

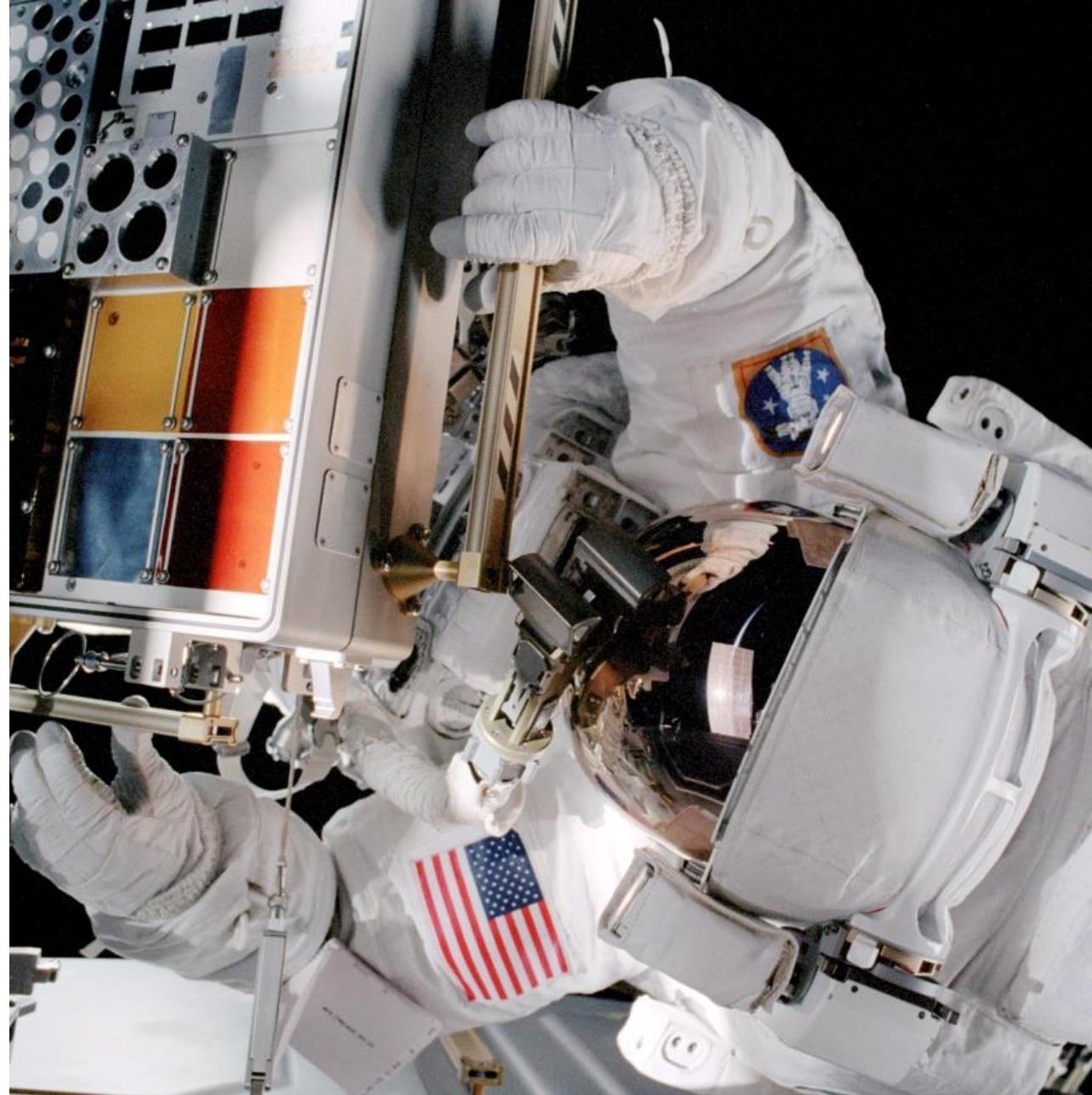


ISS NATIONAL LABORATORY

ISS National Lab User Advisory Committee 2024 Annual Planning Meeting

March 11, 2024

Welcome



2024 UAC Planning Meeting Agenda

1:00 pm Welcome, Agenda Overview – Ray Lugo/Mark Ruether

1:05 pm UAC 2024 membership, leadership – Doug Matson

1:15 pm ISS National Lab updates:

- 1:15 pm CASIS Annual Report, Organizational Update, Strategic Planning efforts – Ray Lugo
- 1:25 pm Budget/Legislative Updates – Laurie Provin
- 1:35 pm ISS flight opportunities update – Robbie Hampton
- 1:45 pm Solicitation calendar – Christy Schwerer
- 1:50 pm ISS Facilities Dashboard – Phil Irace

2:00 pm Best practices for building consensus – Margret Jenny

2:20 pm UAC expectations for 2024 – Mark Ruether

- 2:20 pm Charter update
- 2:25 pm More specific tasks/projects to improve utility of the ISS National Lab
- 2:40 pm Calendar of events

2:50 pm Adjourn



2024 – 2026
UAC Leadership and
Membership

Dr. Doug Matson, UAC Chair



UAC and Subcommittees

UAC Chair: Doug Matson, Tufts University

As of: 3/5/24

G Government

U University

I Industry

N Non-profit/NGO

Science Subcommittee

G Ronald Joslin
NSF
Chair

I Deidre Dalmas Wilk
GlaxoSmithKline

I Paul Reichert
Merck & Co

U Peter Lee
Brown University

Potential candidate pending

Potential candidate pending

Potential candidate pending

NASA Observer: Meg Everett
CASIS Observer: Mike Roberts

Applied R&D Subcommittee

I Nicole Wagner
LambdaVision
Chair

I Ioana Cozmuta
G-Space, Inc.

