



Lunar Surface Innovation

C O N S O R T I U M

Extreme Access Focus Group Telecon

September 9, 2021

We'll start around 3:03

Dr. Angela Stickle
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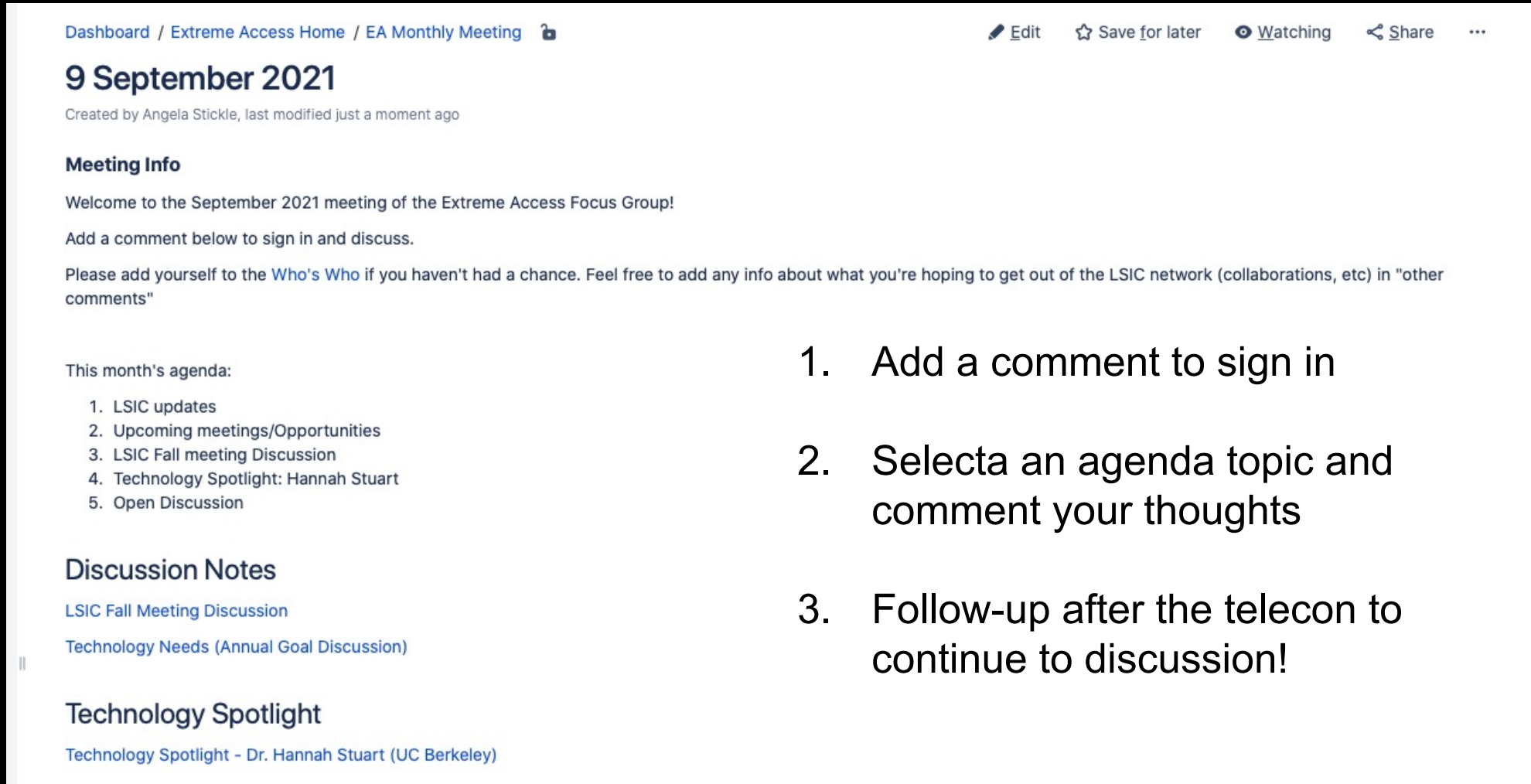







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Today's Agenda



- Introductions
- LSIC Focus Group Updates
- Upcoming Meetings/Opportunities
 - Fall Meeting prep
 - LUSTR
- Technology Spotlight
- Open floor and Discussion



Dashboard / Extreme Access Home / EA Monthly Meeting   Edit  Save for later  Watching  Share ...

