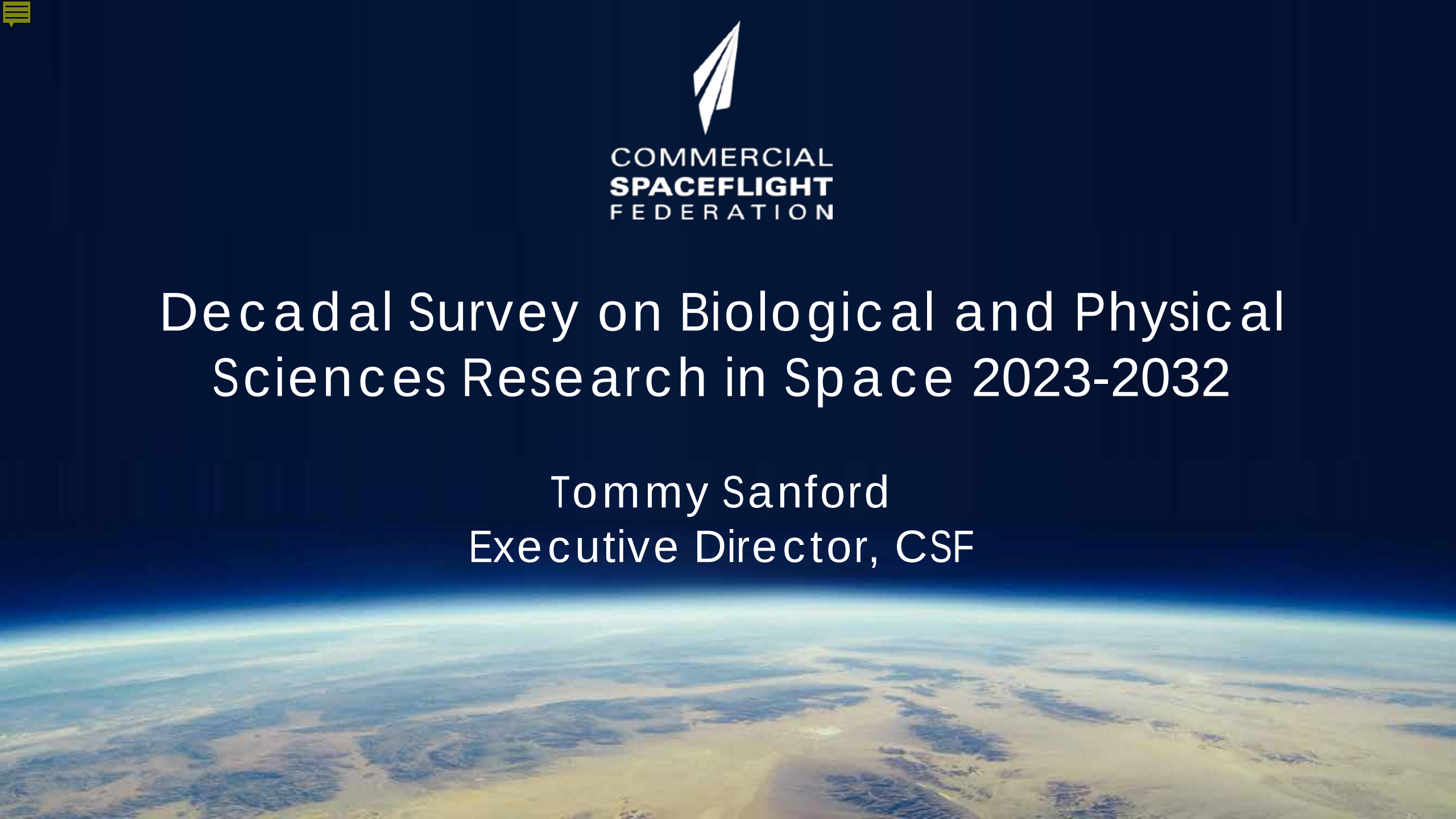


Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032

Tommy Sanford
Executive Director, CSF

COMMERCIAL
SPACEFLIGHT
FEDERATION

Thank you, BPS Committee for including Decadal Stakeholder Perspectives!