I Robert Garmise
Bristol Myers Squibb

N David Kusuma
World Design Org

I Christian Maender
Axiom Space

I Dmitry Starodubov
DSTAR Comms

NASA Observer: Kevin Engelbert
CASIS Observer: Sven Eenmaa

Tech Development Subcommittee

I ~~Heath Mills~~
~~Rhodium Scientific~~
Chair

I Henry Hanson
Adidas

I Brian Hess
RevBio

Potential candidate pending

Potential candidate pending

Potential candidate pending

NASA Observer: Christie Cox
CASIS Observer: Mounir Alafrangy

Educational Outreach Subcommittee

I Stephen White
COSI
Chair

U Cady Coleman
MIT Media Lab, ASU

I Ted Tagami
Magnitude io

I Danny Kim
Quest Institute

U Melissa Pore
STEM Educator

N Illana Raia
Etre Girls

N Teresa Drew
STEM Next Opp Fund

I Jayshree Seth
3M

NASA Observer: Jorge Sotomayor
CASIS Observer: Laurie Provin

Comm Svc. Provider Subcommittee

Mark Gittleman
Aegis Aero Inc
Chair

I Twyman Clements
Space Tango

I Stefanie Countryman
BioServe

I Christopher Allison
Sierra Space

I ~~Kris Kuehn~~ Bill Corley
Airbus DS Space Systems

I ~~Kevin Foley~~ Scott Copeland
Boeing

I Mary Murphy
Nanoracks

I Rich Boling
Redwire Space

I Liz Warren
Blue Origin

I Olivia Holzhaus
Rhodium

NASA Observer: Ryan Prouty
CASIS Observer: Laurie Provin

ISS National Lab Updates

ISS National Lab Team

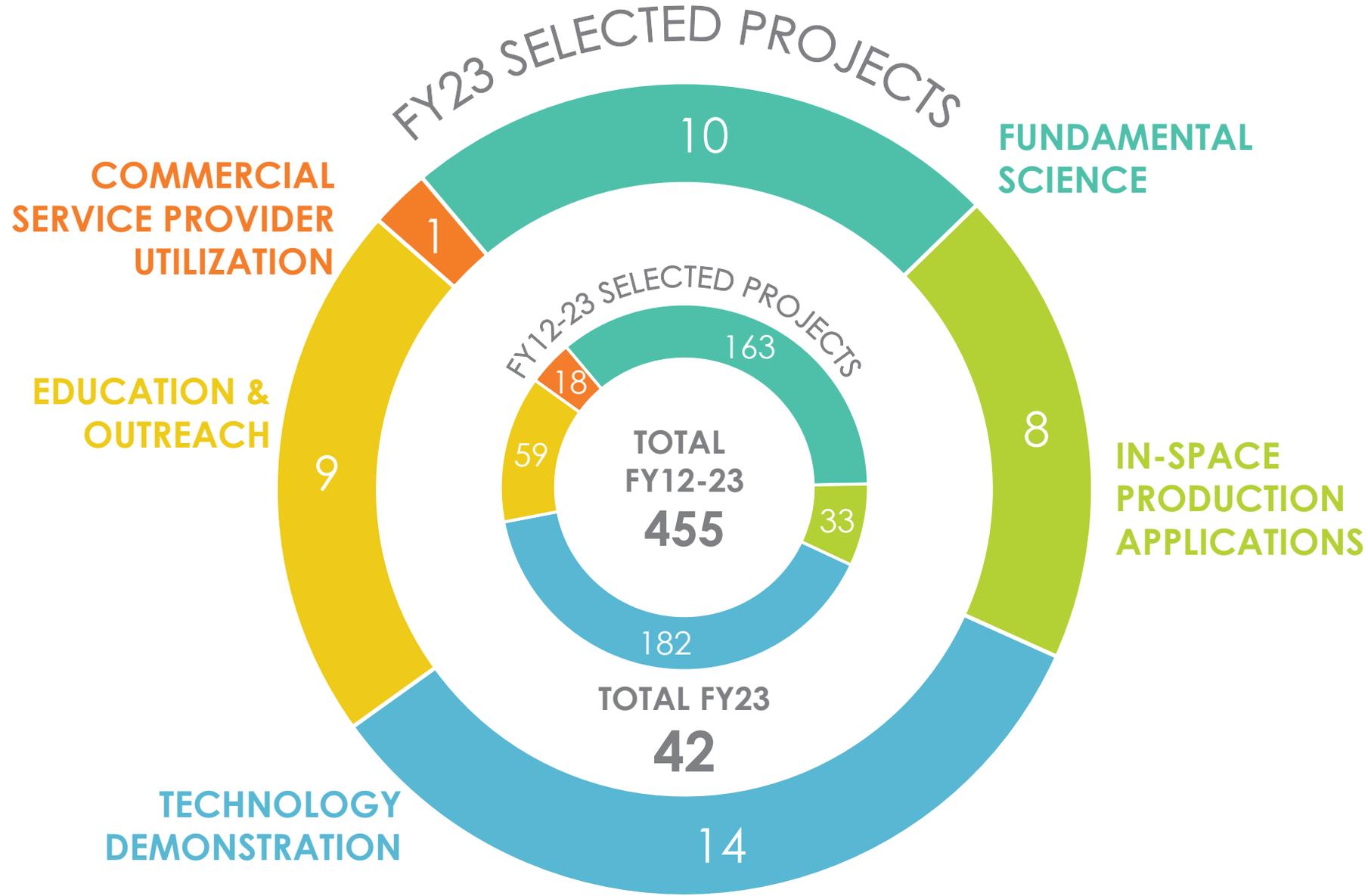


ISS National Lab 2023 Annual Report

Ray Lugo, CASIS CEO

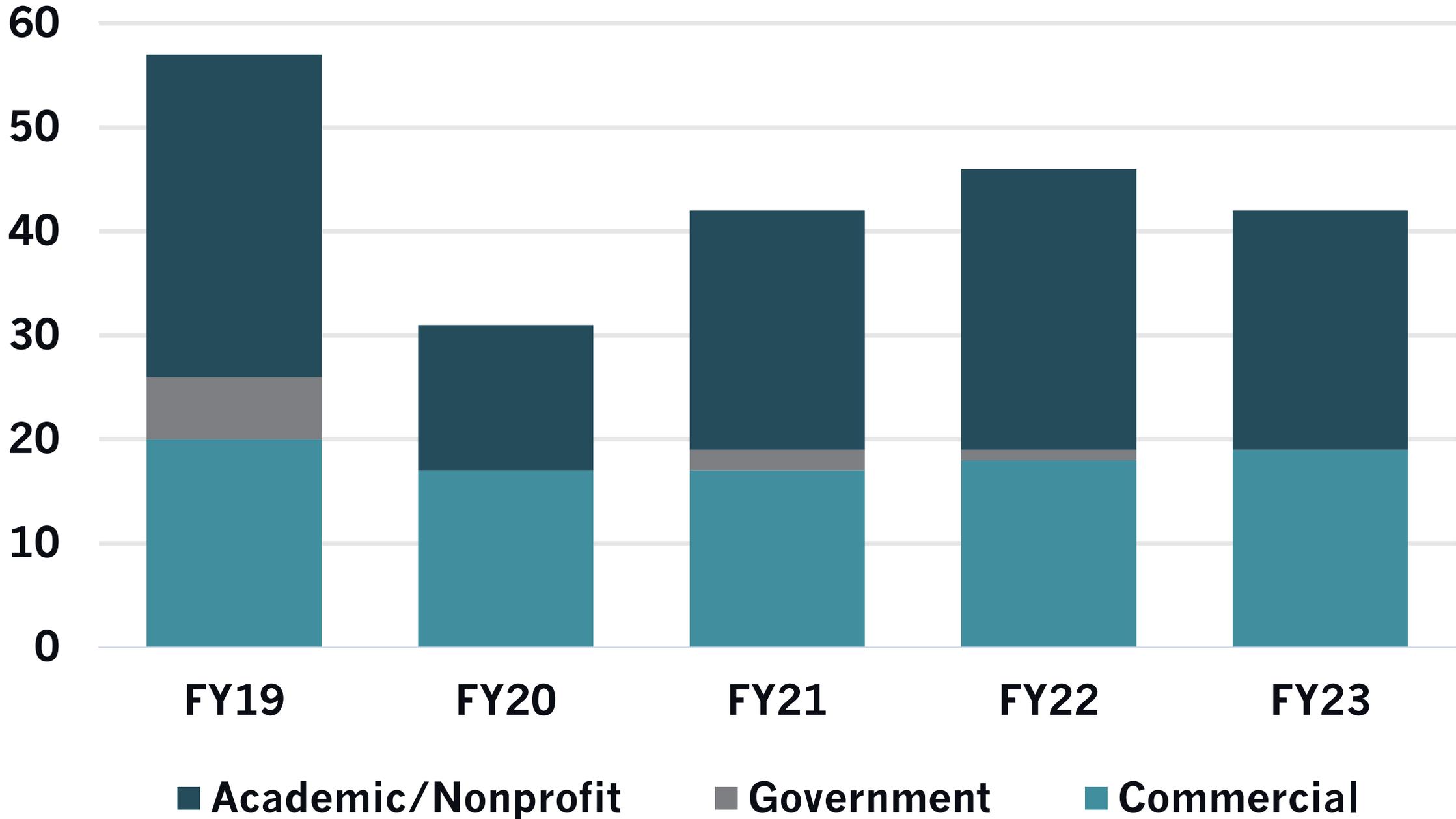


Projects Selected FY23-Selected and Total to Date

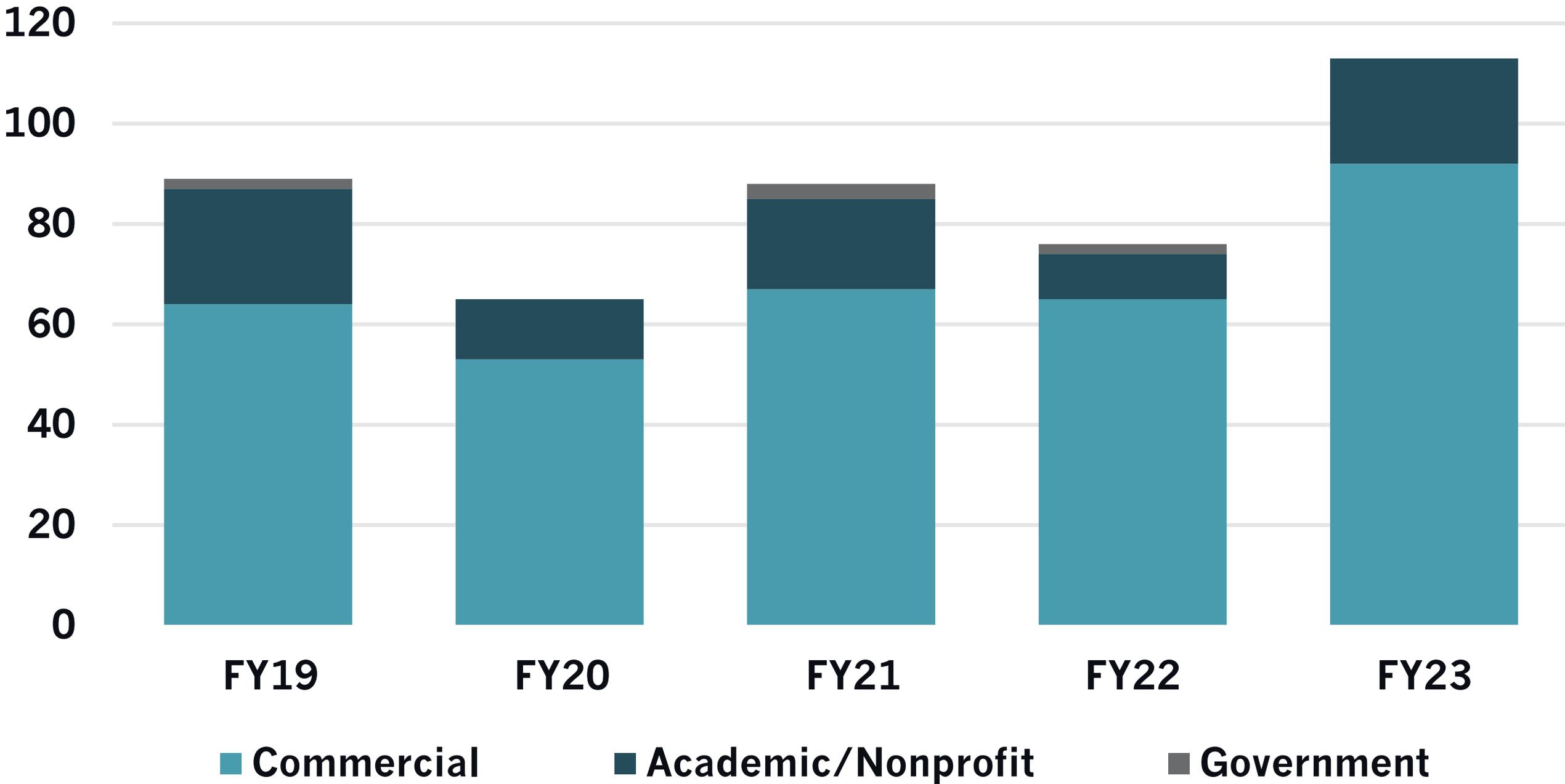


Note: This chart represents the ISS National Lab's strategic focus areas which were implemented in FY21. Projects selected before FY21 were re-categorized post-selection as accurately as possible using the new classification system.

