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Subcommittee on Space and Aeronautics

Hearing on

"The Future of Low Earth Orbit: From the ISS to Commercial Platforms"

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Introduction and Role of the Panel

The Aerospace Safety Advisory Panel was established by Congress to provide independent advice to NASA and to Congress on matters of safety, risk, and mission assurance. The Panel conducts ongoing fact-finding across the Agency's human spaceflight activities, including direct engagement with NASA leadership, workforce, and contractors. [1]

The Panel's perspective is grounded in its role as an independent advisory body that principally focuses on NASA's decision-making and risk management and acceptance processes. In that capacity, the Panel offers recommendations intended to assist NASA's leaders in guiding their teams through the planning, development, and execution of complex operations, rather than to pass judgment on individual decisions.

The Panel does not typically possess the full depth of program-specific data, analysis, and deliberation available to NASA program managers and technical teams. Accordingly, its role is not to adjudicate specific technical decisions, but to engage Agency leadership on the rigor of the questions being asked, the completeness of testing and analysis, and the adequacy of independent expert review. Through this lens, the Panel evaluates how organizational structure, technical authority, program design, and acquisition strategy shape safety outcomes across the Agency.

Health and Status of the ISS

The International Space Station remains one of NASA's most successful and resilient programs, providing over two decades of continuous human presence in low Earth orbit and enabling significant advances in science, operations, and international collaboration.

At the same time, the ISS is operating in the highest-risk phase of its lifecycle. Aging systems, cumulative wear, and structural degradation introduce increasing technical uncertainty. [2]

Continued safe operation is achievable, but it is not assured without sustained engineering rigor, disciplined risk management, and adequate resourcing. As policymakers consider maximizing ISS utilization through the end of the decade, these objectives must be balanced against the realities of operating an aging and increasingly complex orbital system.

ISS Transition and Continuity of LEO Capability

The transition from the ISS to commercial low Earth orbit destinations represents a fundamental shift in how the United States will conduct human spaceflight operations in low Earth orbit.

The Panel supports the goal of commercial capabilities in low Earth orbit and recognizes their potential to expand research opportunities and enable a more sustainable long-term presence. However, the Panel has consistently emphasized the need for a comprehensive and executable transition strategy. [3]

Progress toward such a strategy has been limited relative to the scale and complexity of the transition. In particular, the Panel remains concerned that the alignment of ISS retirement timelines, commercial development schedules, and NASA's future mission requirements has not yet been fully resolved.

As a result, there is a credible risk of a gap in U.S. human spaceflight capability in low Earth orbit. Such a gap would have implications beyond any single program, affecting microgravity research, human health studies, exploration readiness for missions beyond Earth orbit, and the Nation's continuous presence and leadership in space.

Low Earth orbit serves as a critical testbed for reducing technical and operational risk associated with exploration missions beyond Earth orbit. The development, integration, and validation of systems intended for lunar and Mars missions—including life support systems, habitation capabilities, and operational concepts—benefit significantly from testing in the LEO environment.

LEO also provides a unique platform for advancing understanding of human health risks associated with long-duration spaceflight. The physiological and behavioral effects of extended exposure to space flight and the emerging conditions of SANS (Spaceflight Associated Neuro-ocular Syndrome) and venous thromboembolism remain areas of active study and are essential to address before undertaking missions to Mars.

Ensuring continuity of capability in low Earth orbit is therefore both a programmatic and strategic consideration, directly linked to NASA's ability to safely execute its broader exploration objectives.

Acquisition Strategy as a Determinant of Safety

A central finding of the Panel's recent work is that acquisition strategy has become a primary determinant of safety outcomes in NASA's human spaceflight programs. [4]

As NASA increasingly relies on commercial contracting models, particularly fixed-price and service-based arrangements, the structure of those contracts directly influences engineering practices, verification and validation approaches, transparency of technical data, and accountability for risk acceptance. [5]

In this context, acquisition strategy is not merely a business decision; it is a safety-relevant decision framework.

