



# Lunar Surface Innovation

C O N S O R T I U M

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## Extreme Access Focus Group Telecon

**July 14, 2022**

**We'll start around 3:03-3:05**

Angela Stickle  
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JHU Applied Physics Laboratory

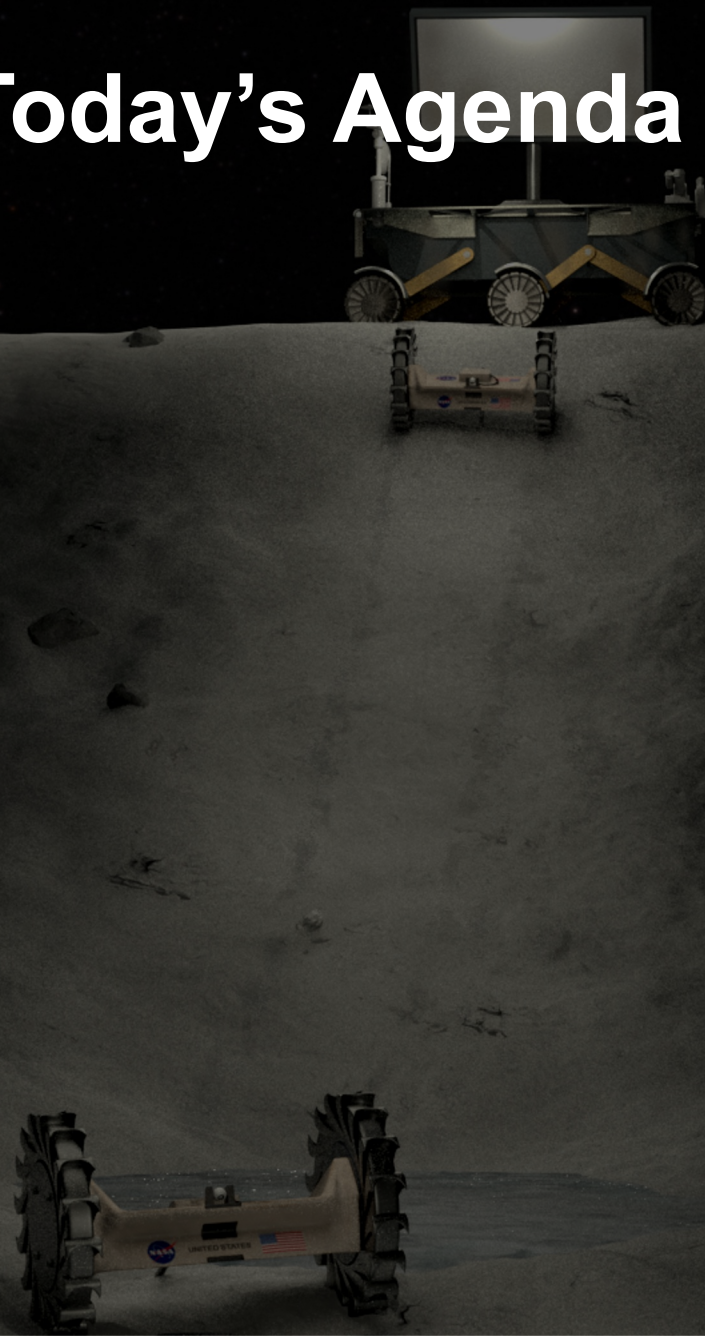
Facilitator\_ExtremeAccess@jhuapl.edu



JOHNS HOPKINS  
APPLIED PHYSICS LABORATORY

# Today's Agenda

- Feedback Fun with Reeve
- LSIC Updates
- Technology Spotlights
- Open floor



# Feedback Time!

# LSIC Updates

## *Funding Opportunities*

- NASA STMD Tipping Point
  - Mini Proposals were due April 8.
  - Invite-only full proposals due July 28, 2022
  - <https://nspires.nasaprs.com/external/solicitations/summary.do?solId={9987D88F-0A12-5203-FC25-423773FAF134}&path=&method=init>
- Phase 2 Break the Ice Challenge
  - <https://breaktheicechallenge.com>
  - Register by September 30, 2022
- Space Technology Research Institutes
  - University-led, sustained, multidisciplinary space technology research focused in strategic areas for transformative impact to future NASA exploration and science
  - Accelerating Additive Manufacturing Certification with Model-Based Tools
  - Quantum Technologies for Remote Sensing
  - 5 years, up to \$15M
- Please visit LSIC website for full list
  - <http://lsic.jhuapl.edu/Resources/Funding-Opportunities.php>