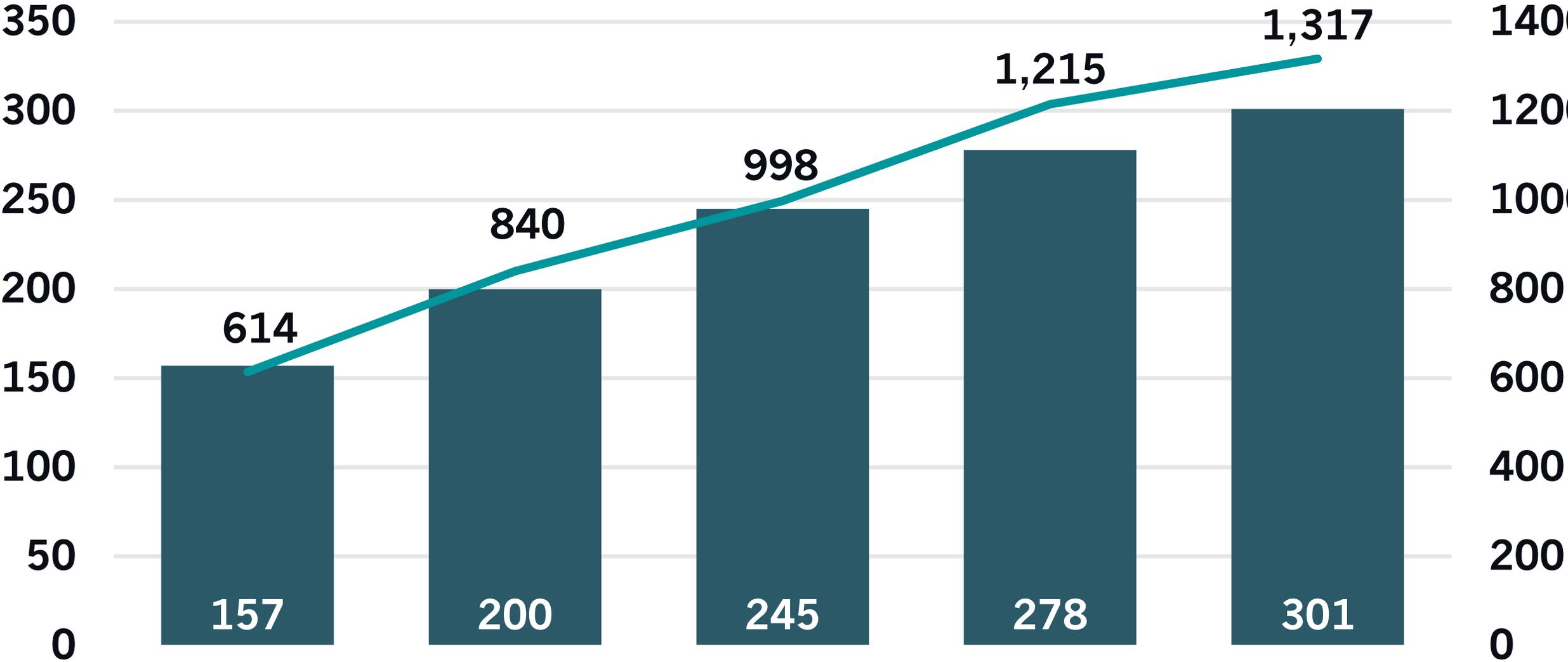
Five-Year Trend in Projects Selected



Five-Year Trend in Payloads Delivered

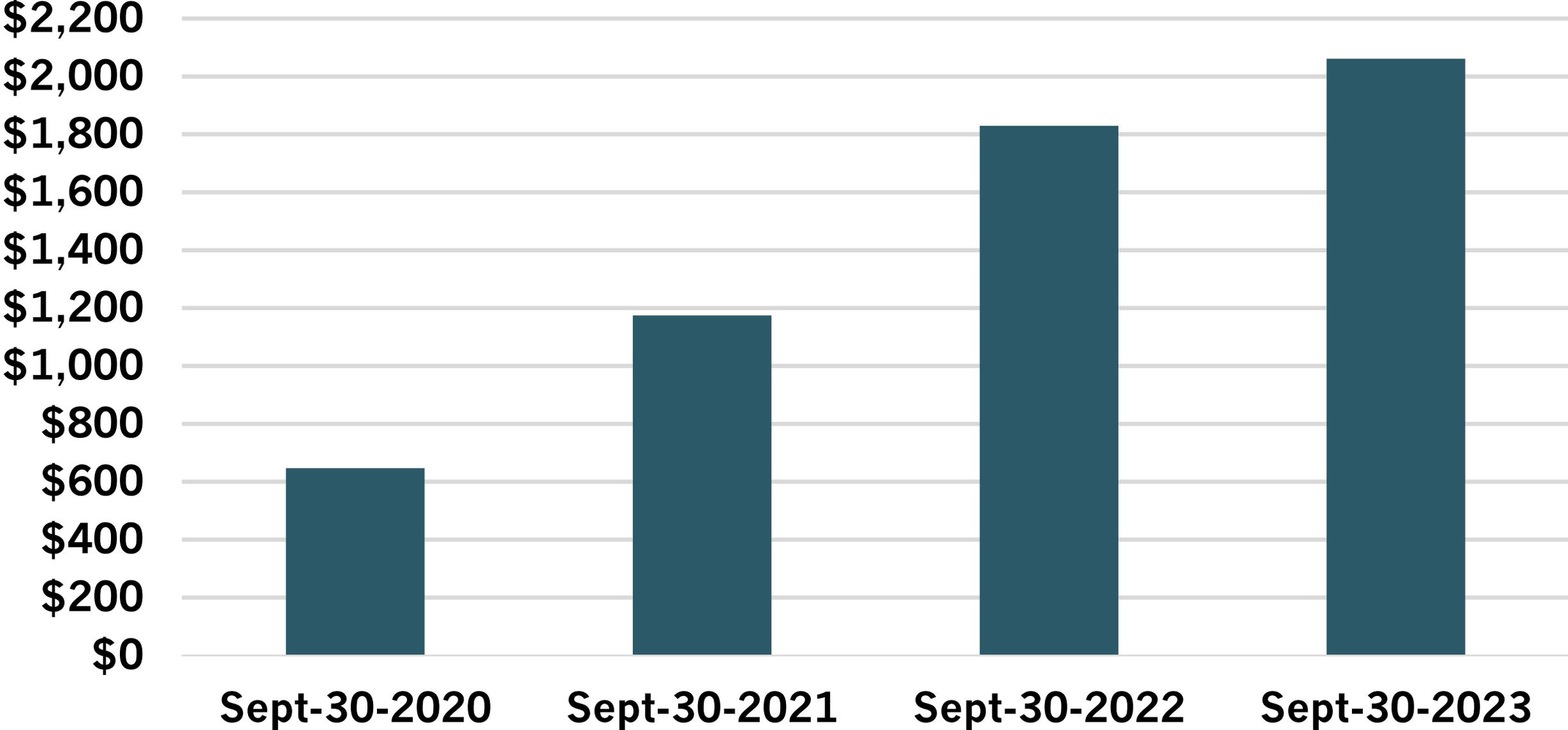


Five-Year Trends in Investor Network Activity



■ ISS National Lab Cumulative Investor Network — Cumulative Capital Introductions

Cumulative Funding Raised by Startups Post the ISS National Lab Flights (\$ millions)



CASIS Organization Update

Ray Lugo, CASIS CEO



Organizational Changes

- Dan Blaettler, Director of Portfolio and Business Processes Management to Director of Research and Innovation (Responsibilities include the Science, Portfolio, and Commercial Innovation teams)
- Dr. Ryan Reeves will serve as Deputy Director for Research and Innovation
- Dr. Mike Roberts, Chief Scientist, and Dr. Donna Roberts, Deputy Chief Scientist will remain direct reports to the CEO
- Laurie Provin, Director of Strategic Engagement to Director of Strategic Engagement and STEM
- Robbie Hampton, Director of Payload of Operations and ISS Program Office Liaison, will now oversee IT activities for the organization



CASIS Strategic Planning Efforts

Ray Lugo, CASIS CEO



What We Know to Date

What happens to the ISS National Laboratory?

NASA is expected to launch an LEO (inter)National laboratory initiative/solicitation

Will likely manage all of US Government's investments (rather than just NASA's).

