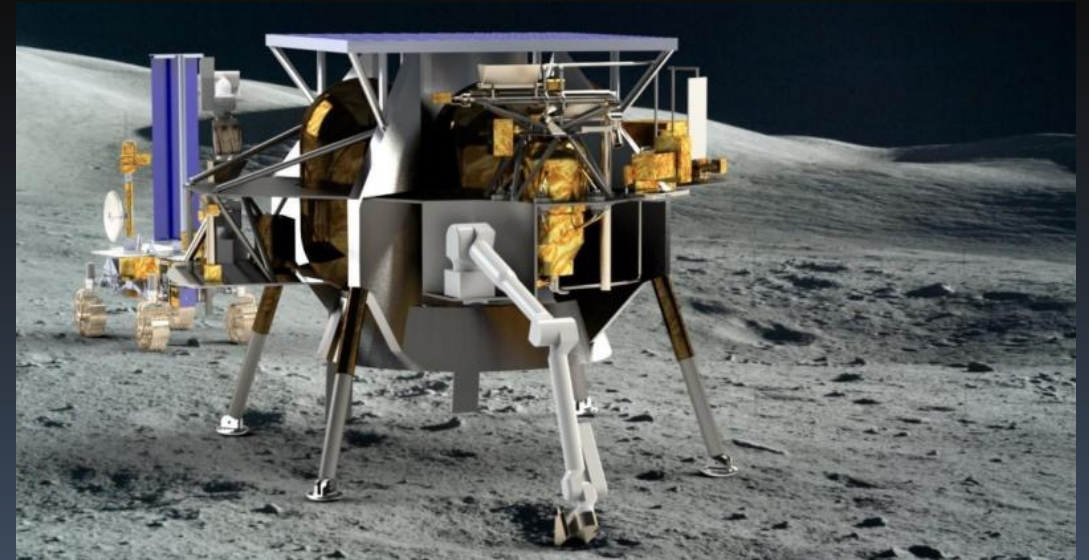
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Major Take-Aways:

#4: There are lots of autonomy-related things we can test on the Earth, but a few things do really need to be tested on the Moon. Identify them, minimize them, and develop plan to execute those you have to.



Wrap-Up and Transition to Breakout Groups

Water. Moderator: Karl Hibbitts

O₂ tech. Moderator: Michael Nord

Value Chain. Moderator: Kirby Runyon

Laboratory Facilities. Moderator: Jodi Berdis



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