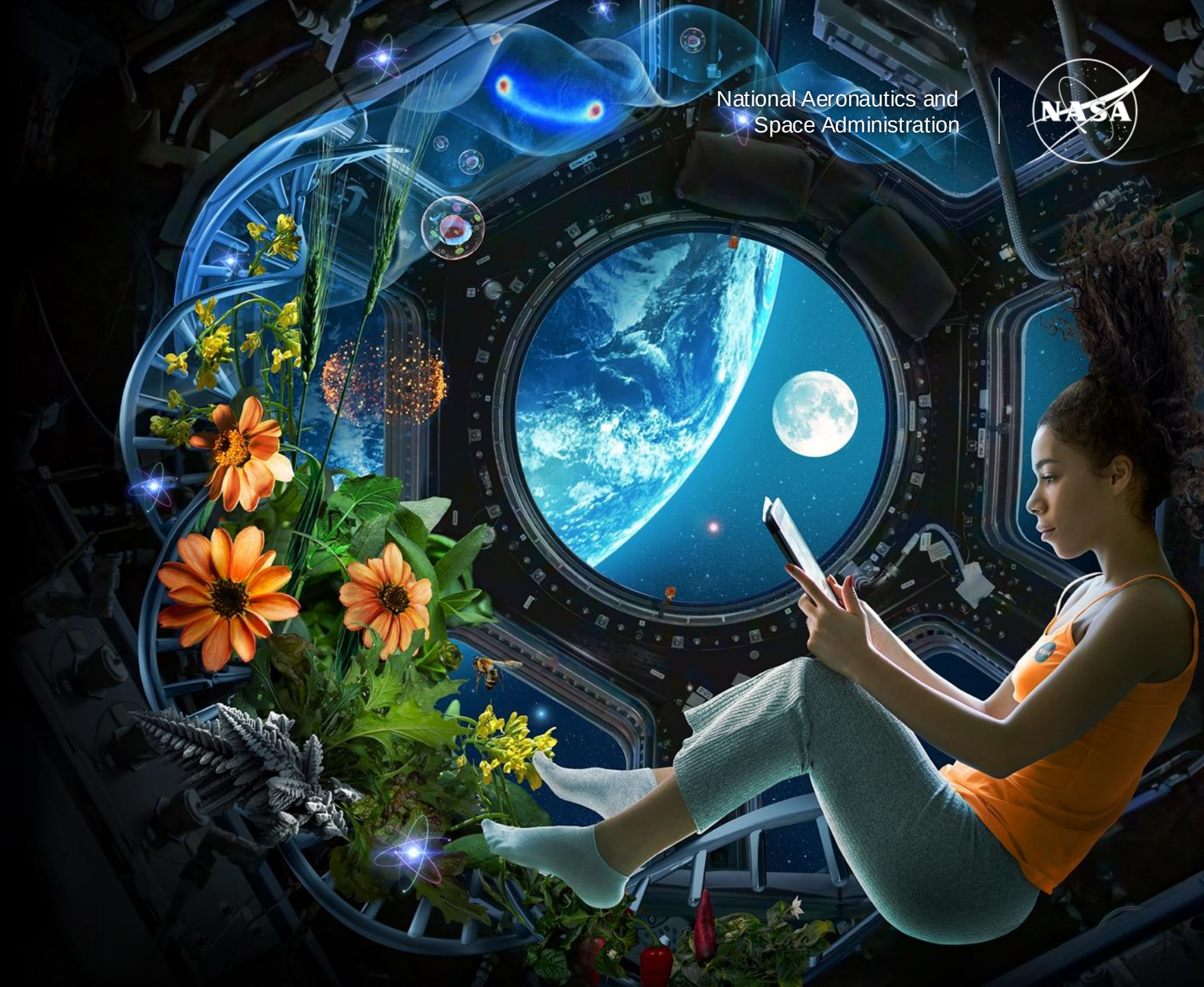
BPS Advisory Committee Meeting
April 25-26, 2024

National Aeronautics and Space Administration



BPS Advisory Committee

FINDINGS AND RECOMMENDATIONS

Biological & **P**hysical **S**ciences

BPS Advisory Committee Members

Kenneth Davidian, International Space University
William Davis, NASA Johnson Space Center
Jamie Foster (Chair), University of Florida
Simon Gilroy, University of Wisconsin-Madison
Mary Guenther, Commercial Spaceflight Federation
Nathan Lundblad, Bates College
Maren Mossman, University of San Diego
Aleksandra Radlinska, Pennsylvania State University
Ali Rangwala, Worcester Polytechnic Institute
Kathleen Rubins, NASA Johnson Space center
Danilo Tagle, National Center for Advancing Translational Sciences
Petia Vlahovska, Northwestern University
Mark Weislogel, IRPI, LLC

Executive Secretary: Mike Robinson, NASA Headquarters

1. Budgetary Impacts on Biological and Physical Sciences

We appreciate the need to deal with difficult budgetary constraints and balance the many BPS initiatives.

Findings:

1. As the Decadal Survey recommends significantly increased funding of BPS research areas, BPS will need additional investment to serve as a catalyst for the greater BPS community. This aspect is even more imperative if BPS will be required to account for operational expenses (e.g., crew time, launches, platform access, etc.) on CLDs, as these are currently covered by other NASA divisions and directorates.
2. There is a risk that a limited BPS budget may impact the capacity and momentum of BPS experiments, thereby potentially resulting in technical and schedule delays in upcoming missions (e.g., Artemis).
3. The planned cuts to the annual ISS operating budget (estimated to be 20%) may significantly constrain the amount of science that can be accomplished by BPS in the final years of the ISS despite the station now being a mature and productive platform.

