



LEAG Commercial Advisory Board (CAB)

Strategic Planning Activity Report

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Context

The Lunar Exploration Analysis Group (LEAG) Commercial Advisory Board (CAB) is a forum for members from the commercial space sector to advise on the planning and prioritization of NASA-funded lunar science and exploration activities. Output from the CAB is shared with the LEAG Executive Committee (ExComm) to be incorporated into findings presented to the Planetary Science Advisory Committee (PAC), which advises NASA's Planetary Science Division of the Science Mission Directorate. The CAB's key stakeholders include NASA, the PAC, and ExComm.

The CAB exists to support the following goals:

1. To serve as a resource to NASA and respond to requests from key stakeholders.
2. To report findings to NASA on the impact on the commercial sector of current or future NASA programs or policies and advocate for changes where needed.
3. To provide a forum for members and affiliates to coordinate activities, interfaces, services, collaborations, and supply chains.
4. To provide an interface between the commercial sector and lunar science community.

Since the CAB leadership change in 2020, the CAB has achieved the following:

- White papers
 - Submitted to the NASA Transition Team
 - Submitted to the recent Planetary Science Decadal Survey
- Relationships established across NASA
 - ESSIO (Joel Kearns, program executives & scientists)
 - NASA SMD (Sarah Noble)
 - CLPS Program Office (Chris Culbert)
 - LSIC (Rachael Klima)
- Advocacy for the commercial perspective on the ExComm, which reports findings to the PAC
- Initiated a working group on CLPS payload standards

This meeting at the 2022 LEAG meeting was the first formal in-person CAB meeting since 2019. With the ongoing effort of the Artemis program and the recent release of the decadal survey, the time is right for the CAB to collectively evaluate how to best serve the needs of its members as a cohesive group. The goal of the meeting was to discuss how the CAB can position itself to contribute to the next decade of lunar exploration.

Strategic Planning Activity Results

The CAB meeting occurred in parallel with the LEAG fall meeting on August 23, 2022. There were approximately 25 attendees. The group was given the following prompt to generate ideas on the future direction of the CAB:

What challenges do you foresee in the next decade of lunar exploration that this group could tackle together?

The resulting ideas, listed in **Table 1**, were grouped into the following categories: CLPS, NASA, Science, Cislunar Economy, Politics, and Standards.

Table 1. Challenges identified by CAB members during the in-person strategic planning activity.

Category	Challenges
CLPS	<ul style="list-style-type: none"> ● Shortening cycle time between selection and launch ● Developing an evolutionary roadmap for CLPS ● Definition of CLPS 2.0 ● Get one unified vision/plan; don't pick cheapest payloads ● Collaborate on how to evolve CLPS to big cargo lander ● Stability of CLPS long term ● Post-CLPS plan ● Convincing commercial base of realism in landing expectations ● Sample return ● Payload interface standardization (power/data/etc) ● Establishing marketplace of capabilities/services → more awareness
NASA	<ul style="list-style-type: none"> ● Everything that can be sustainable should be mandated to be ● Overcoming failures - technically, programmatically, politically ● Aligning procurement & risk tolerance ● Steady funding for Moon → Mars
Science	<ul style="list-style-type: none"> ● Varied destinations vs intense study of one area ● Subsurface exploration ● Long-term dust mitigation & cleaning ● Maximizing scientific return across multiple missions ● Efficient sample return ● Provide sample return services

Cislunar Economy	<ul style="list-style-type: none"> ● Enabling space resources to be in the critical path of human space exploration ● Linkage between service/infrastructure providers ● Developing a coordinated lunar resource evaluation campaign ● Honest evaluation of lunar economics ● Making transportation to/from lunar surface routine & affordable ● Effective surface sustainable commercial development & ISRU strategies - NASA as anchor tenant? ● ISRU at scale ● Survive the night ● Provide mobility services ● Help getting commercial radioisotope approval for launch ● Reliable, high bandwidth communications plan ● Building up permanent infrastructure through services at base ● Reaching out outside of the standard NASA community to draw more non-traditional commercial interests into the cislunar economy ● Non-NASA customers ● Beyond government as prime customer - little to no investment dollars for cislunar economy ● Enabling a transition to commercial operations on the Moon ● Creating a market beyond NASA alone ● Help NASA plan the transition to users of lunar infrastructure
Politics	<ul style="list-style-type: none"> ● Acknowledge the influence of Chinese lunar activity on US lunar policy ● Lobby NASA/Congress for money like the big jobs programs & defense contractors
Standards	<ul style="list-style-type: none"> ● Commonality and standards ● Standardization of tool sets and interfaces of assets left on lunar surface - additional conversations about legal implication for re-use and recycling of said assets ● Coordination across US government of tech and mission needs ● Establishment of standards for lunar systems (including testing/ISRU interactions)

From the challenges listed in **Table 1**, the group then identified the highest-priority items, listed in **Table 2**. Participants volunteered to take action in member-led working groups.

Table 2. Issues down-selected from **Table 1** along with volunteers.

#	High-Priority Challenge	Working Group Volunteers
1	Standards <ul style="list-style-type: none"> ● Identify class & category of standards; identify where standards are prohibitive vs beneficial ● Distribute/dissipate standards to int'l & commercial community ● Incentivizing buy-in to beneficial standards ● Specific case: CLPS interface standardization 	Kaizad Raimalwala, Steve Indyk, Melissa Roth

2	Work with CLPS program office on technology development roadmaps	Will Coogan
3	Close the business case with advanced market commitment	Marchel Holle, Trent Martin, Jennifer Lopez
4	Facilitate commercial use of a wider range of power options, including nuclear, currently limited by regulations	
5	Determine and fund the infrastructure needed to create a long-term lunar economy	Melissa Sampson, Bruce Morris, Taylor Johnson
6	Politics <ul style="list-style-type: none"> ● Long term investment and planning ● Establish a vision rather than lead by fear ● Legal framework for investment security ● Lobbying & messaging – perceptions, ongoing story 	Taylor Johnson, Hunter Williams

Next Steps

1. All CAB members will have the opportunity to sign up to participate in the working groups.
2. An email will be sent to the volunteers in each working group.
3. Each working group will be responsible for self-organizing objectives, roles, and actions. The CAB leadership team will provide support as needed, but the working groups’ efforts will be member-driven.

Findings

After each LEAG meeting, and also throughout the year, the LEAG ExComm reports findings to the PAC that are then passed on to PSD leadership. Findings are a way of communicating the lunar science & exploration community’s priorities and providing recommendations to NASA on how to take action.

From the discussions that occurred at the CAB meeting, two actionable findings were identified and recommended to the LEAG ExComm for consideration:

1. ESSIO and the CLPS Program Office should work with CLPS providers to develop a technology roadmap that evolves CLPS capabilities to advance science & exploration objectives prioritized by the lunar community.
2. Nuclear power on the lunar surface is enabling for lunar surface operations, but commercial use is currently hamstrung by a complex regulatory environment. NASA should work with CLPS providers and other commercial partners with appropriate regulatory authorities to develop a pathway for commercial delivery of nuclear-powered payloads to the lunar surface.