Will expand the role currently being performed by CASIS

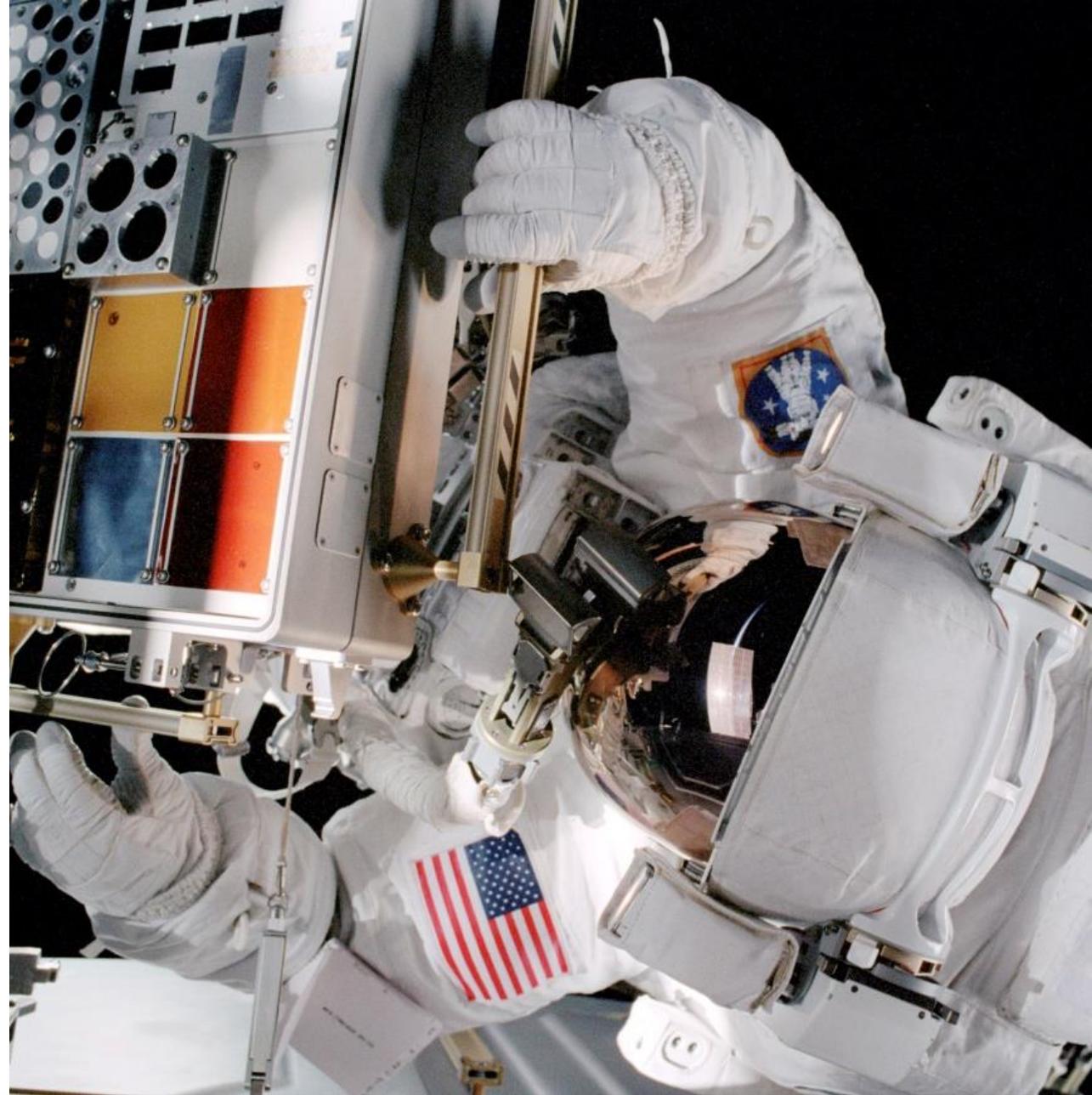
Focus on managing & prioritizing the US and other Government investments in LEO R&D

- **CASIS has an agreement in place to operate the ISS National Lab thru 2027**
 - Expecting extension to 2030
- **NASA submitted draft of Initial Assessment of Models for the Next Generation of Microgravity National Lab to National Space Council**
- **Current CLD environment continues to evolve**
 - Crewed and uncrewed platforms making progress
- **Two new vehicles slated for April 2024 launches (Starliner and Dream Chaser)**
 - But launch capacity remain a challenge



Budget and Legislative Updates

Laurie Provin, Director of Strategic Engagement and STEM



Who Knows?!

Budget:

- FY 24 Budget
 - provides NASA with \$24.875 billion for 2024, 8.5% below its original request and 2% lower, even before adjusting for inflation, from what NASA received in 2023
 - Cuts mostly to Mars Sample Return program
 - No money allocated for a de-orbit vehicle
- FY 25 budget being released today
 - Expected to raise taxes on billionaires and corporations and increase Defense spending (to some degree)
- ISS Program Office expects to have some level of decrease in funding - effects of which remain to be seen

Legislative

- Draft bills about future LEO R&D (including a LEO lab) have been circulating but not gathering much traction in their draft form
- It's an election year.



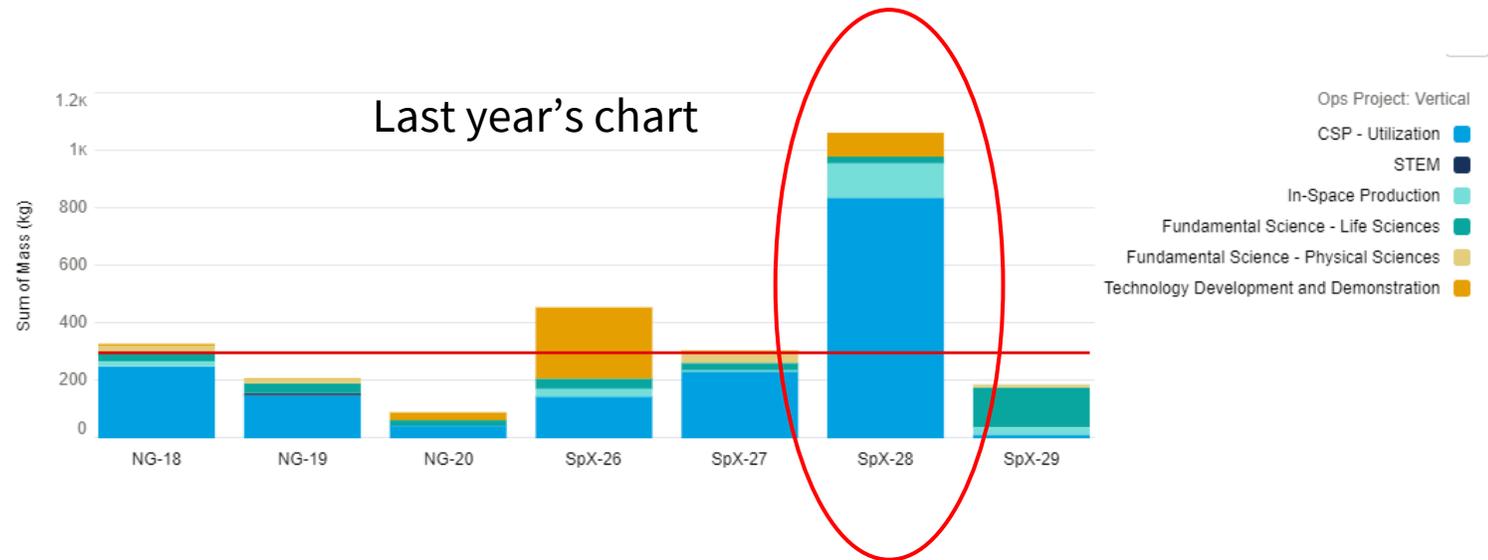
ISS Flight Opportunity Updates

Robbie Hampton, Director of Operations



2023 – A year in review

- Since we last met.....
- We've had four cargo flights to ISS:
 - SpX-27
 - 19 Payloads, 278 kg (~50%)
 - NG-19
 - 20 Payloads, 210 kg (~30%)
 - SpX-28
 - 8 Payloads, 51.5 kg (~50%)
 - SpX-29
 - 17 Payloads, 143 kg (~25%)