# Upcoming Meetings

- Focus Group Telecons (2<sup>nd</sup> Thursday each month, 3-4 pm EST)
  - July 14, 2022
  - August 11 – Guest speaker: Parsec lunar communications system
- Subgroup Meetings:
  - Communications: July 20, 4 pm ET
    - Safran Data Systems: designs for lunar ground stations which will be the first commercial ground stations to meet the NASA specs for Lunar Communications Ground Stations (LEGS).
  - PNT: July 21, 3 pm ET
  - Mobility: July 28, 1 pm ET
- Surface Power Workshop: Low Temperature Sub-kW Power and Energy Storage for the Lunar Surface, July 28 2022
- Extreme Access/Extreme Environments: Designing for the Extremes! August 5
- LSIC Fall Meeting November 2-3 (University of Texas, El Paso + Online)

# LSIC | Low-Temperature, Sub-kW Power and Energy Storage for the Lunar Surface



The Moon harbors thermal extremes with requirements far beyond most terrestrial technologies. The permanently shadowed regions near the lunar poles, rich in science and containing potentially commercially relevant volatiles, reach ultra-cold temperatures ranging down to tens of degrees Kelvin. Solutions such as battery modules that will survive or operate within these extremes, as well as strategies that ensure survival through hibernation, are immediate needs critical for operations on the lunar surface and beyond.

Topics for the workshop include:

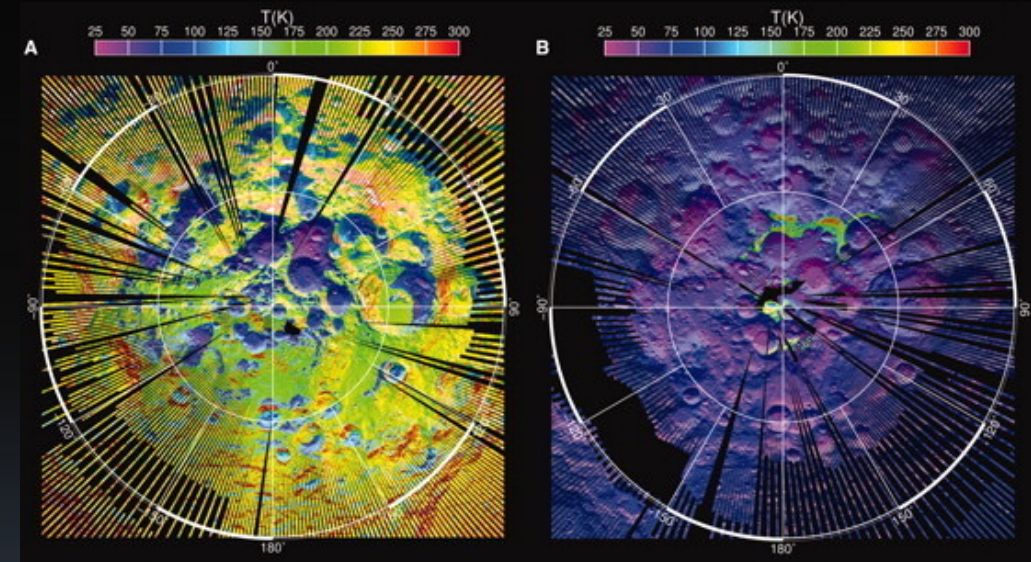
- Context on needs and lunar thermal environments
- Panel discussion of near-term system solutions
- Lightning talks that survey recent developments
- Focused session on low temperature batteries
- Break-out discussions targeting specific scenarios

Format and date:

Virtual, Zoom Webinar (**registration required, but is fast and free**)

Lightning Talks: 400-word max abstracts due July 8<sup>th</sup>

**Thursday July 28<sup>th</sup>, 11:00 – 4:45 ET (total length subject to change)**



*Diviner-measured daytime (left) and nighttime (right) bolometric brightness temperatures*

<https://lsic.jhuapl.edu/Events/Agenda/index.php?id=214>

# Designing for the Extremes

A Joint Workshop between Extreme Access and Extreme Environments

Virtual workshop on August 5,  
2022

Start time: 9 am PT /12 pm ET

End time: 430 pm? ET

This interactive workshop will consist of an overview of the Robotics Lunar Surface Operations 2 (RLSO2) study, an Environmental Effects panel with Q&A , a panel with Q&A on technology needed to access these sites, and breakout sessions.