COMMERCIAL SPACEFLIGHT FEDERATION

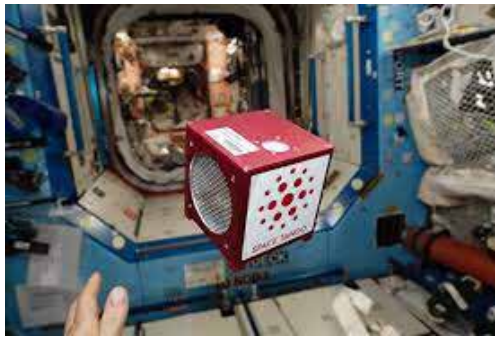
The Commercial Spaceflight Federation is the leading voice for the commercial space industry. CSF and its members are laying the foundation for a sustainable space economy and democratizing access to space for scientists, students, civilians, and businesses. CSF members are responsible for the creation of thousands of high-tech jobs driven by billions of dollars in investment. Through the promotion of technology innovation, CSF is guiding the expansion of Earth's economic sphere, bolstering U.S. leadership in aerospace, and inspiring America's next generation of engineers and explorers.

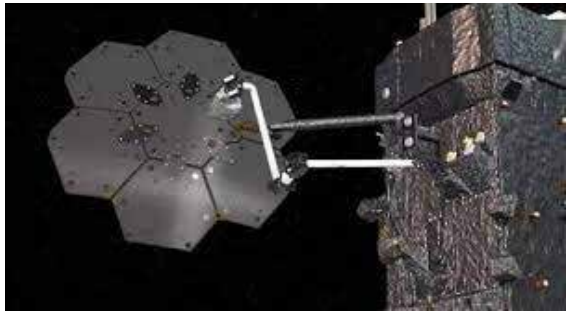
COMMERCIAL SPACEFLIGHT FEDERATION

The private space sector is enabling great science in Suborbital

COMMERCIAL SPACEFLIGHT FEDERATION

The private space sector is enabling great science in LEO





2011 Report: lack of funds and access

The scientific community engaged in space exploration research has dwindled in the past decade as a result of marked reductions in budget funding levels, from approximately $500 million shared equally between life and physical sciences in 2002 to the 2010 level of less than $200 million, with most of the latter going to the Human Research Program and only $47 million going to International Space Station (ISS) life and physical sciences research. There has been a corresponding reduction in the ISS research portfolio, from 966 investigations in 2002 to 285 in 2008.[2] NASA has acknowledged the decline in research activity but had also projected that the decline would be temporary. For example, in describing the run-up to full ISS utilization, the authors of a 2000 NASA report wrote:

> The high level of space life sciences research activity seen in the 1991-1995 period continued through 1996 and then began to taper off. This decline in the number of life sciences payloads is attributable to several factors: the close out of the Cosmos/Bion program in 1997, the end of the planned NASA/Mir collaboration in 1998, the retirement of Spacelab, and the requirement for Space Shuttle flights to conduct assembly of the International Space Station (ISS) beginning in late 1998. Flight experimentation should again pick up as ISS assembly reaches completion in the first few years of the twenty-first century.[3]