184 kg average
over the flights

19 Payloads deferred
from lack of resources

NG average upmass: 315 kg

SpX average upmass: 296 kg



Flight Program

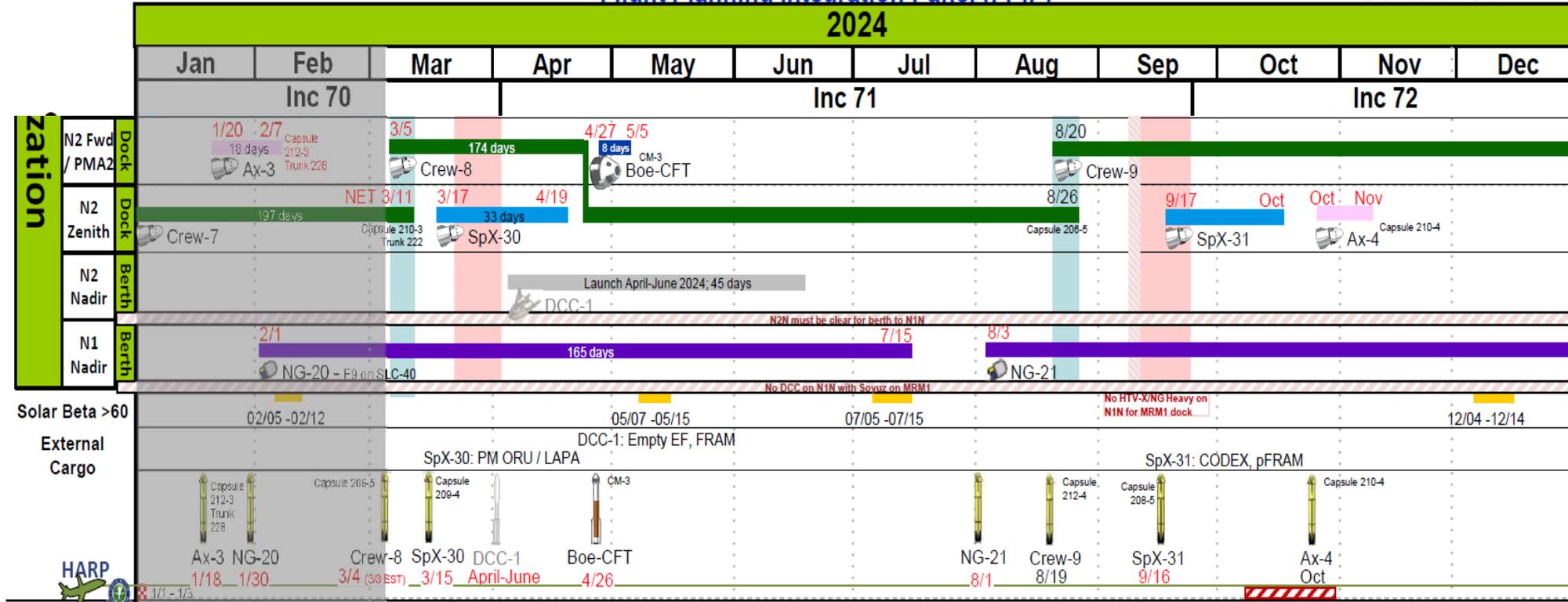
INTERNATIONAL SPACE STATION

Planning document (initial) through 2024

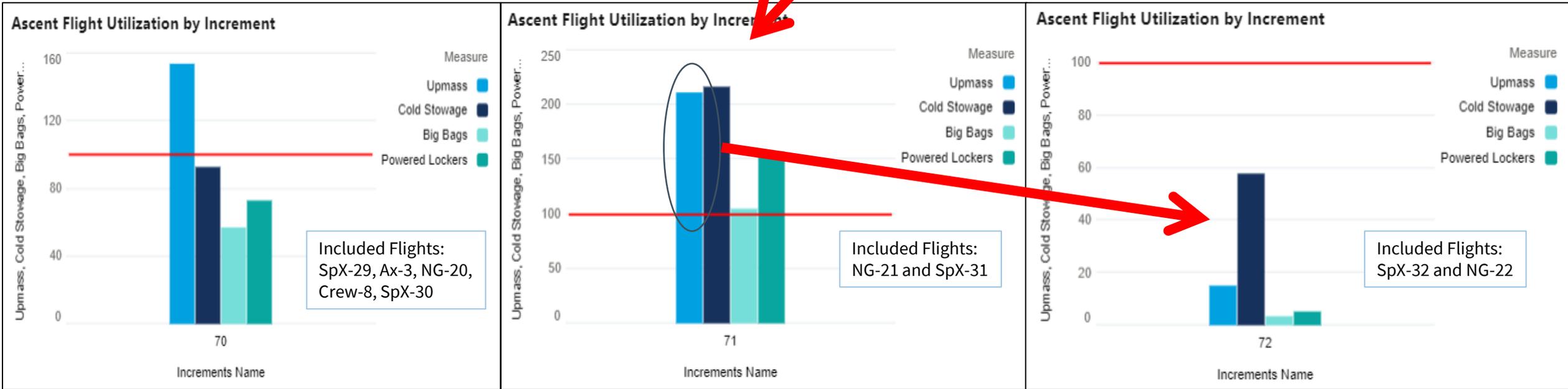
Chart Updated: March 4th, 2024

Flight Planning Integration Panel (FPIP)

Event dates in GMT



2024 Outlook



Take Aways:

- SpX-31 (Inc 71) is **FULL** for cold storage





Cold Stowage is consistently the most oversubscribed resource

When designing your experiment, consider these options to alleviate the challenges:

1. Minimize your cold stowage footprint to be more easily accommodated
2. Look for flexibility in your temperature ranges
3. Clearly communicate if/when you have ANY changes to dimensions and in a timely manner

Beyond

- Upmass and cold stowage resources expected to be scarce for the foreseeable future.
- Expect 4 cargo flights per year, 2 having return capability.
- We have been underrunning crew-time. With the cargo flights spread out as planned, we have crew-time between flights to take advantage of.
- Maintain schedules to avoid missing flight opportunities.

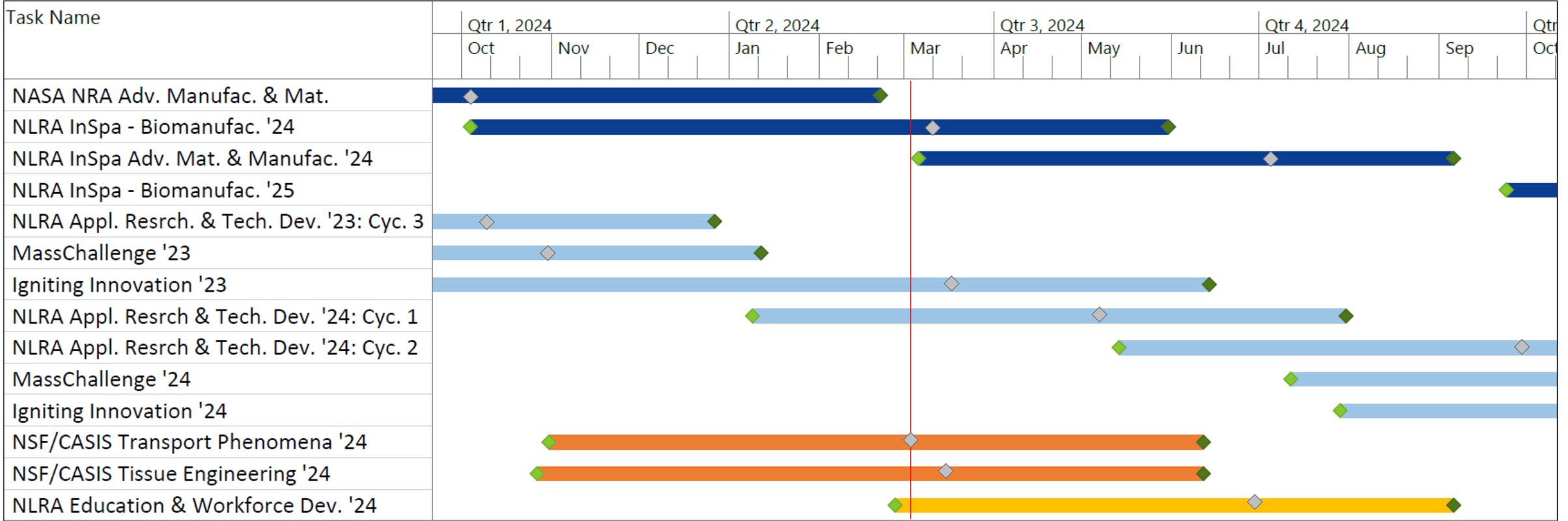


FY24 Solicitation Calendar

Christy Schwerer, Portfolio Management



FY24 Solicitation Overview - All



ISS Facilities Dashboard

Phil Irace, Research & Innovation





ISS NATIONAL LABORATORY

Facilities Dashboard Update

Phillip Irace, PhD | Science Program Director

Mounir Alafrangy | Commercial Innovation Manager

March 11, 2024

A photograph of a rocket launch at night. The rocket is positioned vertically in the center-left, with a bright, glowing fire trail extending upwards. A massive, billowing plume of white and orange smoke surrounds the base of the rocket, spreading across the lower half of the frame. The background is dark, making the light from the launch stand out.

ISS National Lab Mission:

We manage the premier space laboratory, providing expertise, connection and inspiration to visionaries.

Facilities Dashboard Motivation

- Need
 - “There is a need to reduce the challenges of PIs when working through the proposal process”
- Solution/Goal
 - Create an easy to navigate Facilities Dashboard where PIs can search for existing facilities that can meet their research needs and quickly identify the appropriate Implementation Partner (IP)
- Additional Benefits
 - An environment where IPs can advertise hardware/capabilities
 - Accurate facility availability information
 - An educational tool
 - Interconnectivity between lines of business and programs



Schedule & Progress

- Phase I – Facilities Dashboard Demo (*Complete*)
 - Presented at the 2023 ASGSR Meeting in DC on 11/15/23
- Phase II – NASA Multi-User Facilities (*In Progress, 2024 ISSRDC*)
 - NASA facilities that we have access to
- Phase III – Commercial Facilities (*Not Started, TBD*)
 - All IP-owned facilities that are available to PIs
- Phase IV – All ISS Facilities (*Not Started, TBD*)
 - Other NASA facilities
 - International facilities



Phase II – NASA Multi-User Facilities

- 33 facilities/sub-facilities
- Most data has been gathered, but needs a little polishing
- Testing the dashboard interface
- Hoping to integrate a new beta version into the new ISS National Lab website at the end of June



Cross-Cutting Tasks

- Improve readability/nomenclature
- Improve organization/structure
- Conduct survey to gather feedback



Searchability

- NASA Investigation Categories/Subcategories
 - Biology and Biotechnology
 - Earth and Space Science
 - Educational and Cultural Activities
 - Human Research
 - Multipurpose
 - Physical Science
 - Technology Development and Demonstration
- ISS National Lab Investigation Categories
 - Physical Sciences
 - Life Sciences
 - Remote Sensing
 - Technology Development
 - Education



Facilities Dashboard Preview



ISS NATIONAL LABORATORY
CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE



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Facilities Dashboard

▾ ▾ ▾

Advanced Combustion via Microgravity Experiments

The Advanced Combustion via Microgravity Experiments (ACME) project is a set of six independent studies of gaseous flames to be conducted in the Combustion Integrated Rack (CIR). ACME's primary and secondary goals are (1) improved fuel efficiency and reduced pollutant production in practical combustion on Earth, and (2) spacecraft fire prevention through innovative research focused on materials flammability.

[FACILITY DETAILS](#)



Facilities Dashboard Preview

[« Back to Facilities Dashboard](#)

Burning and Suppression of Solids

OPNOM: BASS

Level: 3

Subscription: Medium

Current Availability: Onboard

Burning and Suppression of Solids (BASS) examines the burning and extinction characteristics of a wide variety of fuel samples in microgravity. BASS will guide strategies for extinguishing accidental fires in microgravity. BASS results contribute to the combustion computational models used in the design of fire detection and suppression systems in microgravity and on Earth.

BASS utilizes slightly modified Smoke Point In Co-flow Experiment (SPICE) hardware within the Microgravity Science Glovebox (MSG) for observations of burning solid materials on board the ISS.

