



# Lunar Surface Innovation

C O N S O R T I U M

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## LSIC ISRU Focus Group Monthly

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

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

**April 21, 2021**

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# Agenda

- General Updates – 5min
- Technology Showcase – ESSIO presentation, Dr. Ryan Watkins – 25 min (15 presentation followed by discussion)
- How is the ISRU FG meeting your needs? – Survey Results – 10min
- Moving forward – 10min
  - ‘Lightening Groups’ to address timely topics of finite duration (one being setting our first set of annual goals)
  - Subgroups – thematic topics (to be defined)
- Meetings take-aways and open discussions – 10 min as time allows
  - Space Resources Week – Luxembourg.
  - ASCE Earth and Space Conference

# Updates

- “Who’s Who in ……”
  - ISRU– 33 contributions...keep this up! <https://lsic-wiki.jhuapl.edu/display/ISRU/Who%27s+Who+in+ISRU>
  - Extreme Access. <https://lsic-wiki.jhuapl.edu/display/EA/Who%27s+Who+in+EA>
  - Extreme Environments. <https://lsic-wiki.jhuapl.edu/display/EE/Who%27s+Who+in+LSIC-EE>
  - Excavation and Construction. <https://lsic-wiki.jhuapl.edu/pages/viewpage.action?pageId=6260179>
- The Power FG will be hosting a workshop in May on Power Beaming. Likely 2-day. There will be an ISRU break-out, or focus, session on Day 2.
- The LSIC Spring Workshop is May 11-12. Registration is open and draft agenda available. <http://lsic.jhuapl.edu/News-and-Events/Agenda/index.php?id=124>
- Abstracts for the Joint NASA Exploration Science Forum/European Lunar Symposium are due this Friday, **April 23rd**. <https://sservi.nasa.gov/articles/joint-nasa-exploration-science-forumeuropean-lunar-symposium/>
- Next ISRU FG meeting is May 19.
  - May include a recap/take-aways from the LSIC Spring meeting from an ISRU perspective.

**Technology Showcase**  
**NASA ESSIO (Exploration Science Strategy and  
Integration Office)**  
**Dr. Ryan Watkins, Program Scientist**

A presentation followed by discussion

# ISRU FG Survey

A Survey Monkey request was sent out after the last focus group meeting to canvas the ISRU on ‘how are things going?’

## Three questions:

1. What were you hoping to get out of joining the LSIC ISRU Focus Group?
2. What benefits have you gotten out of LSIC ISRU activities?
3. What specific requests or suggestions do you have?

## Results

30 responses (~ 30% of active participants)

Responses fell into a few general themes

Details available on Confluence – your comments?

### Expectations?

Number	Category
13	Networking
15	Insight and better understand the community/NASA and/or influence tech development
2	Just get involved

### Usefulness?

Number	Category
9	Networking
13	Insight and better understand the community/NASA and/or influence tech development
3	enjoyed the presentations and discussions
5	no time to participate or no value

### Suggestions

Number	Category
7	more technical resources and networking
3	better understanding of community/NASA including schedule and path forward
8	clear goals and deliverables
5	speakers suggestions
7	no change or no comment

# Going forward for the ISRU FG

Dynamic and Static subgroups for deeper dives into areas of sufficient importance.

- Keeping in mind we are all extremely busy and this is an unfunded effort for you....

## Lightening Groups

Address time sensitive goals of well-defined topics of limited duration.

Email: [Karl.Hibbitts@jhuapl.edu](mailto:Karl.Hibbitts@jhuapl.edu) if interested and/or have suggestions for topics.

Initial groups:

- Defining the first set of the FG annual goals

- Defining topics for thematic groups

## Thematic groups

--- industry and NASA needs for developing ISRU tech for sustained presense

Concepts to consider include: setting FOMs, design for servicing, power for ISRU, excavation for

ISRU, dust mitigation for ISRU and other cross-FG themes.

# Take-aways from this week's meetings

## Space Resources Week

Multiple presentations by FG members.

Economic drivers for Lunar (and small body) ISRU.

CentuarV – the cis-Lunar refueling tanker or 'gas station' (>100,000lbs propellant)

'System-level' approach to ISRU technology development and integration.

ESA space resource competition (non European collaborators allowed)

<https://business.esa.int/funding/invitation-to-tender/space-resources>

## ASCE Earth & Space Conference

--- I have been unable to attend



**ESA-ESRIC SPACE RESOURCES CHALLENGE - OVERVIEW**

ESA, in partnership with ESRIC, embraces Challenge Driven Innovation, launching the first robotics SPACE RESOURCES CHALLENGE

We are asking **European industries and research institutions**: which are the best technological solutions for prospecting resources on the Moon? Which missions architectures can be more efficient in the task of surveying large areas for water and metals?

We hope to engage also entities outside the space business, from domains like mining and automotive.

**Two Goals:**

- 1) **identify technologies** for a future ESA mission post 2027
- 2) engage the space resources **community** gathering around ESRIC

**CHALLENGE**  
ESA-ESRIC SPACE RESOURCES

THE EUROPEAN SPACE AGENCY

# First Annual Goal for the ISRU Focus Group

<https://lsic-wiki.jhuapl.edu/display/ISRU/ISRU+YEAR+1+Goals>

Go to the ISRU homepage, under ISRU Conversations



Vision Statement	Goal	Objective	Implementation
<p style="text-align: center;">Enable the identification and maturation of technology needs for ISRU systems that can produce up to 10s to 100s MT/yr of O2</p>	<p style="text-align: center;">Connect FG technology ideas with NASA</p>	<p>The FG provides recommendations and rationales to NASA on which technologies that members would like to see NASA fly as risk mitigation.</p>	<p>Increasing the number of ISRU components selected to be flown on future CLPS missions.</p>
		<p>The FG makes recommendations to NASA on which ISRU technologies and interfaces need maturing.</p>	<p>Future NASA AO's and selections reflect recommendations for ISRU technology development.</p>
	<p>Provide NASA an assessment of the effectiveness of current funding approach to ISRU technology</p>	<p>The FG will assess the strengths and weaknesses of the current funding approach by NASA and make recommendations on how to improve.</p>	<p>Better alignment of NASA funding opportunities, and possibly new funding options, with ISRU technology NASA and the community believes needs maturing.</p>
	<p>Affect a positive impact on community collaborations</p>	<p>The FG will develop and demonstrate effective metrics for determining how well it is meeting the needs of the community: industry, NASA, academia, non-profits.</p>	<p>New line of funding or new business opportunity obtained by FG members attributable to participation in the LSIC ISRU FG.</p>
			<p>A report based upon input by the ISRU FG members on how well the ISRU FG is meeting their needs.</p>
			<p>Continual population of the Who's Who database for improved networking by the ISRU community.</p>

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