

LSIC Excavation & Construction Focus Group Meeting

January Monthly Meeting

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LSIC E&C Focus Group

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Excavation and Construction - Focus Areas

- **Infrastructure:**

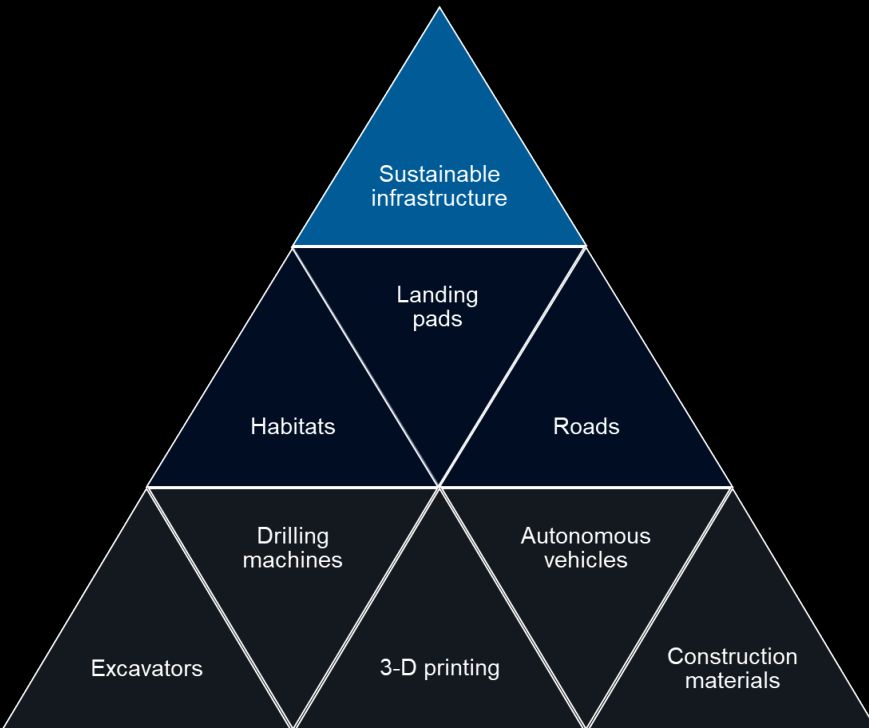
- Landing and Launch Pads
- Habitats: In-situ and deployable
- Roads, Berms, etc.
- Space architecture – urban planning and governance.

- **Technology:**

- Additive Construction
- Autonomous Construction technologies
- High-fidelity excavation tools for lunar applications
- Manufacturing technologies : sintering, regolith processing, additive manufacturing

- **In-situ Repair and Outfitting**

- Maintaining and refurbishing the infrastructure.
- Spare parts : in-situ fabrication vs. sending from earth
- Outfitting requirements



Assist NASA in developing technologies that enable affordable, robust, autonomous, construction of infrastructure on the lunar surface to establish a sustained human presence



Agenda

1. Sign-Ups & Call for Speakers
2. E&C 2023 Reflection & Feedback
3. E&C Workshop – Launch & Landing Pads (Targeting - June, 2024 [Virtual])
4. Spring Meeting - Monday, April 24, 2023 -Tuesday, April 25, 2023 @ APL (Abstract Portal Now Open)
5. Excavation & Construction of Launch & Landing Pads
 1. Dr. Milena Graziano (JHU/APL) – Considerations for Lunar Design and Engineering
 2. Evan Jensen (ICON) – Advances in Lunar Construction
6. Networking Breakouts (30 mins)



LSIC E&C 2023 Reflection & Feedback - Results

- Survey to reflect on E&C activities throughout the past year, and areas for impact in 2024
- Help us help you!