## The goals of the workshop are to:

- Discuss specific access challenges and how environmental effects affect the design of hardware needed to implement an architecture as defined in the RLSO2 study
- Identify data needed to set design requirements and determine whether that data has already been collected, or what additional data is needed.
- Discuss ways to test to these requirements

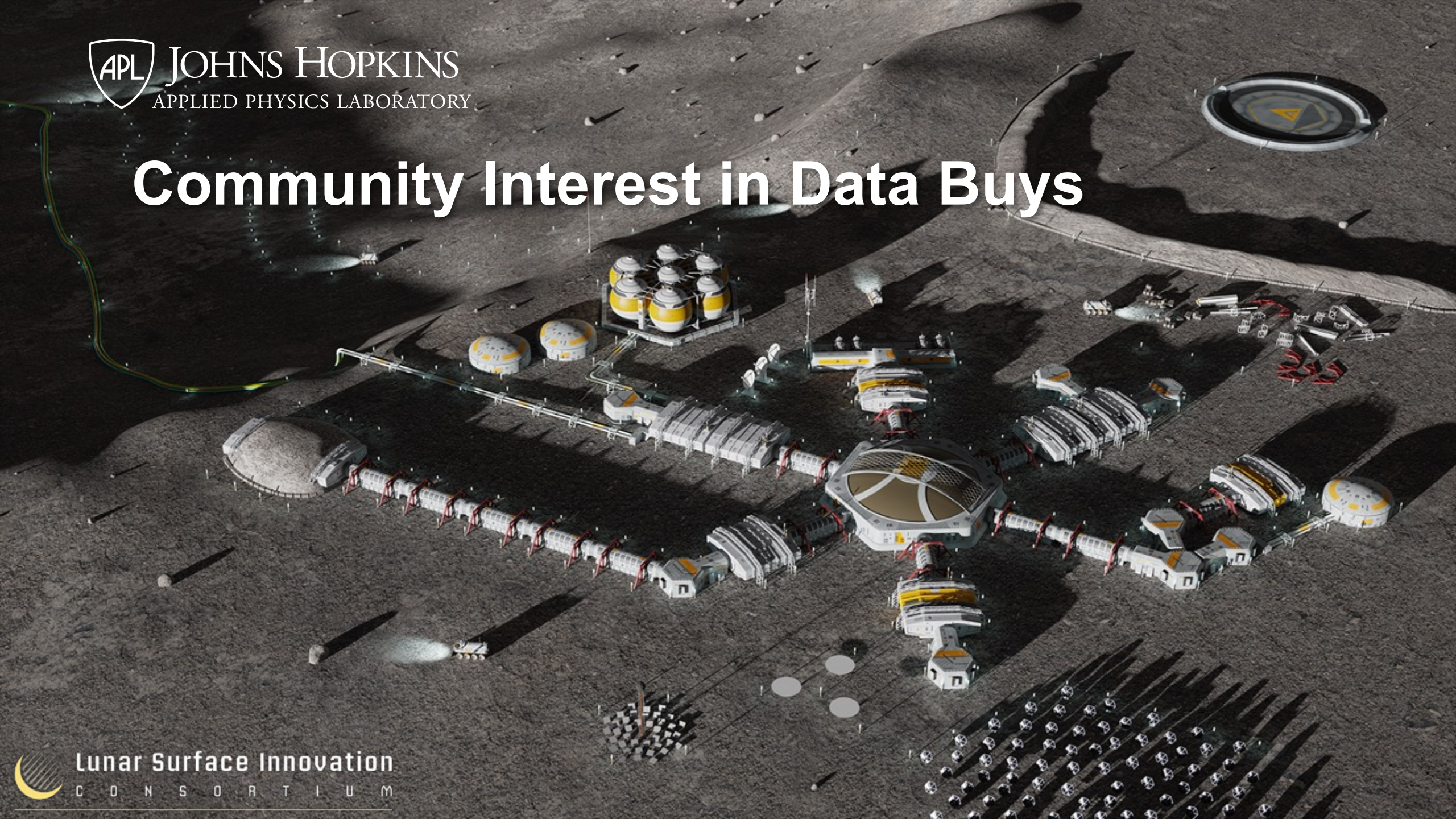
The workshop will consist of a plenary speaker and panel discussions in a webinar format (with interactive Q&A during the panels), followed by smaller-ground discussions in breakout rooms with interactive brainstorming and note taking using miro (or similar software).