2011 Report: vision, dedication…but, still need regular, reliable, and low-cost access

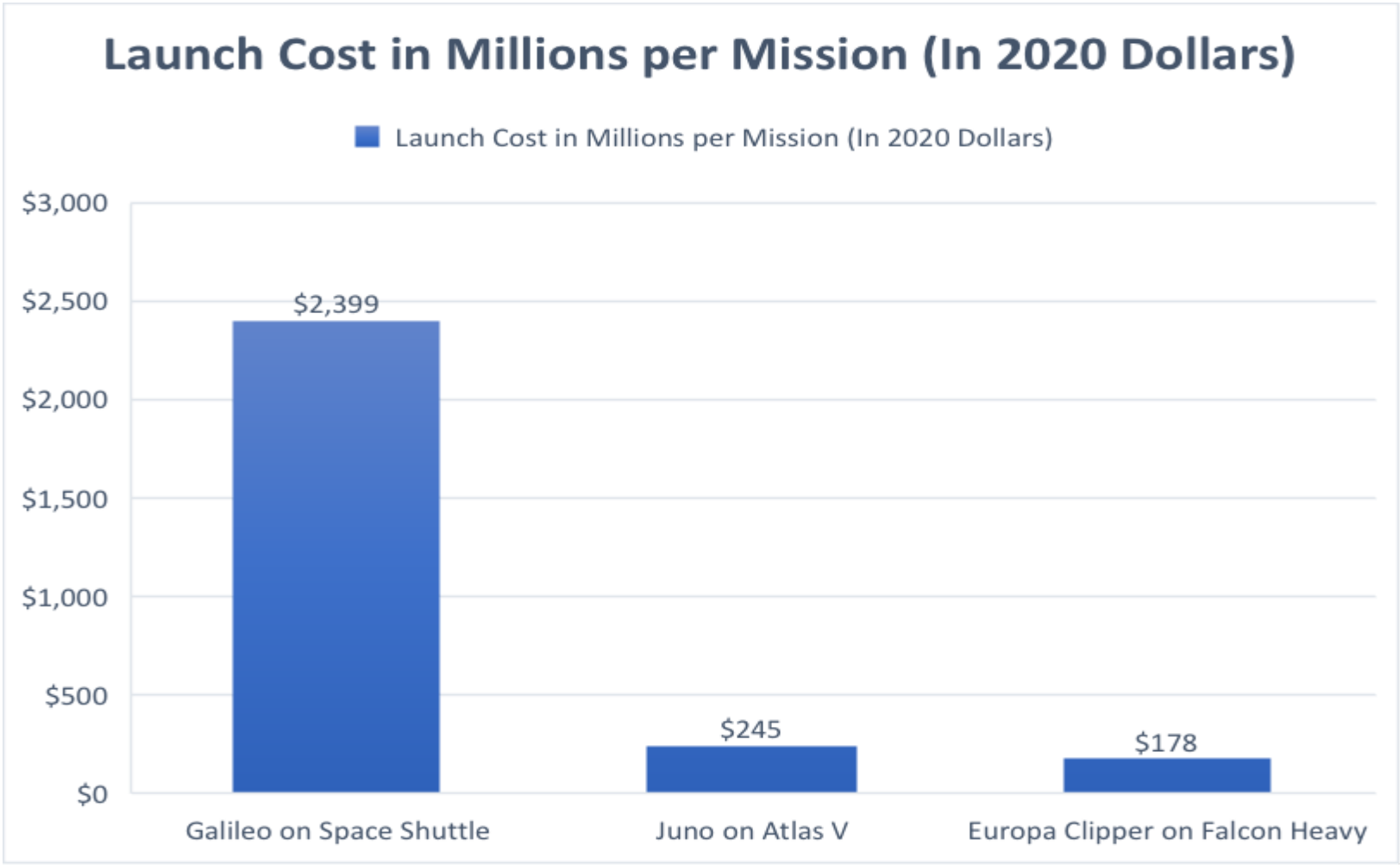
It is now time for NASA to return to a high level of programmatic vision and dedication to life and physical sciences research, to ensure that the considerable obstacles to long-duration human exploration missions in space can be resolved. As has always been the case, achievement of these goals will depend on a steady input of

Industry can help drive innovation and help lower costs = increased opportunities for more science

Ten years ago, the number of spacefaring entities was relatively small, limited mainly to government space agencies with budgets capable of supporting the development of complex technology, spacecraft, and launch vehicles. However, the advent of the commercial launch industry and miniaturized satellites have significantly decreased the costs of owning and launching spacecraft over the last 10 years, enabling more countries and even commercial entities to develop, own, and launch space-based assets. For example, the cost of a trip to LEO on NASA's now-retired Space Shuttle was about $25,000 per pound; the cost of that same trip today with commercial companies costs as little as $1,250 per pound. Currently, more than 500 entities—including small government agencies, nonprofits, students, and commercial companies—have assets in space. This rapid increase of space activity has simultaneously accelerated the creation of orbital debris.

Multiple studies by NASA and other space agencies have found that orbital debris has already reached critical mass, and collisional cascading will eventually happen even if no more objects are launched into orbit. According to NASA, by 2005 the amount and mass of debris in LEO had grown to the point that