9 September 2021

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Meeting Info

Welcome to the September 2021 meeting of the Extreme Access Focus Group!

Add a comment below to sign in and discuss.

Please add yourself to the [Who's Who](#) if you haven't had a chance. Feel free to add any info about what you're hoping to get out of the LSIC network (collaborations, etc) in "other comments"

This month's agenda:

1. LSIC updates
2. Upcoming meetings/Opportunities
3. LSIC Fall meeting Discussion
4. Technology Spotlight: Hannah Stuart
5. Open Discussion

Discussion Notes

[LSIC Fall Meeting Discussion](#)

[Technology Needs \(Annual Goal Discussion\)](#)

Technology Spotlight

[Technology Spotlight - Dr. Hannah Stuart \(UC Berkeley\)](#)

1. Add a comment to sign in
2. Select an agenda topic and comment your thoughts
3. Follow-up after the telecon to continue to discussion!

Confluence is an important resource to provide asynchronous discussion opportunities and a record of conversations

The ISRU working groups continue to be active:

- Water Ice Prospecting and Mining
- O2 Extraction
- ValueChain Analysis
- Facilities

Discussions on Water Ice prospecting and a presentation by Clive Neal, Notre Dame, on International Lunar Water-Ice Prospecting Campaign.

Discussions of opportunities and challenges associated with O2 extraction from regolith led by Michael Miller, SwRI

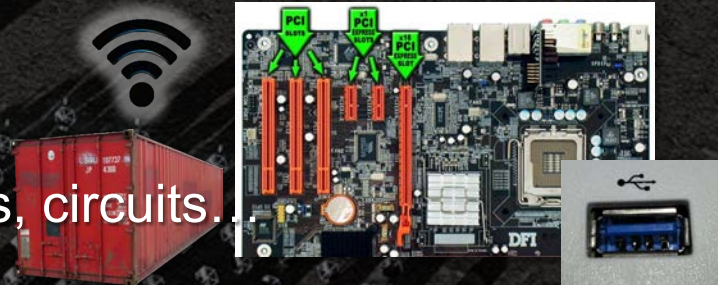
The ValueChain working group continues to be very active.

ISRU Facilities needs survey completed. <https://forms.gle/TxXbvb1LwN4XzQT47>. There will be a report out in the September ISRU FG meeting.

Join these discussions on Confluence at: <https://lsic-wiki.jhuapl.edu/display/ISRU>

Modularity and Standards

- Overview and Brainstorming Sessions:
 - September 9th 2021, 11:00am – Noon EDT
<https://jhuapl.zoomgov.com/j/1616303523?pwd=SVVTNU03MWZNCnNLU3I4YlJBQTFpUT09>
 - September 14th 2021, 2:00pm – 3:00pm EDT
<https://jhuapl.zoomgov.com/j/1600847204?pwd=STZjWi9Oc2Y4WjdiUFZLR1dUcmpWUT09>
- Objective:
 - Discuss potential benefits of a Modular Open Systems Approach
 - Develop a comprehensive list of items that could be standardized or modularized on the lunar surface
- Examples:
 - Connectors, voltages, communications, data, message sets, controls, circuits.