Many sample configurations can be used: flat, solid spheres, candles within tubes, etc. Concurrent-flow spread rate, limiting flame length, and other combustion characteristics can be measured using images. The cotton-fiberglass fabric blend Solid Inflammability Boundary at Low-Speeds (SIBAL) fuel has been used. Other materials that have been burned include Nomex, Ultem, Polymethylmethacrylate (PMMA), and wax-saturated fiberglass fabric. For some of these tests, the nitrogen suppressant system is engaged at a gradually increasing level until extinction is reached.

The important experimental observations from BASS with respect to the burning process include flame shape and appearance as a function of flow speed, flame spread rate (how fast the flame develops), and flame dynamics (pulsations, oscillations, etc.). With respect to extinction, the critical observations and data are the time to extinction as a function of fuel geometry, the nitrogen flow rate, and the flame distance from the nozzle.



Parent Facility: MSG

Child Facility:

Module Location: N/A

Location Data Source: N/A

Facility Manager: Michael Johnston, NASA Glenn Research Center, Cleveland;
Manager Email: michael.c.johnston@nasa.gov

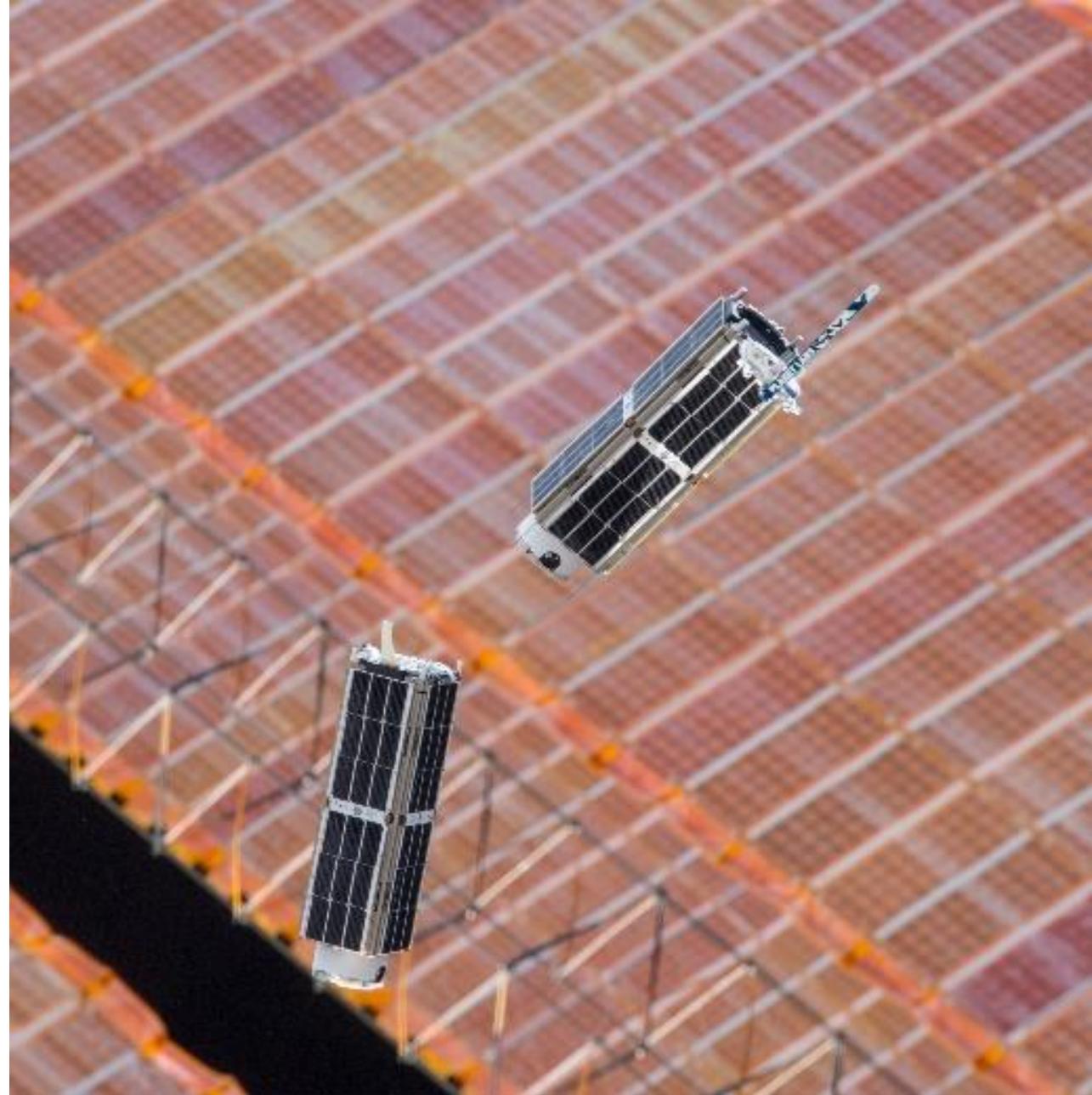
Operator: [ZIN Technologies](#)

Developers: NASA Glenn Research Center,
Cleveland, OH, United States;



Best Practices for Building Consensus

Margaret Jenny, CASIS Board Member and
Past President, RTCA



Developing Consensus Among Diverse Stakeholders: Aviation Example

Margaret Jenny
(Member of CASIS Board of Directors)
March 11, 2024

RTCA

- A Standards Development Organization that works with the Federal Aviation Administration to develop comprehensive, industry-vetted and endorsed standards that can be used as means of compliance with FAA regulations.
- A venue to develop consensus-based recommendations on policy and investments to facilitate modernization of the US air transportation system

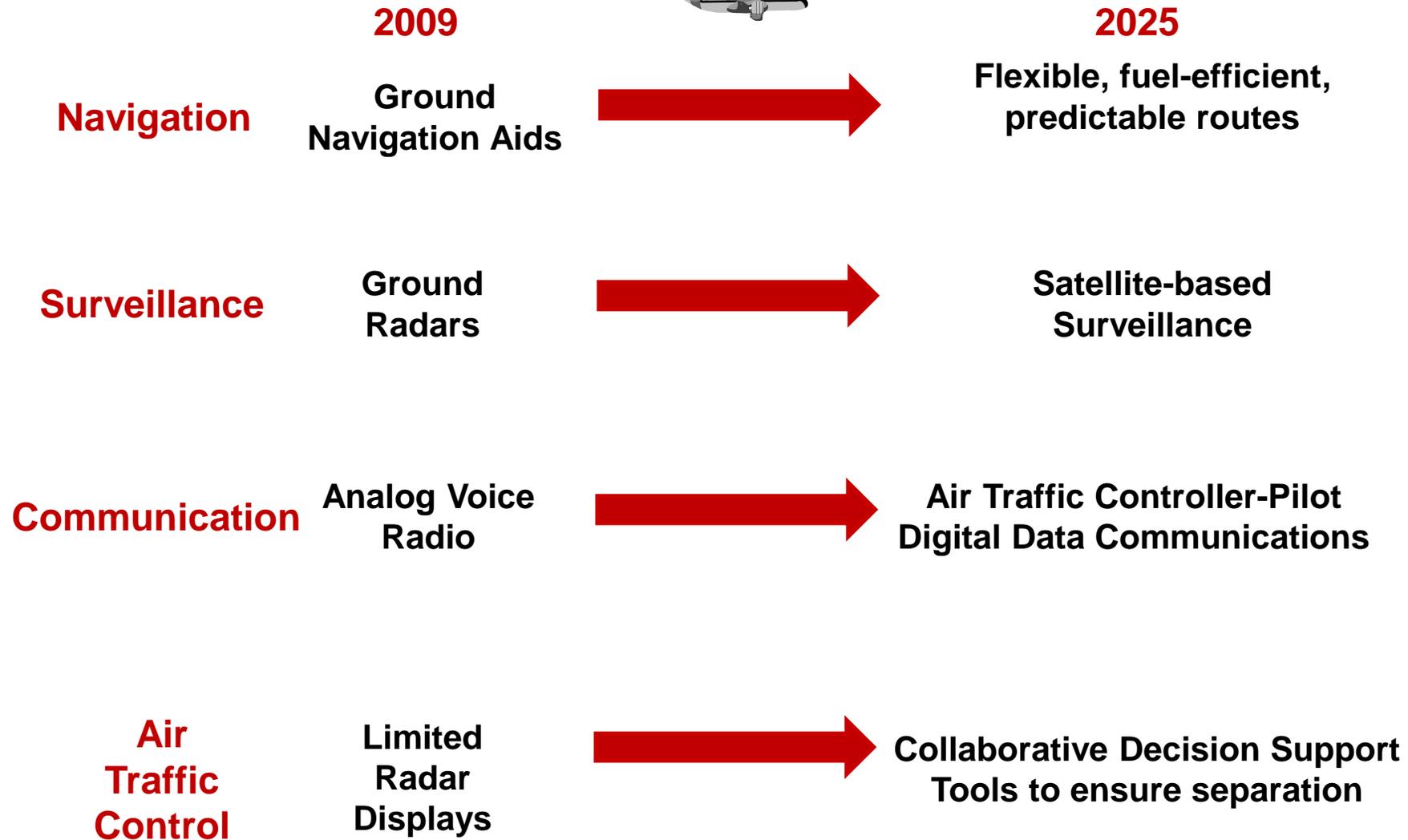
Overview

- FAA needed to modernize aging airspace system on limited budget
- Published vision for 2025 – but needed a roadmap
- Success would require major investments from stakeholders
- Success would require trust in FAA's ability to deliver
- Established advisory committee to propose implementation plan
 - ***Prioritized list of operational capabilities to deploy***
 - Business case
 - Coordinated implementation strategies
- Committee developed consensus on top 28 priorities

Similarities between ISS and Aviation

- Limited budget
- Diverse, sometimes competing interests
- Aim: positive financial, commercial, societal outcomes
- Substantial investments required
- Trust between government and industry needed
- Utilizing shared, limited resources
- Demand exceeds capacity
- Need to prioritize to maximize limited resources

Modernizing the Air Transportation System



How did 300 People Reach Consensus?