# Upcoming Community Meetings

- COSPAR 2022
  - July 16-24, Athens Greece
  - <https://www.cosparathens2022.org>
- NASA SSERVI Exploration Science Forum
  - July 19-21 (hybrid)
  - In-person: Boulder, CO
  - Focus on basic and applied scientific questions fundamental to understanding the Moon
  - <https://sservi.nasa.gov/nesf2022>
- AIAA Intelligent Systems Workshop
  - July 26-27, Texas A&M
  - Technical sessions covering autonomy and human-machine teaming
  - [https://aiaa-istc.github.io/2022\\_IS\\_Workshop.html](https://aiaa-istc.github.io/2022_IS_Workshop.html)
- International Astronautical Congress
  - September 18-22, Paris France
  - <https://iac2022.org>
- AIAA ASCEND Conference
  - October 24-26, 2022 in Las Vegas, NV
  - <https://www.ascend.events/call-for-content/>



# Community Interest in Data Buys



# LSII | Data Buys

- NASA is interested to learn more about the interest in the LSIC community of NASA conducting data buys from commercial providers
- There are two types of data to consider
  - Data acquired as a by product of landing on the Moon
  - Dedicated data that require a specific instrument to be flown
- What kind of data access is required?
  - Does NASA buy an entire data set and put it in PDS?
  - Do users buy data directly from the providers?

# LSII | By-Product Data

- Data acquired as a by product of landing on the Moon
  - Environmental Data
    - Radiation, thermal, illumination, dust, volatiles
  - Descent & Landing Imagery
    - Images of terrain during descent, surface panorama after landing
  - Landing & Post-landing effects
    - Plume/surface interactions
  - Technology/System Performance
    - Navigation performance, comm performance, landing precision, hazard detection and avoidance
- Are there additional data sets you would want?
- Are there data sets the lander will naturally acquire, but perhaps you need a variation of those data, e.g. a certain data set to be acquired at a higher cadence?

# LSII | New Data Sets

- What data would enhance your ability to plan lunar surface operations?
- Data sets that require a dedicated instrument to be flown
  - E.g. New topography, or mineral map data sets
  - Could be either an orbital or surface data set
- Monitoring Data for Situational Awareness
  - Rover locations and movement
  - Charging operations
  - Search and Rescue for lost rovers
  - Comm quality/performance

# LSII | General thoughts/questions

- Are there any Data privacy, Intellectual Property or Distribution Concerns
- Are these data global or regional in nature?
- Is there a different financial value for different data qualities, e.g. spatial or spectral resolution?
- What does this data set enable?
- How do you put a value on a data set (financial or otherwise)?
- What is the value of this data set to your LSIC/STMD/ESDMD, etc. mission?
- If you are a potential provider, what level of funding, if successful, is required for you to consider acquiring these data?
- Is the data you want a one-time acquisition? Every landing?
- Do you need it only for a particular region

# Technology Spotlight

Jean-Pierre de la Croix (JPL) : Cooperative Autonomous Distributed Robotic Explorers (CADRE)

# Technology Spotlight

Brad Buckles (NASA) : RASSOR and ROS



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- Confluence is our record of discussions and a good repository
  - Confluence is free to you and available to all registered LSIC members
  - We will be using Confluence to document discussions and provide resources to LSIC members. All focus groups have a separate page so it's a good collaboration space.
  - To request an account, please email Andrea Harman: [ams573@alumni.psu.edu](mailto:ams573@alumni.psu.edu)
- Technology Spotlights/Lightning Talks at monthly telecons
  - Anyone can volunteer to give a lightning talk (10-20 mins)
  - Email Angela or Sarah, or comment on Confluence, to sign up!
- Updates to the webpage - <http://lsic.jhuapl.edu/Focus-Areas/Extreme-Access.php>
  - Notes, slides, recordings from telecons posted here

Follow the Code of Conduct for all Focus Group communications

# Contact information

LSIC Director: Rachel Klima, [SES-LSIC-Director@jhuapl.edu](mailto:SES-LSIC-Director@jhuapl.edu)  
<http://lsic.jhuapl.edu>