Lunar Surface Innovation

C O N S O R T I U M

- SurveyMonkey link in chat: <https://www.surveymonkey.com/r/PTTPB5>



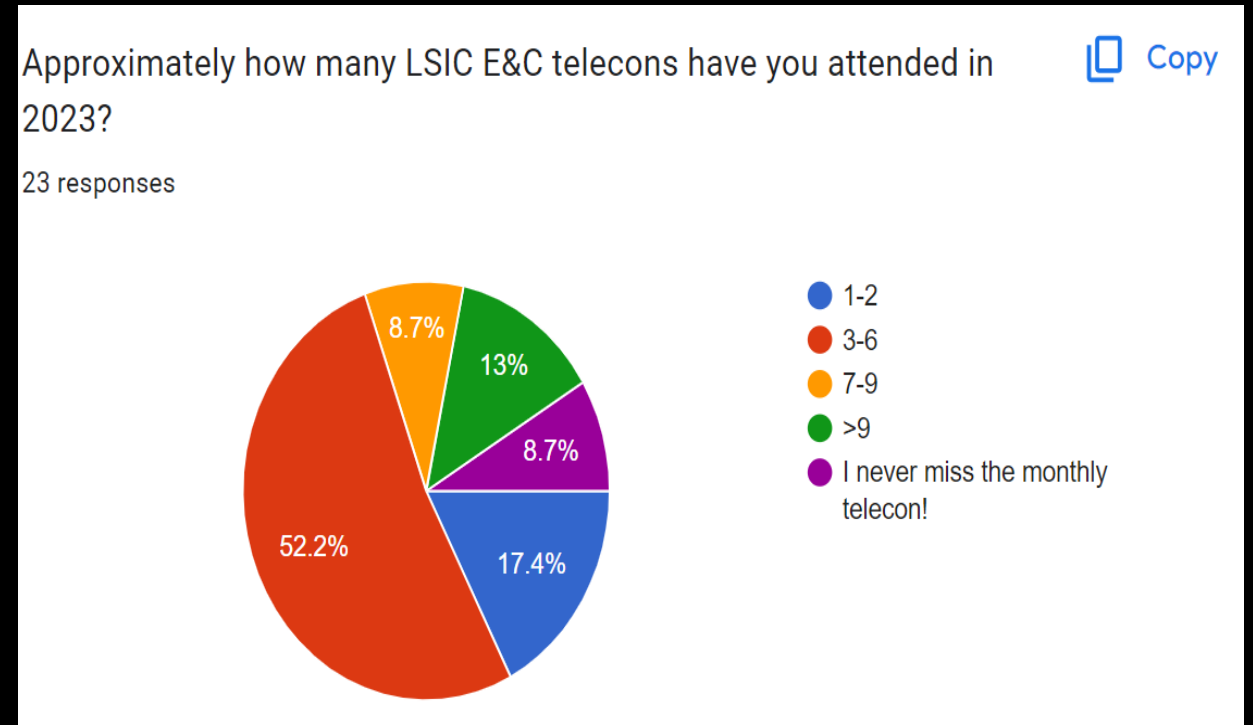
Survey Main Takeaways

- Respondents enjoyed the meetings and agreed they were being well run
- There was significant interest in being more involved as a community (more on this later)
- Respondents enjoyed the variety of topics that were presented, but still identified other areas of interest to be presented on
- Website usage was in general low and a little hard to navigate
 - [LSIC Home - LSIC Home - LSIC \(jhuapl.edu\)](#)
 - [Lunar Surface Innovation Consortium: \(jhuapl.edu\)](#)



Meetings

- Overall Well attended
- Identified Technical Gaps
 - Autonomous Construction
 - Spare parts: in-situ fabrication
- Topics for 1-day virtual workshops
 - Autonomous E&C
 - Manufacturing
 - Lunar Masterplanning
 - Landing Pads