Advisory Task Force

**350 people from
140 organizations
identified over
120 capabilities
through a consensus process
reduced to
28 capabilities at
specific locations & dates
and produced a report
In 7 months**

- Everyone was listened to
- All ideas documented
- Agreed on selection criteria FIRST
- Assessed relative value of all capabilities
- Expert opinion considered as necessary
- Not everyone got everything they wanted
- Open to dissenting opinions

FAA adopted committee recommendations as their modernization plan

Evaluated Benefits of Candidates

(High, Medium, Low)

Stakeholder Benefits	Implementation Readiness	Implementation Risk
Increase Capacity	Concepts and Standards Maturity	Policy & Institutional
Increase Efficiency	Policy Maturity	Global Harmonization
Increase Predictability	Workforce Training & Procedures	Complexity
Increase Productivity – Pilots & Controllers	ANSP and Gov't Systems	Safety and Security Risks
Protect Environment	Flight Operator Systems	
Decrease Passenger Delay	Safety Assessment	
Ensure Access and Equity	Security Assessment	
Optimize Resource Utilization	Regulatory Approvals	
Increase Operator Flexibility	Safety Analysis	
Ensure Security		



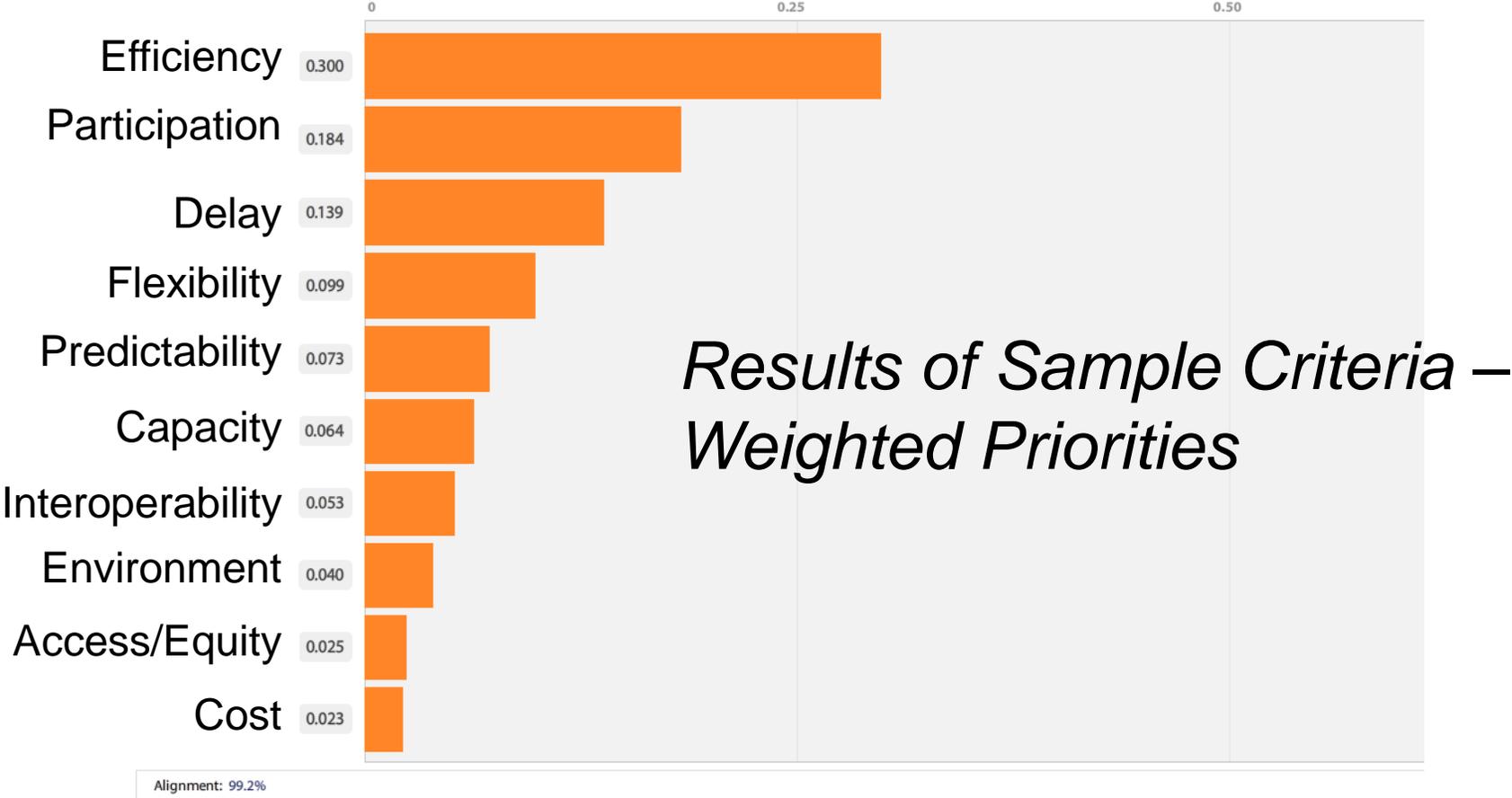
Considered Risks

Challenges to Delivering Outcomes

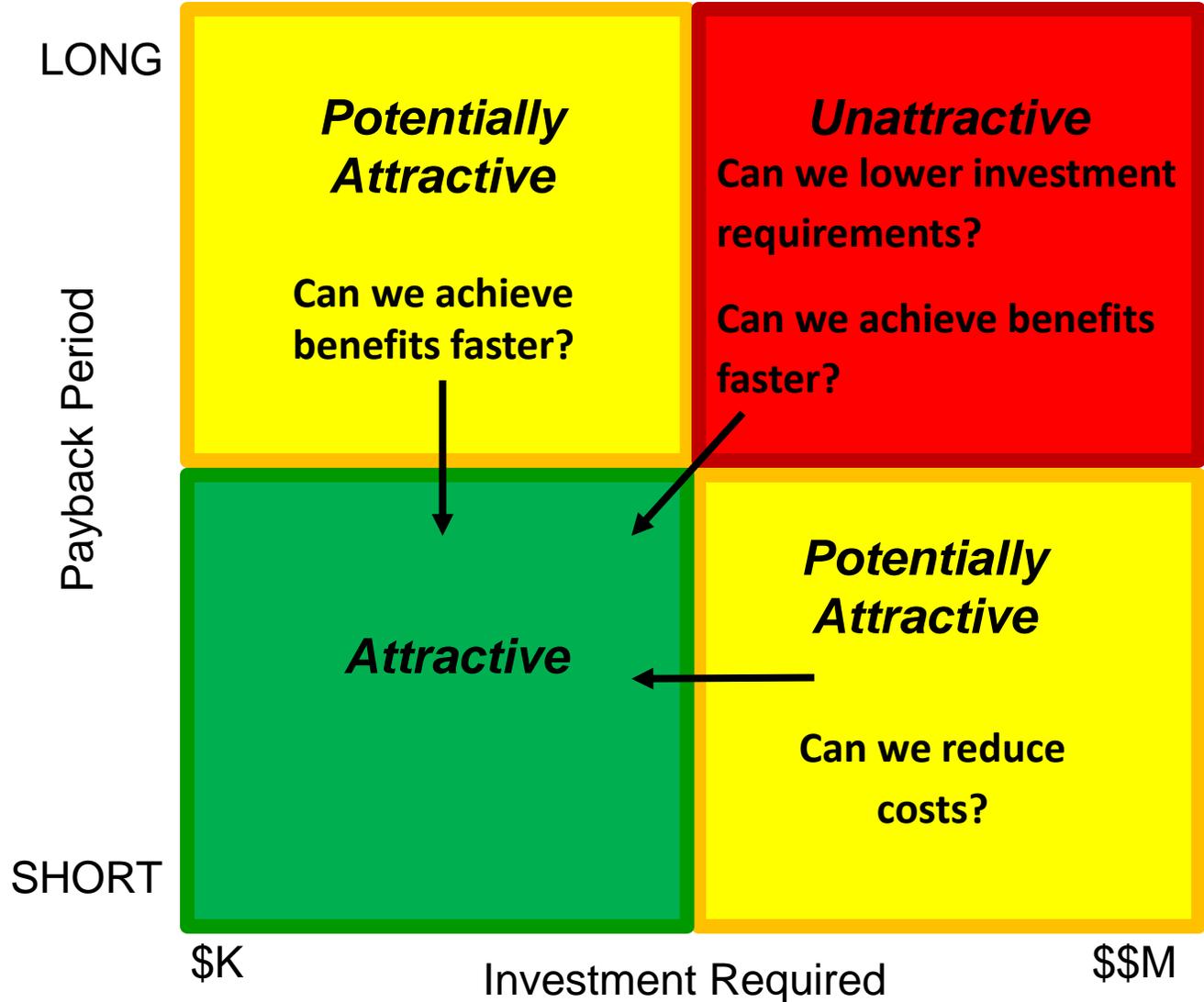
- Change in Roles of Pilot, Controller, Dispatcher
- Technology/Equipage Required
- Technology/Equipage Available
- Decision Support Tools Required
- Policy Changes Needed
- Implementation Bandwidth Issues
- Airspace Changes Required
- Standards Required
- Ops Approval Required
- Certification Required
- Political Risk
- Training Required

Established Priorities

Priorities with respect to Air Traffic Management implementation:



Determined Potential ROI



Getting from 122 to 28 capabilities

Ops Capability	Detailed Description	Evaluation Factors																						
		<i>Benefits</i>					<i>Risks</i>					<i>Costs</i>												
1																								
...																								
122																								