As NASA transitions to procuring services from commercial low Earth orbit destinations, it becomes essential that the Agency retain sufficient insight, oversight, and technical authority to ensure that safety-critical systems meet the standards required for human spaceflight, and that NASA matures an operational risk management paradigm for NASA personnel flying on commercial low Earth orbit destinations. [6]

Lessons from the Commercial Crew Program and Starliner

It is important to emphasize that, regardless of contract structure or commercial partnership model, NASA retains ultimate responsibility and accountability for the safety of its personnel in human spaceflight missions.

The Panel's review of the Commercial Crew Program, including the Boeing Starliner Crew Flight Test, illustrates several broader themes relevant to NASA's evolving operational model of working with commercial entities for human spaceflight.

During that mission, technical anomalies and operational challenges exposed concerns regarding organizational clarity, decision authority, and risk governance. The Panel observed that contract structure and programmatic relationships contributed to ambiguity in the definition of safety responsibility and in the processes used to assess and communicate risk during critical phases of the mission.

Of particular concern was the absence of a formal mishap or close-call declaration in the presence of significant anomalies. This limited opportunities for structured learning reflected a diffusion of safety accountability. [7]

These observations are not isolated to a single program. Rather, they highlight systemic challenges associated with aligning commercial acquisition models with NASA's enduring responsibility for human spaceflight safety. [8]

Technical Authority, Workforce, and Risk Management Capacity

Effective safety governance depends on strong independent technical authority, a capable and experienced workforce, and a culture that prioritizes disciplined risk management.

Recent workforce attrition, organizational changes, and budget pressures raise concerns about NASA's ability to sustain the depth of expertise required to oversee increasingly complex programs and commercial partnerships. These pressures coincide with a period in which NASA must exercise greater—not lesser—technical insight. [9]

Maintaining independence, consistency, and resourcing of technical authority functions is essential to ensuring that safety considerations remain central to decision-making across all programs.

Considerations for the Committee

As Congress considers the future of U.S. activities in low Earth orbit, including implementation of H.R. 7273, the ASAP offers several considerations:

- The safe operation of the ISS through end-of-life requires sustained attention to aging system risks.
- A credible, executable strategy for transition to commercial LEO platforms remains essential and is not yet fully realized.
- Avoiding a gap in U.S. LEO capability should be a priority given its implications for research, exploration, and national leadership.
- Acquisition strategies must be aligned with NASA's responsibility for human spaceflight safety, ensuring adequate insight, oversight, and accountability.

Conclusion

The United States is entering a period of significant transition in human spaceflight, characterized by the simultaneous management of an aging orbital platform, the development of commercial successors in low Earth orbit, and the pursuit of exploration beyond Earth orbit.

These transitions introduce new opportunities, but also new complexities in how risk is understood, managed, and governed.

The Aerospace Safety Advisory Panel continues to emphasize that strong governance, clear safety authority, disciplined acquisition strategies, and sustained technical capability are essential to ensuring safe and successful outcomes.

Innovation in acquisition must not outpace NASA's ability to manage risk.

Footnotes

[1] ASAP 2025 Annual Report, Preface and Introduction.
[2] ASAP 2025 Annual Report, ISS section, including the Panel's characterization of the ISS as entering the riskiest period of its operational life.
[3] ASAP 2025 Annual Report; ASAP 1st Quarterly 2026 Public Meeting Statement, March 16, 2026, noting limited progress on a comprehensive ISS transition strategy.
[4] ASAP 2025 Annual Report, Strategic Vision and Governance, including the Panel's discussion of acquisition strategy as an emerging determinant of safety outcomes.
[5] ASAP 2025 Annual Report, "Make, Manage, Buy: NASA's Approach to Commercial Contracts."
[6] ASAP Recommendation 2025-12-01, as reproduced in the ASAP 2025 Annual Report.
[7] ASAP 2025 Annual Report, Boeing Starliner and Crew Flight Test discussion, including the Panel's concern regarding the lack of a mishap or close-call declaration.
[8] ASAP 2025 Annual Report, Commercial Crew Program / Starliner discussion regarding broader systemic implications of contract misalignment.
[9] ASAP 2025 Annual Report, Human Capital and Technical Authority sections.