Save the Date! LSIC 2021 Fall Meeting

- November 3-4, 2021
- Hybrid Meeting, in-person events taking place at Bowie State University (Bowie, MD)
- Please fill out this short survey to assist with planning:
 - <https://forms.gle/DpdnJM5LPiXwcste7>
- Breakout sessions will focus on technology and autonomy needs for accessing extreme areas, conducting operations and constructing & maintain infrastructure
 - 3 overarching scenarios under development
 - Will have a poll for community input sometime this month/next telecon



Upcoming Meetings

- Focus Group Telecons (2nd Thursday each month, 3-4 pm EST)
 - September 9, 2021
 - October 14, 2021
- NASA's Lunar Communications and Navigation Interoperability Standards Engineering Interchange Meeting
 - September 5, 1030-12 pm EST
 - This meeting will provide a platform for technical industry members to give feedback on proposed LunaNet interoperability standards
 - Access the document and register here: <https://go.nasa.gov/3mPzvzB> by September 13, 2021
- Lunar Surface Science Workshop
 - Lunar Science Accomplished with a Robotic Arm (September 30, 2021)
 - Free, but **registration is required, deadline Sept. 27**
 - <https://www.hou.usra.edu/meetings/lunarsurface2020/>
- AIAA ASCEND (November 8-10, 15-17)
 - Registration now open for in-person and online programming
 - <https://www.ascend.events/2021-ascend/program/>



Upcoming Meetings

- Lunar Communications and Navigation Interoperability Standards: Engineering Interchange Meeting
 - September 15, 2021 10:30 am – 12 pm ET
 - This event is meant for technical industry members to provide feedback on NASA's plan for communications and navigation interoperability at the Moon
 - Discuss proposed LunaNet interoperability standards
 - <https://esc.gsfc.nasa.gov/projects/CIS?tab=upcoming%20events>
 - Register by September 13, 2021
- ASCE Earth and Space 2022
 - April 25-28, Denver, CO
 - <https://learn.mines.edu/earthspace2022/abstracts>
 - Abstracts due September 12, 2021



Other Notes of Interest

- **Subgroup Meetings – notes on Confluence**

- PNT Subgroup Meeting, 16 September 3 pm ET
- Communications Subgroup Meetings: 3rd Wednesday of the month, 4 pm ET (next: 9/15/21)
- TRN Subgroup , TBD
- Mobility Subgroup, TBD
- Service Sheds, TBD

- **Current Funding Opportunities:**

- LuSTR due September 17, 2021

<https://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=838616/solicitationId=%7BFC8AA32D-180F-9B49-AE48-7C30FCD68E9B%7D/viewSolicitationDocument=1/ST-REDDI-2021%20Appendix%20B5%20-%20LuSTR%202021.pdf>

- <http://lsic.jhuapl.edu/Resources/Funding-Opportunities.php>



LuSTR Solicitation Released!

STMD Lunar Surface Technology Research Opportunities

- NOIs due August 20, 2021
- **Proposals Due: September 17, 2021**
- **LuSTR is focused on the development of early- to mid-TRL (2-4) lunar surface technologies of high priority to NASA's Mission Directorates**
- **Eligibility:** Accredited U.S. universities are eligible to submit proposals; teaming and collaboration are permitted
 - At least 60% of the proposed budget must go to accredited U.S. universities
 - The university submitting the proposal may partner with other universities and colleges. Partnering with industry and/or non-profit entities is encouraged
- Award Amount: \$1M to \$2M total per award
- Maximum of two years

A screenshot of a website menu for LuSTR21 documents. The menu is organized into three sections: "Documents", "Other Documents", and "Omnibus Information".