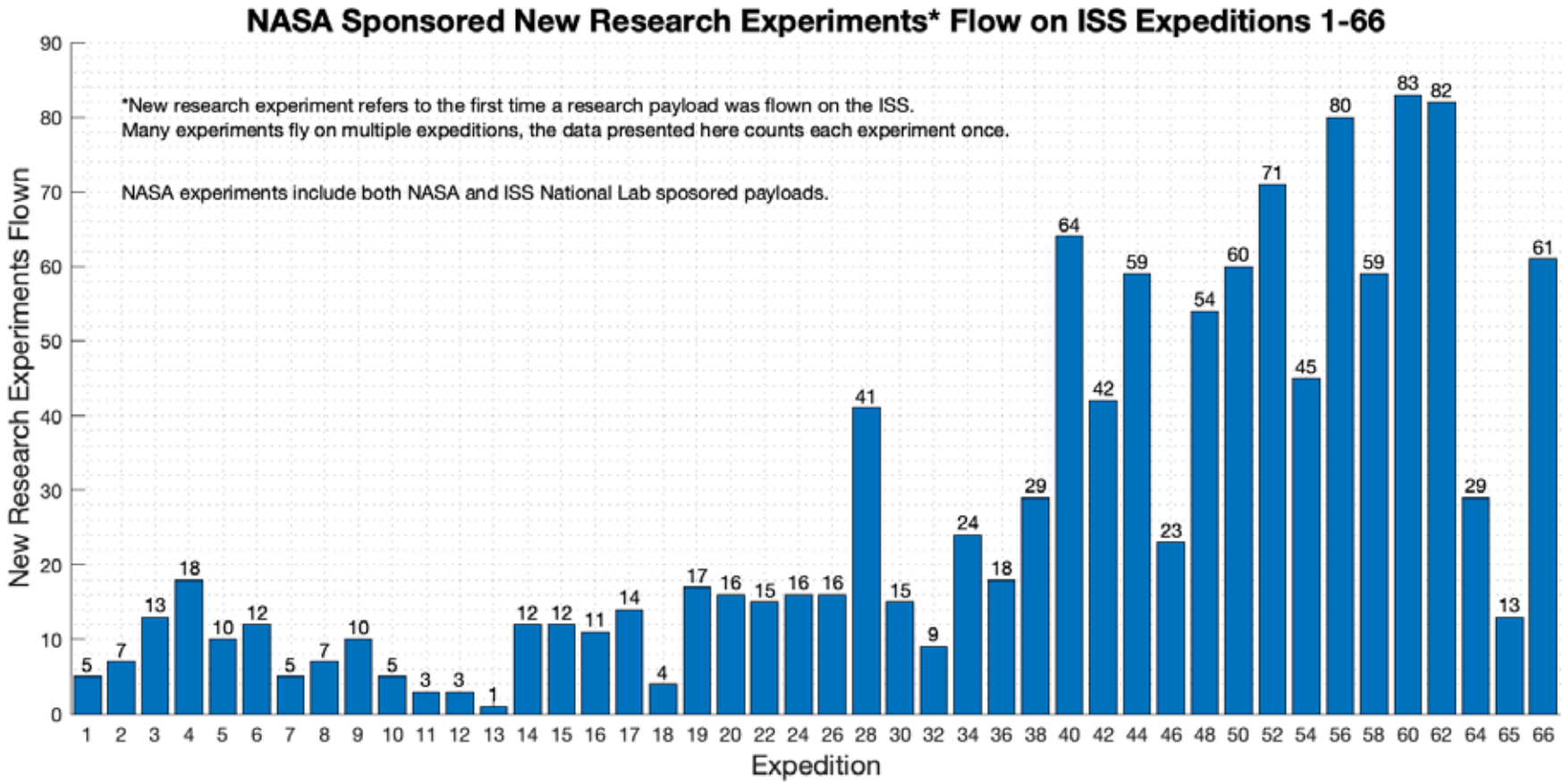
Industry can help drive innovation and help lower costs = increased opportunities for more science



Industry can help drive innovation and help lower costs = increased opportunities for more science

"One reason this is so gut-wrenchingly painful," said Harold Masursky, a geologist at the U.S. Geological Survey in Flagstaff, Ariz., who has worked on space missions for 20 years, "is that the increase in the cost from the delays, overall, would have bought us another whole mission of equal complexity," to Saturn.

Industry can help drive innovation and help lower costs = increased opportunities for more science



Questions from the BPS Committee

- How the private space sector views the Decadal?
- How private space sector used the last Decadal?
- How private space sector are likely to use this Decadal?
- What are the issues that this decadal will tackle that have special relevance to the private space industry, and are there industry resources/data/tools that might be useful to the decadal committees?

In General

- At a time when a growing number of U.S. commercial space companies are providing cost-effective and frequent access to space for civil, commercial, and national security payloads, it is critical that NASA fully utilize these game-changing capabilities to meet its scientific mission needs.
- The Decadal has an enormous influence on NASA and the future.
- If NASA is to fully utilize the game-changing capabilities to meet its scientific mission needs, it’s important for the Decadal to be informed and supportive, and for commercial to be the same.

How can we continue to improve?
More of this. Increase Communication, Empathy, Understanding, & Recognition of our shared goals.

Thank you!

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