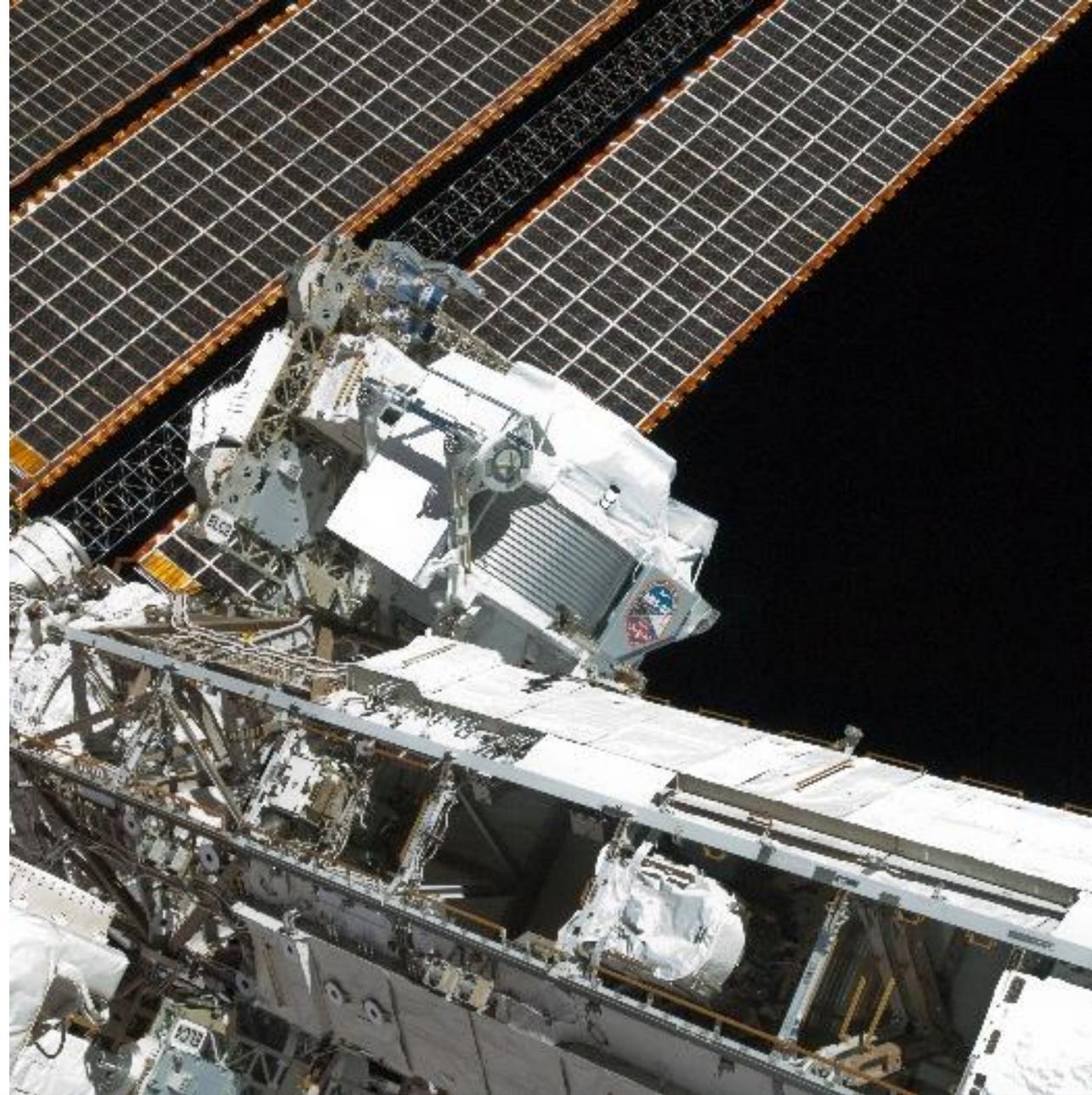


TF Guidelines – each proposed capability:

- Must define Where, What, When
- Must have financially committed user
- Must have positive business case

UAC Expectations for 2024

Mark Ruether, UAC Liaison



UAC Charter Content

- **Purpose:** Organized framework and forum for interaction between CASIS and ISS user community.
- **Function:** Advisory body to the CASIS CEO on:
 - Research project prioritization and selection processes
 - Research goals of the user community
 - Resolution of user community issues and improvements to the user experience
 - Recommended functionality and utility enhancements to the ISS National Lab
- **Structure and membership:**
 - Five subcommittees
 - Members must be participants in the mission of the ISS National Lab
 - Two-year terms



UAC Charter updates

- New background section: Brief history of ISS National Lab and CASIS
- Task assignments added as a function
- Members expected to represent the interests of the broader science, technology and development communities
- Clarified membership terms and conditions
- Additional document configuration control measures



Specific task assignments to improve utility of ISS National Lab

Examples of potential questions/task assignments:

- “What process should the UAC use to gain consensus on recommendations to CASIS?”
- “What are the most important things CASIS should accomplish?”
- “What processes and resources could be enhanced, eliminated, modified as we navigate through the transition?”
- “What capabilities are most important in a future LEO lab?”
- “What standardization in CLD labs would be most beneficial to science, research and technology users?”
- “What other questions would be in the best interests of the current ISS user community to have answered in preparation for the design and utility of future space labs?”
- “What other issues do you face that CASIS could help resolve?”



2024 UAC Calendar

UAC Public meetings

July 30-August 1

ISSRDC

Boston

December 3-7

ASGSR

Puerto Rico

UAC Core Committee

Quarterly (March 11, June, September, December?)

Subcommittees (Encouraged to meet at least quarterly)

Education: bi-weekly (February 29, etc)

Applied R&D:

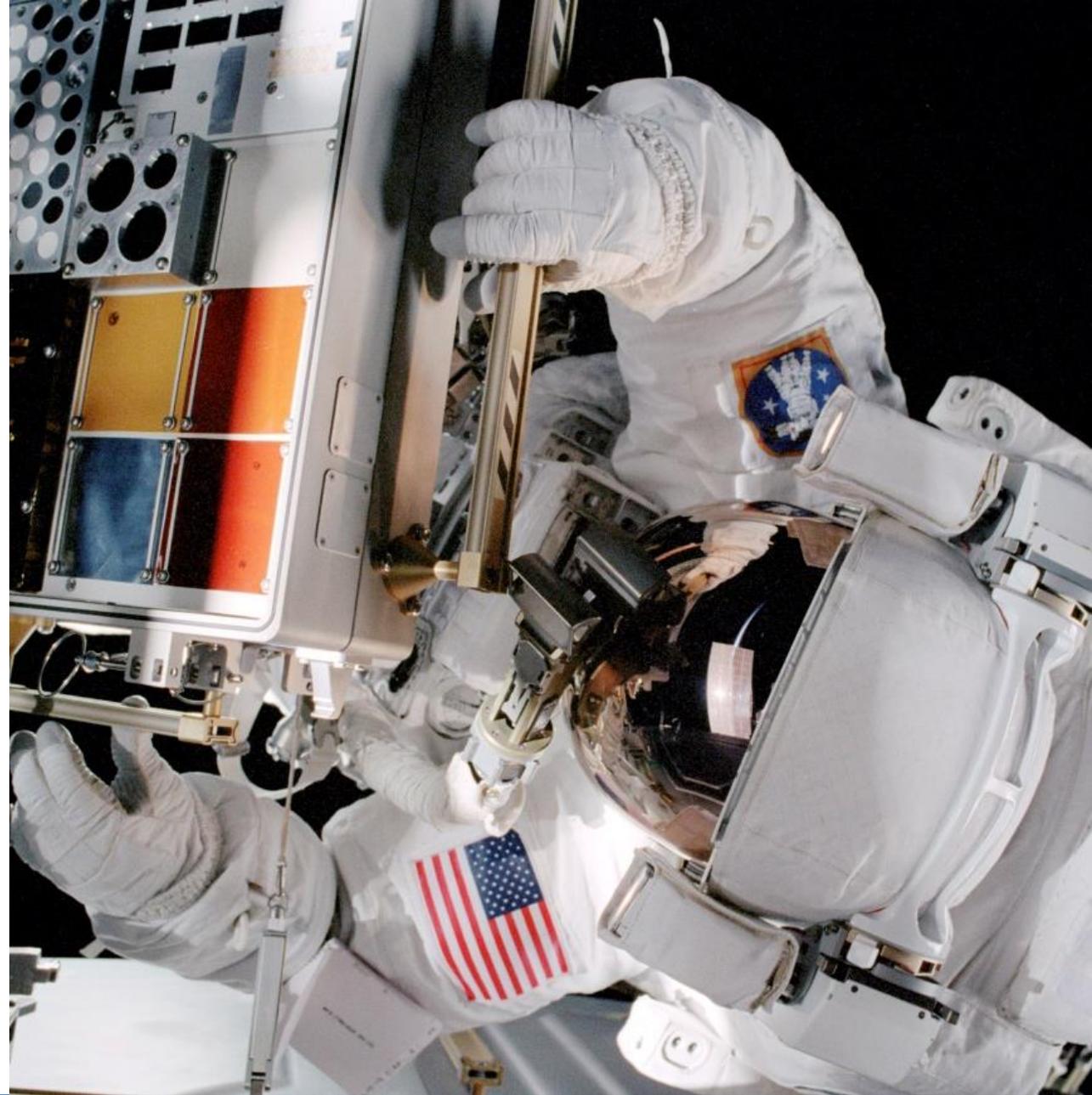
Science:

Tech Dev:

CSP: March 26, TBD



Thank You!





THANK YOU

Discover the unique advantages of research in microgravity with the ISS National Lab.



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