- Documents**
 - Announcement Documents
 - Title
 - > [SpaceTech-REDDI-2021 Solicitation](#)
 - > [Lunar Surface Technology Research \(LuSTR\) Opportunities](#)
- Other Documents**
 - Title
 - > [LuSTR21 Frequently Asked Questions \(as of July 22, 2021\)](#)
 - > [LuSTR21 Technical FAQ - Topic 1 \(as of July 22, 2021\)](#)
 - > [LuSTR21 Technical FAQ - Topic 2 \(as of August 10, 2021\)](#)
 - > [LuSTR21 Technical FAQ - Topic 3 \(as of July 22, 2021\)](#)
 - > [LuSTR21 Technical FAQ - Topic 4 \(as of July 28, 2021\)](#)
- Omnibus Information**
 - > [Space Technology Research, Development, Demonstration, and Infusion-2021 \(SpaceTech-REDDI-2021\)](#)



University-led efforts to develop and mature technologies that address high-priority lunar surface challenges

Technical Characteristics:

- Entry TRL: 2 – 4 (meaningful TRL advancement required)
- Unique, disruptive or transformational lunar surface technology development efforts that directly respond to one of 4 topics:
 1. Autonomous Systems for Excavation and Site Preparation
 - The goal of this topic is to develop and demonstrate autonomous surface construction technologies, specifically those for lunar launch and landing pads, required to enable a sustained presence on the lunar surface.
 2. Lunar Regolith Mineral Beneficiation
 - The goal of this topic is to enable greater efficiency and ultimately reduce waste during the physical separation and concentration of lunar surface minerals of importance to ISRU and manufacturing/construction processes.
 3. Cold-Temperature Analog Integrated Circuits
 - The goal of this topic is to develop analog integrated circuits and analog-to-digital electronics, fabricated using standard foundry processes, that will function under the extreme low temperature of the lunar night and shadowed regions.
 4. Novel Heat Transfer Fluids
 - The goal of this topic is to develop and/or characterize novel heat transfer fluids that may provide significant mass and performance improvements in thermal control systems for lunar surface applications.

University-led efforts to develop and mature technologies that address high-priority lunar surface challenges

Eligibility

- Organization submitting proposal must be an accredited U.S. university
- Faculty and research staff may serve as PIs (see Appendix for full details)
- $\geq 60\%$ of budget must go to accredited U.S. universities
- Up to 40% paid teaming with other universities, industry and non-profits encouraged
- OGAs and non-NASA FFRDCs may collaborate on an unfunded basis

Key Information

- Expected duration: **2 years**
- Anticipated awards: **4**
- Awards from **\$1-2M** each
- Oversight: Annual reviews and semi-annual briefings at LSIC meetings
- Award instrument: Grants
- Release Date: **July 22, 2022**
- NOIs Due: **08/20/2021**
- Proposals Due: **09/17/2021**

[Dashboard](#) / ... / 12 August 2021 

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Technology Needs and Gaps

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Please use this space to comment on specific technology needs, or big science questions needing answers, that you see for exploration of lunar pits/lave tubes and PSRs at the poles.

Questions to Consider

What technology, if present, would make your life easier?

Are there gaps that you are having difficulty filling?

What data/infrastructure would help facilitate and accelerate development of your technology?

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Technology Spotlight

Dr. Hannah Stuart (UC Berkeley)

Forceful milli-robot teams on varied Martian terrains



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

Focus Group Area	Listserv address	Facilitator
In-Situ Resource Utilization	LSIC_ISRU@listserv.jhuapl.edu	Karl Hibbitts
Surface Power	LSIC_Power@listserv.jhuapl.edu	Wes Fuhrman
Extreme Environments	LSIC_ExtremeEnvironment@listserv.jhuapl.edu	Ben Greenhagen
Extreme Access	LSIC_ExtremeAccess@listserv.jhuapl.edu	Angela Stickle
Excavation and Construction	LSIC_ExcavationConstruction@listserv.jhuapl.edu	Athonu Chatterjee
Dust Mitigation	LSIC_DustMitigation@listserv.jhuapl.edu	Jorge Núñez

