



Lunar Surface Innovation

C O N S O R T I U M

Extreme Environments Focus Group October Telecon

October 6, 2020

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JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

Today's Agenda

- Introductions
 - Kevin Somervill, LSIC-EE NASA POC & STMD Extreme Environments TIM
 - Don Barker, Regolith / Surface Interface Task 1 Lead
- LSIC-EE Confluence Updates & Walkthrough
- LSIC Fall Meeting Discussion & Brainstorming (on Confluence)

- Next month (11/10): LSIC Meeting Wrap-up and Subgroup Updates!
 - May be last meeting of the 2020 (AGU 12/1-12/17, holidays, etc.)

LSIC-EE Confluence Site

- Please contact Andrea Harman (ams573@alumni.psu.edu) to get set up with an account!

The screenshot shows a web browser window displaying the 'Extreme Environments Home' page on the LSIC-EE Confluence site. The page is titled 'Extreme Environments Home' and was created by Andrea Harman. It features a navigation sidebar on the left with sections for Pages, Blog, Space Shortcuts, and Page Tree. The main content area includes a description of the focus area, a list of subgroups, recent space activity, and past meetings. A photo of a lunar lander is also visible.

<https://lsic-wiki.jhuapl.edu/display/EE>

Fall Meeting Agenda

- Dates: October 14th and 15th, 2020
- Venue: Virtual (hosted by Arizona State University)
- Agenda: <http://lsic.jhuapl.edu/Events/docs/agenda.pdf>
- Information: The Lunar Surface Innovation Consortium (LSIC) fall meeting will be held virtually on October 14th and 15th. The event will feature interrelationships between the six focus areas identified by the Consortium, especially in the context of surface power. Day one of the meeting (October 14th) will feature key note addresses and LSIC-wide plenary sessions, including a poster session. Day two (October 15th) will delve more deeply into technology areas, including smaller group discussions.
- Register: <http://lsic.jhuapl.edu/Events/Register/>

Fall Meeting Agenda

Day 1



Lunar Surface Innovation Consortium (LSIC)

Fall Meeting Draft Agenda

All times Eastern

October 14-15, 2020

Day 1 – Wednesday, October 14, 2020

- | | | |
|-------|--|---|
| 11:00 | Welcome and Introduction | Rachel Klima, LSIC Director,
Johns Hopkins Applied Physics Laboratory (APL)
Lindy Elkins-Tanton, Managing Director,
Arizona State University (ASU) Interplanetary Initiative |
| 11:15 | Keynote Address; Artemis Update | Jim Bridenstine, NASA Administrator |
| 11:50 | Lunar Surface Innovation Initiative Update | Jim Reuter, NASA Associate Administrator
for Space Technology |
| 12:15 | Systems Integration | Ben Bussey, APL |
| 12:30 | LSIC Update | Rachel Klima, APL |
| 1:15 | <i>Lunch Break</i> | |

Fall Meeting Agenda

Day 1

- | | | |
|------|--|---|
| 2:00 | Arizona State University Overview | Lindy Elkins-Tanton, ASU |
| 2:25 | Engaging Non-Traditional Players in Space | Timiebi Aganaba-Jeanty,
ASU School for the Future of Innovation in Society |
| 2:45 | ASU Feature | Michael Goryll,
ASU School of Electrical, Computer and Energy
Engineering |
| 3:00 | <i>Break</i> | |
| 3:10 | Space Tech Opportunities: Panel Discussion | Chris Baker, Program Executive
NASA Small Spacecraft and Flight Opportunities
Jason Derleth, Program Executive
NASA Innovative Advance Concepts
Jenn Gustetic, Program Executive
NASA Small Business Innovation Research & Small
Business Technology Transfer Programs
Claudia Meyer, Program Executive,
NASA Space Technology Research Grants
Amy Kaminski, Program Executive
NASA Prizes and Challenges |
| 4:10 | Technology Transfer | Dan Lockney, Program Executive
NASA Technology Transfer Program |
| 4:25 | Lightning Talks | Selected Participants |
| 4:50 | <i>Break – Transition to Poster and Networking Session</i> | |
| 5:00 | Posters and Networking Session | |
| 6:00 | <i>Adjourn</i> | |

Fall Meeting Agenda



Lunar Surface Innovation Consortium (LSIC)