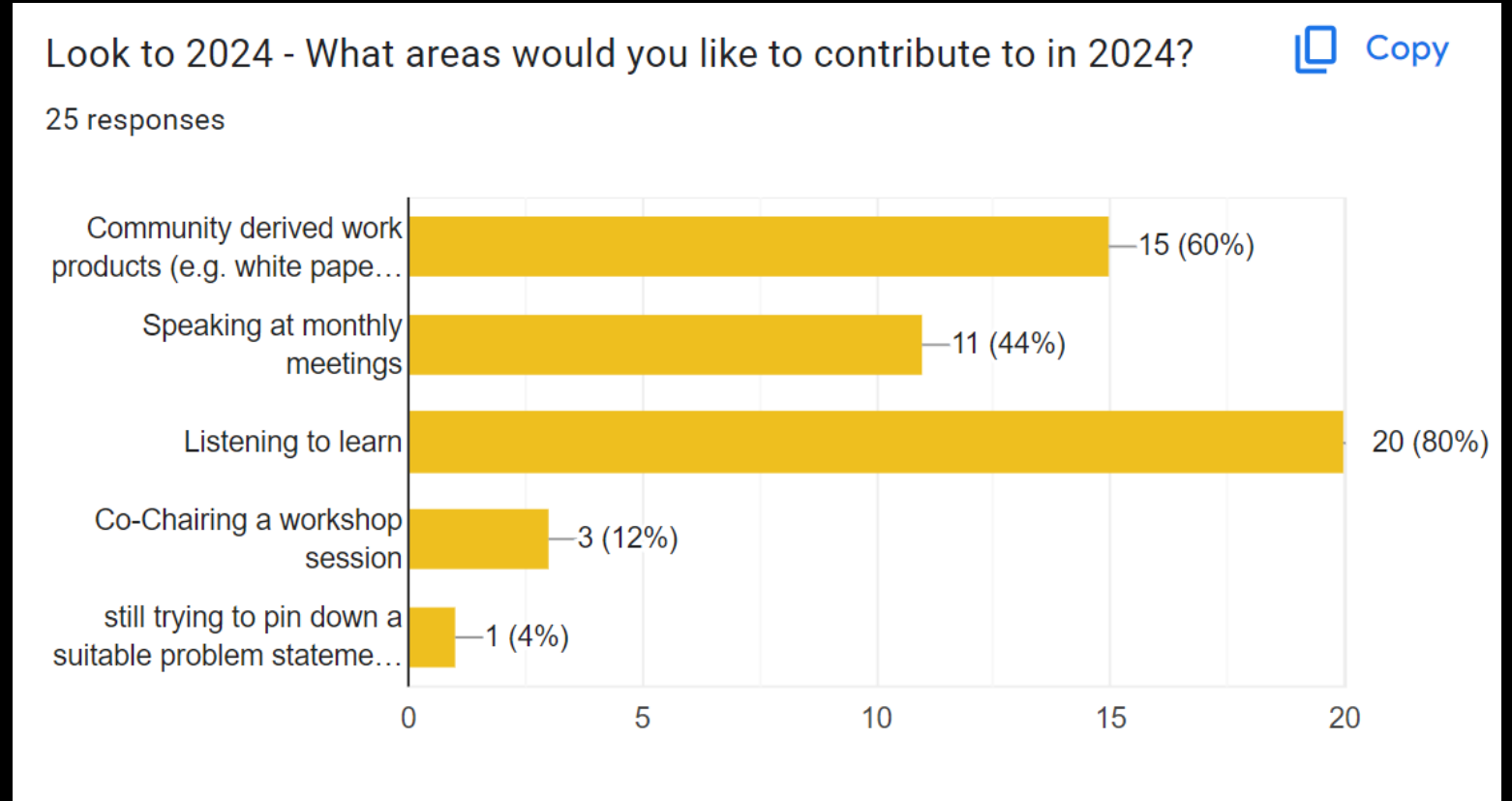
SurveyMonkey link in chat:

<https://www.surveymonkey.com/r/PTPTPB5>



Contributions

- Respondents want to be more involved
- Considering LSIC Special Action Teams



Dr. Milena Graziano – JHU/APL

- Dr. Milena Bobea Graziano is a Senior Engineer in the Space Exploration Sector at the Johns Hopkins University Applied Physics Laboratory. She holds a bachelor's degree in Physics from the University of Puerto Rico, and a masters and Ph.D in Materials Science and Engineering from North Carolina State University. Her work focuses on materials and processes selection, qualification, and testing for spaceflight programs, and has worked on several subsystems for Psyche, Europa Clipper, and Interstellar Mapping and Acceleration Probe. She is also a Deputy Systems Engineer for a gamma ray and neutron sensor instrument going on the JAXA Martian Moons Exploration spacecraft. As a part of the Lunar Surface Innovation Consortium (LSIC), Milena is the Systems Integrator Lead for Dust, Simulants, and Extreme Environments, and has led the development of a lunar resource for scientists and engineers that can aid the design and test of lunar surface systems, titled Lunar Engineering 101, which will be briefly overviewed in today's meeting.



Evan Jensen - ICON

- Evan Jensen, Vice President, Strategic R&D.
- Evan leads ICON's Strategic R&D programs. As ICON's 11th employee, he was responsible for the system and software architectures of ICON's Vulcan series of additive construction systems. He has been a program manager and an original contributor to ICON's Laser VMX process, and associated robotic and software systems. Evan has been in the field of mechatronics and technology development for 20+ years. His core competencies in systems integration and strategic partnerships will help solve the complex challenges of additive construction at scale, terrestrially and now in space leading ICON's Project Olympus. Evan holds an MS in Science and Technology, Texas State University.



An aerial, top-down view of a lunar base. The base consists of several interconnected modules, including a large central dome, smaller cylindrical habitats, and various support structures. A winding path or road is visible on the lunar surface. The scene is dimly lit, suggesting a low sun position. The text "Networking Breakouts" is overlaid in a large, bold, yellow font across the center of the image.

Networking Breakouts



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