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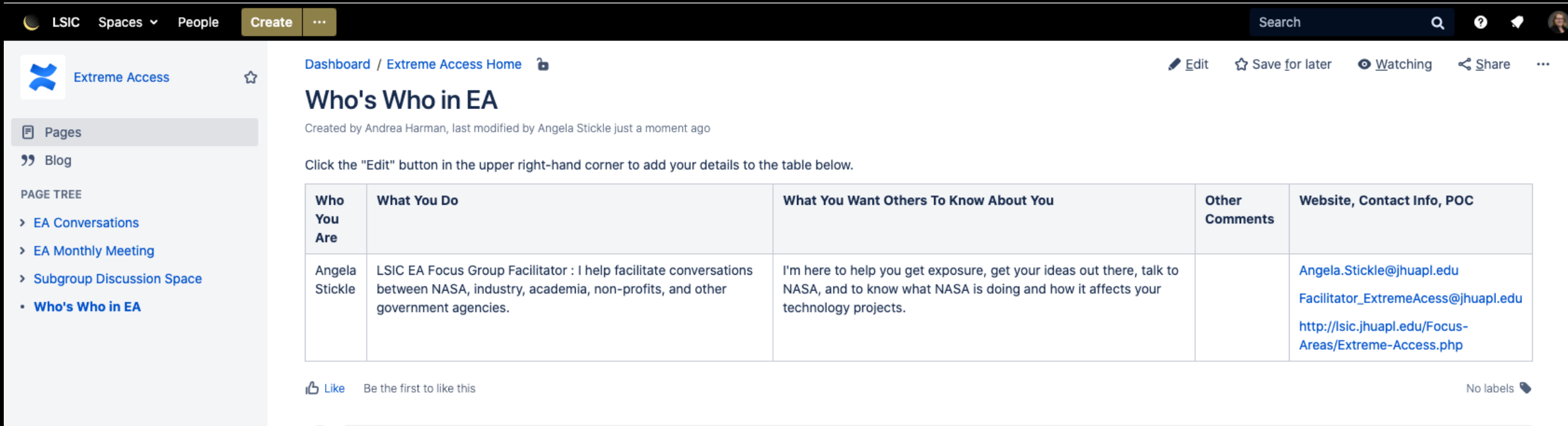


# LSIC Meeting Cadence

- **Bi-Annual Meetings (Spring and Fall)**
- **Monthly Focus Group Meetings**
  - 2<sup>nd</sup> Tuesday of the Month 3:00-4:00 pm – Extreme Environment
  - 2<sup>nd</sup> Thursday of the Month 3:00-4:00 pm – Extreme Access
  - 3<sup>rd</sup> Wednesday of the Month 3:00-4:00 pm – ISRU
  - 3<sup>rd</sup> Thursday of the Month 12:00-1:00 pm – Dust Mitigation
  - 4<sup>th</sup> Thursday of the Month 11:00 am-12:00 pm – Surface Power
  - 4<sup>th</sup> Wednesday of the Month 2:00-3:00 – Excavation and Construction
- **Thematic Workshops (as identified by FGs and NASA POCs)**
  - Workshops In development Funding, CLPS Provider

# Get to know the community

<https://lsic-wiki.jhuapl.edu/x/0IVf>



LSIC Spaces People Create ... Search

Extreme Access

Dashboard / Extreme Access Home

## Who's Who in EA

Created by Andrea Harman, last modified by Angela Stickle just a moment ago

Click the "Edit" button in the upper right-hand corner to add your details to the table below.

Who You Are	What You Do	What You Want Others To Know About You	Other Comments	Website, Contact Info, POC
Angela Stickle	LSIC EA Focus Group Facilitator : I help facilitate conversations between NASA, industry, academia, non-profits, and other government agencies.	I'm here to help you get exposure, get your ideas out there, talk to NASA, and to know what NASA is doing and how it affects your technology projects.		<a href="mailto:Angela.Stickle@jhuapl.edu">Angela.Stickle@jhuapl.edu</a> <a href="mailto:Facilitator_ExtremeAccess@jhuapl.edu">Facilitator_ExtremeAccess@jhuapl.edu</a> <a href="http://lsic.jhuapl.edu/Focus-Areas/Extreme-Access.php">http://lsic.jhuapl.edu/Focus-Areas/Extreme-Access.php</a>

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Who's Who in ISRU: <https://lsic-wiki.jhuapl.edu/display/ISRU/Who%27s+Who+in+ISRU>

Who's Who in Surface Power: <https://lsic-wiki.jhuapl.edu/display/SP/Who%27s+Who+in+LSIC-Surface+Power>

Who's Who in E&C: <https://lsic-wiki.jhuapl.edu/pages/viewpage.action?pageId=6260179>

Who's Who in EE: <https://lsic-wiki.jhuapl.edu/display/EE/Who%27s+Who+in+LSIC-EE>