Fall Meeting Draft Agenda

All times Eastern

October 14-15, 2020

Day 2

Day 2 – Thursday, October 15, 2020

- | | | |
|-------|---|---|
| 11:00 | Envisioned Future Outbrief | Ben Bussey, APL |
| 11:15 | NASA Space Technology Gaps | Niki Werkheiser, Lunar Surface
Innovation Initiative Lead, NASA Space Tech |
| 11:45 | Power Panel: System level concerns & Current status | Ray Beach, Principal Technologist for Power and Thermal Management, NASA
Anthony Calomino, Nuclear Systems Portfolio Manager, NASA Space Tech
Chuck Taylor, Lunar Vertical Solar Array Technology Project Manager, NASA Space Tech
Marija Ilic, Massachusetts Institute of Technology, Institute for Data, Systems and Society |
| 12:30 | <i>Break/Transition</i> | |

Fall Meeting Agenda

Day 2

12:40	Scenario 1: 2028-2030 timeframe Establishing a sustained presence	6+ parallel sessions, ASU and APL chairs
1:40	<i>Break/Transition</i>	
1:50	Scenario 2: 2024-2026 timeframe Building towards sustainability	6+ parallel sessions, ASU and APL chairs
2:50	<i>Break/Transition</i>	
3:00	Scenario Out brief preparation: Discussion and synthesis	3 parallel sessions, ASU and APL chairs
4:00	<i>Break/Transition</i>	
4:10	Scenario Report Out Discussion and Next Steps	LSIC Group Representatives Rachel Klima, APL
5:00	<i>Adjourn</i>	

Fall Meeting Breakout Sessions

- Breakout Session 1 – Envisioning a future sustained lunar presence for different power constraint categories
 - 10 kW continuous power
 - 100 kW with 70% duty cycle
 - >1 MW continuous power
- Breakout Session 2 – Key technologies and knowledge gaps to be addressed to achieve envisioned future from Breakout Session 1
 - Groups within each power categories will be scrambled!
- Breakout Session 3 – Critical factors linking envisioned futures
 - All groups together within each power category

Fall Meeting Brainstorming

Extreme Environments Home - Extreme Environments Home

Isic-wiki.jhuapl.edu/display/EE/Extreme+Environments+Home

LSIC Spaces People Create

Extreme Environments

Dashboard

Extreme Environments Home

Created by Andrea Harman, last modified on Sep 28, 2020

Extreme Environments

The Extreme Environments focus area will progress technologies enabling the survival and operation of systems through the full range of lunar surface and subsurface conditions that drive engineering requirements. These technologies will enable landers, rovers, manipulators, and other systems to operate through extreme conditions such as rapid temperature changes and permanently shadowed regions. Additional examples of extreme environments include exogenic factors (e.g. illumination, communications, radiation, plasma, micro-meteorites) and endogenic factors (e.g., dust, surface toxicity, regolith, rocks). An important expected output is the generation of an Extreme Environments User's Guide.

Facilitator: @Benjamin Greenhagen

Facilitator Email: Facilitator@ExtremeEnvironments@jhuapl.edu

Listserv Address: Listserv Address: LSIC_EXTREMEENVIRONMENTS@LISTSERV.JHUAPL.EDU

[Return to LSIC Home](#)

Extreme Environments Subgroups

- > Illumination Environment
- > Radiation Environment
- > Regolith / Surface Interface
- > Thermal Environment
- > Vacuum / Exosphere Environment
- External Hazards (organizing)
- Space Weather / Plasma Environment (organizing)
- Subgroup Leads (Private)

Extreme Environments Conversations

To create a new conversation, just hit the "create" button while on the LSIC-EE Conversations page to keep everything in the same place.

- Welcome to LSIC-EE Confluence!
- LSIC-EE Open Discussion
- What to do about Regolith?
- Task 1 - Defining the Environment
- Oct. 6 Brainstorming

Past Meetings

- 08 September 2020
- 11 August 2020
- 14 July 2020
- 23 June 2020
- 2020-10-06 Meeting notes

Upcoming Events

- 📅 06 Oct 2020
Extreme Environments Monthly Meeting
- 📅 14 Oct 2020 - 📅 15 Oct 2020
LSIC Fall Meeting