Recommendations:

1. BPS and SMD leadership continue to advocate for increased funding, on the order of 30% annually, to achieve Decadal Survey recommendations. Advocacy can include direct funding requests as well as the continuation of building partnerships across NASA and other agencies to maximize resource utilization.
2. As BPS continues its Decadal Survey road mapping efforts, clarify to BPAC, and the larger BPS research community, the procedures used to address budgetary issues and prioritize targeted elements of the survey.
3. Despite clear budget constraints maintain regular proposal cycles that includes ground-based research.
4. Consider expanding collaborations with other government's space agencies to leverage BPS funding.

2. Decadal Survey Road Mapping and Implementation

We understand that BPS research experiments are subject to program schedules and priorities outside of the control of BPS, which can impact BPS activities and funding priorities.

Findings:

1. BPS Roadmap activities to identify prioritized research activities are needed and valuable; however, the planned timeline for road mapping may not be fast enough to help the research community align their proposed activities before the next grant cycle.

Recommendations:

1. Quickly provide community guidance and highlight initial areas of priority from the Decadal Survey to research community prior to the next RFP announcement.
2. As BPS refines its research roadmaps, coordinate efforts with other SMD divisions and directorates to optimize efforts and timing.
3. Consider moving key ground analogs and facilities to institutions outside of NASA centers to reduce costs and increase accessibility of facility beyond normal NASA working hours, thereby increasing productivity and usage of the facilities.

3. Information and Data Exchange with Commercial Providers

Findings:

1. A significant factor influencing BPS mission success in the next decade will depend on how quickly Commercial LEO Destinations (CLDs) platforms achieve operational status. It will take time for CLDs to match the current capabilities and capacities of the ISS.
2. BPS has needs in terms of requirements and generated best practices learned from ISS research that need to be included in the design, development and operations of the CLDs.
3. NASA was unable to provide insight to BPAC on the level of community and agency access to commercial flight test data relevant to BPS objectives, which was concerning.
4. This lack of critical data sharing appears to be inconsistent with the NASA Open Science Initiative.

Recommendations:

1. Ensure BPS maintains transparent and rapid communication with CLDs to ensure NASA requirements and best practices are conveyed to CLDs to enable CLDs to incorporate into their designs.
2. Ensure BPS has access to all data from test flights and experiments related to BPS research. Although considerations must be made for protecting proprietary and other controlled information, this data should be openly shared with the greater BPS community as much as possible.
3. Continue to assess and identify potential CLD external schedule and priority impacts on BPS research to ensure there are contingency plans for events beyond the control of BPS.

4. Optimizing BPS Science Aboard the ISS

Findings:

1. There is risk that BPS research efforts on the ISS are not fully maximizing ISS capabilities, thereby limiting the scientific return for the remaining lifespan of the ISS.

Recommendations:

1. Develop approaches to increase experiments that take greater advantage of on-orbit analysis rather than sample return .
2. Create a pipeline of “on-demand” science experiments that can be sent and stored on ISS. These ”on-demand” experiments could be completed in between docked missions or during vehicle slips when crew time becomes available, thereby increasing the efficiency and output of BPS science and be more adaptable to CLDs if upmass/downmass and cold stowage is restricted.
3. Utilize procurement models that facilitate rapid development of hardware that serves more like an agent (e.g., Air Force Space Enterprise Consortium) to delegate approval authority to lower levels, thereby increasing decision speed and reducing entry resistance for more entities engaging in BPS-related research.

5. Workforce Development

We appreciate the continued emphasis on student training and research participation to achieve the BPS mission

Findings:

1. Gaps in research funding threaten entire generations biological and physical space researchers in areas of micro- and partial gravity science.

Recommendations:

1. Create short videos highlighting overall BPS achievements and impact of research that can be used as a student engagement tools and assist in raising BPS profile amongst stakeholders.
2. Consider partnering with NASA Office of STEM engagement to identify an approach for longitudinal analysis of funded students to measure and assess the impact of IDEA-related initiatives. Establish criteria of success for the engagement programs.
3. Leverage usage of the NASA FINESST program by expanding number of BPS-funded graduate students.

6. Additional Infrastructure for BPS

Findings:

1. There is a critical need for the construction or increased access to partial gravity drop towers to test key physical processes (e.g., combustion, fluids) to support upcoming missions (e.g., Artemis).
2. Future platforms, such as the Lunar Gateway, must have the infrastructure necessary to support these lines of research to uphold the advancement of fundamental physics research in space-based environments beyond the ISS.

Recommendations:

1. BPS should consider a specific funding request from Congress to construct a US-based partial gravity drop tower, or facility, to ensure the success of critical upcoming missions (e.g., Artemis).
2. Examine and potentially leverage successful NASA-ESA collaborations where research (e.g., partial gravity) can be co-funded and enhance international participation.
3. Leverage its distinctive role in providing new types of environments for quantum science and technology development that can be accessible to other institutions for the expansion of research and workforce development opportunities.
4. Explore having a joint proposal for soft matter and fluid dynamics.

Future Meeting Topics and Suggestions

Topic Suggestions:

1. Updates on Decadal Survey Road mapping efforts and discussion of criteria used to priorities areas for funding.
2. Request criteria on criteria for decisions on how BPS budget requests and portfolio balance are made for the outyears.
3. Discussion of how BPS (and NASA) will ensure safety, hardware maintenance and operations of BPS-funded projects on future CLDs.

Overall suggestions:

1. Improved organizational charts or clarifications to help BPAC understand BPS's specific contributions to the programs being discussed (e.g., ESSIO-related charts did not clearly articulate how BPS contributes to these programs).

Final Thoughts

BPAC members are excited by the future of BPS and the high impact science and technology outcomes emerging from BPS-sponsored research.