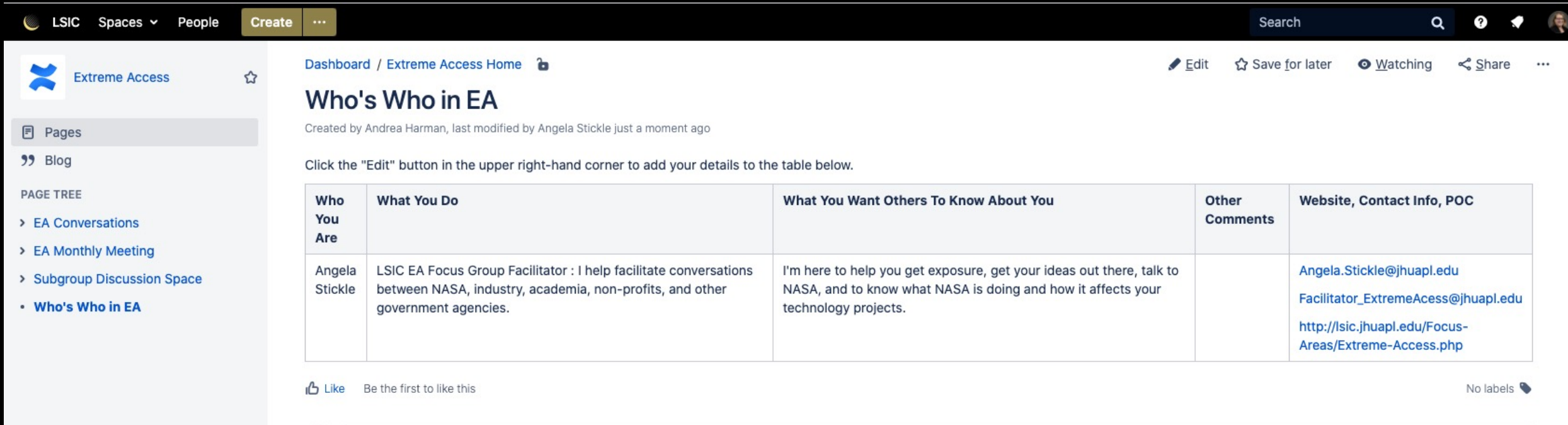


LSIC Meeting Cadence

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

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

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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.		Angela.Stickle@jhuapl.edu Facilitator_ExtremeAccess@jhuapl.edu http://lsic.jhuapl.edu/Focus-Areas/Extreme-Access.php

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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>

STMD Opportunities for Academia and Industry

STMD anticipates awarding ~\$600M to academia and industry supporting 2020 solicitations & awards

STMD Tipping Point Multiple Awards: *Jan – Mar 2020*

\$250M

Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Phases I, II, II-E, Civilian Commercialization Readiness Pilot Program (CCRPP), Sequential: *Phase I Solicitation Jan – Apr 2020*

\$212M

Announcement of Collaborative Opportunity (ACO): *Jan – Mar 2020*

\$10M

Flight Opportunities Tech Flights: *Feb – May 2020*

\$10M

Early Career Faculty (ECF): *Feb – Apr 2020*

\$6M

Early Stage Innovations (ESI): *Apr – Jun 2020*

\$9M

NASA Innovative Advanced Concepts (NIAC) Phases I, II, III: *Phase I Solicitation Jun – Jul 2020*

\$4M

Space Technology Research Institutes (STRI): *Jun – Aug 2020*

\$30M

NASA Space Technology Graduate Research Opportunities (NSTGRO): *Sep – Nov 2020*

\$19M

SmallSat Technology Partnerships (STP): *Sep – Nov 2021*

\$3M

Centennial Challenges: *Varied release dates*

\$8M

NextSTEP Broad Agency Announcements (BAAs): *Varied release dates*

Varies

Lunar Surface Technology Research (LuSTR) Opportunities: *Coming soon!!!*

\$30M

Note: Funding awards are approximate and subject to change

Open Solicitations as of June 5, 2020

Solicitations were/will be open in the timeframe specified in italics