Recent space activity

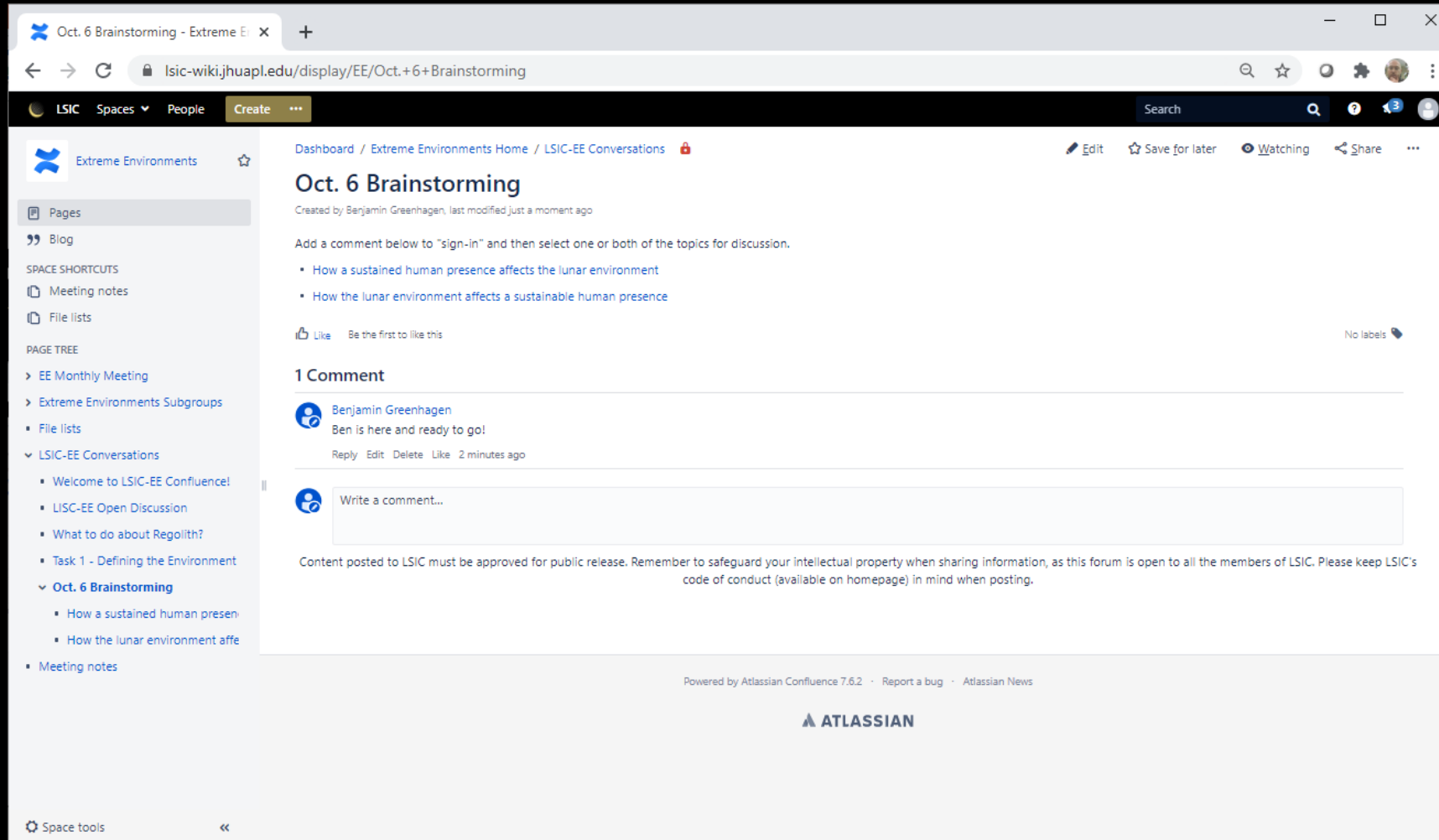
- Benjamin Greenhagen
Oct. 6 Brainstorming created less than a minute ago
- Stephen Indyk

Space contributors

- Benjamin Greenhagen (less than a minute ago)
- Stephen Indyk (17 hours ago)
- Kevin Somerville (18 hours ago)
- Lawrence Heilbronn (19 hours ago)
- Craig Peterson (3 days ago)

<https://Isic-wiki.jhuapl.edu/display/EE>

Fall Meeting Brainstorming



The screenshot shows a web browser window displaying a Confluence page. The browser's address bar shows the URL: `Isic-wiki.jhuapl.edu/display/EE/Oct.+6+Brainstorming`. The page title is "Oct. 6 Brainstorming". The page content includes a "Like" button, a "1 Comment" section with a comment from Benjamin Greenhagen, and a "Write a comment..." input field. The comment from Benjamin Greenhagen says "Ben is here and ready to go!". The page footer includes the Atlassian logo and the text "Powered by Atlassian Confluence 7.6.2".

1. Add a comment to “sign-in”
2. Select a topic and comment your thoughts
3. Check out the other topic too!

Fall Meeting Brainstorming

- **How the lunar environment affects a sustainable human presence**
 - What are the ways, both big and small, that the local lunar environment requires mitigation?
 - Can we meet these challenges with existing technologies or are new technologies required?
 - Do we know everything that we need to know regarding the lunar polar environment(s)?
 - What are the opportunities that the lunar environment provides to a sustained human presence?

- **How a sustained human presence affects the lunar environment**
 - What are the ways, both big and small, that the human presence affects the local lunar environment beyond the settlement? Which require mitigation?
 - How do different parts of the settlement affect the lunar environment within the settlement?
 - Do we know everything that we need to know regarding how human structures affect their surroundings?
 - Do we have adequate tools to understand these interdependences or are new tool required?
 - What opportunities does careful settlement planning provide to leverage intentional modification of the environment inside and outside the settlement?

An Envisioned Future

1 Minute
Timer

ISRU

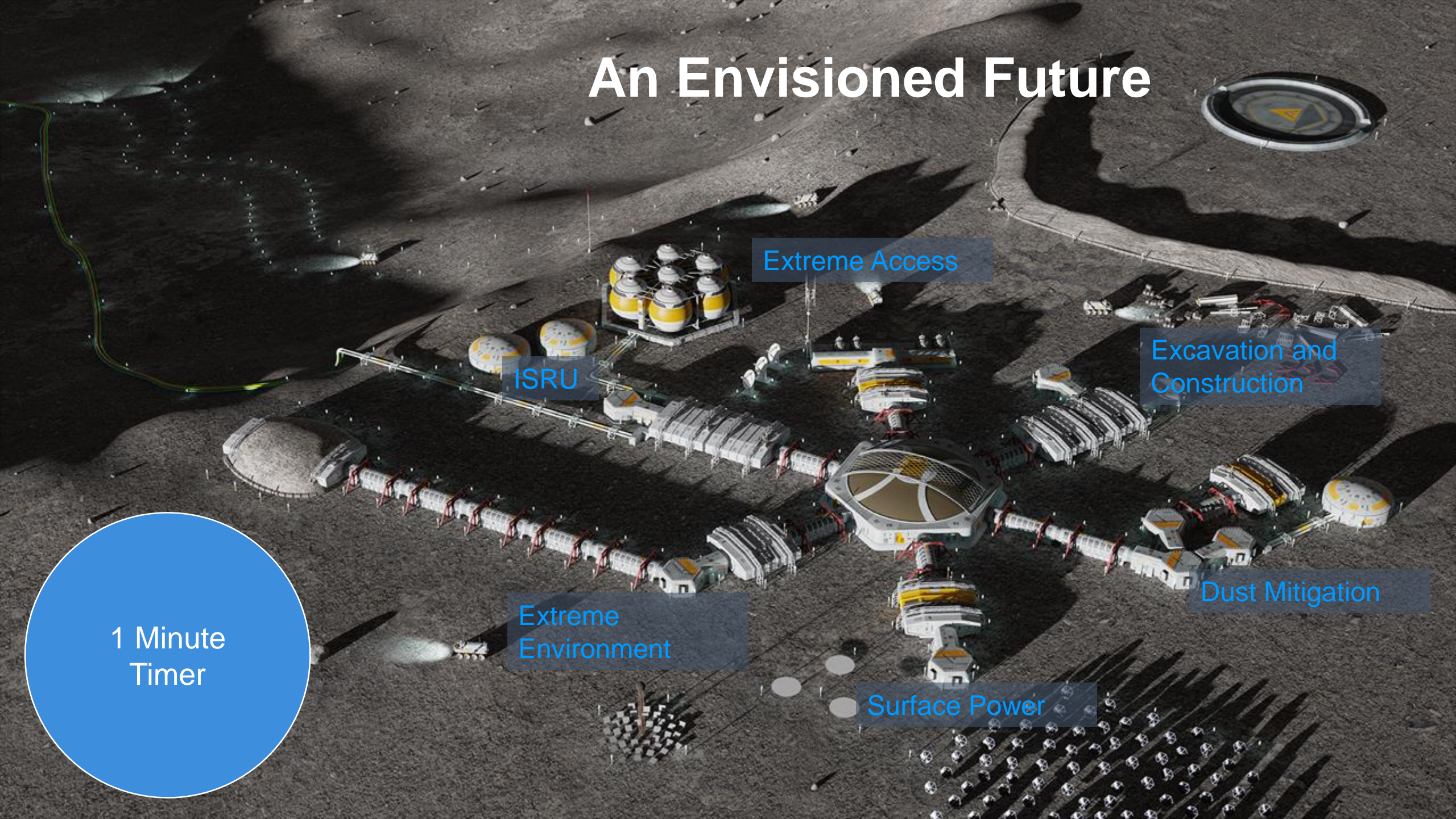
Extreme Access

Excavation and
Construction

Extreme
Environment

Dust Mitigation

Surface Power





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