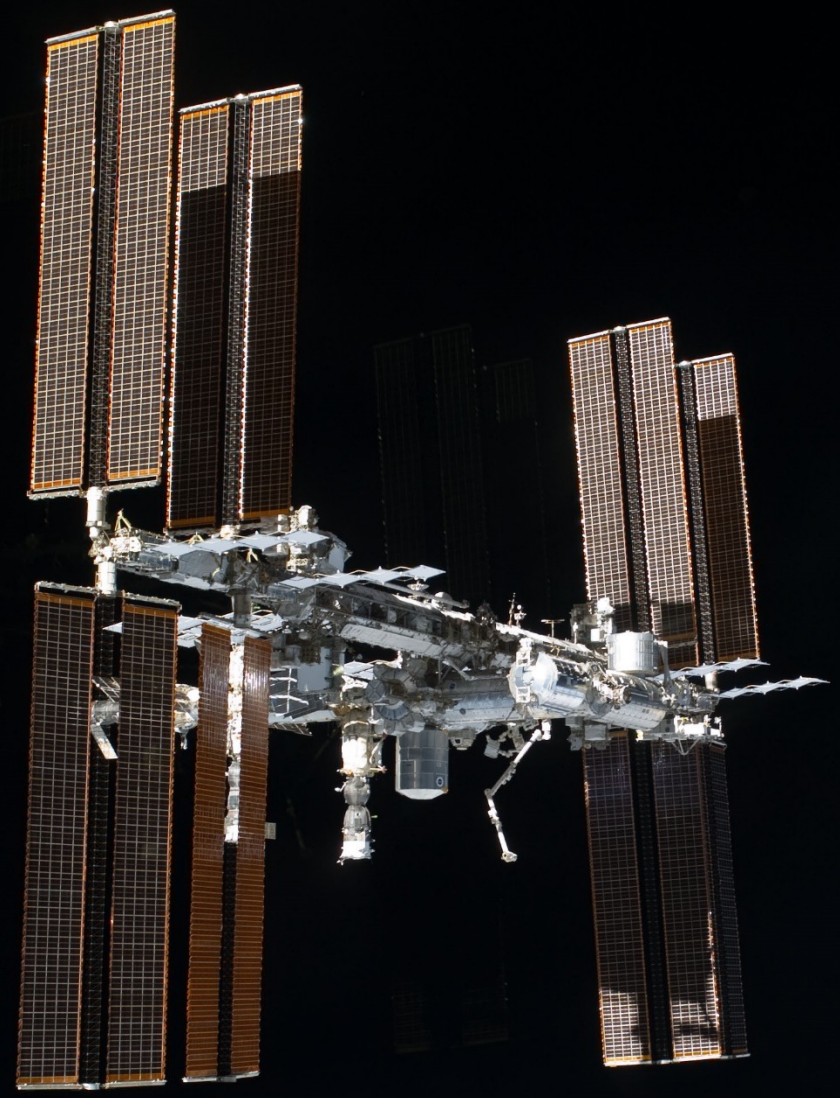


ISS
U.S. NATIONAL LABORATORY

ISS NATIONAL LAB UAC MEETING

CASIS STAFF

6/24/2022

AGENDA

- Resource Utilization Planning System (RUPS) Overview
- Historic, Current, and Future Utilization
- CSP Minimum Allocation Policy
- UAC Charter Update

GAO RECOMMENDATIONS

1. The NASA Administrator should ensure the CEO of CASIS obtains input from the UAC regarding ISS National Lab resource allocation decisions.

2. The NASA Administrator should ensure the CEO of CASIS works with the UAC to agree upon the types of data and information on past resource allocations that the UAC needs to support CASIS.

3. The NASA Administrator should ensure the CEO of CASIS provides ISS National Lab users visibility into the entirety of CASIS's planned resource allocations, including the flight queue.

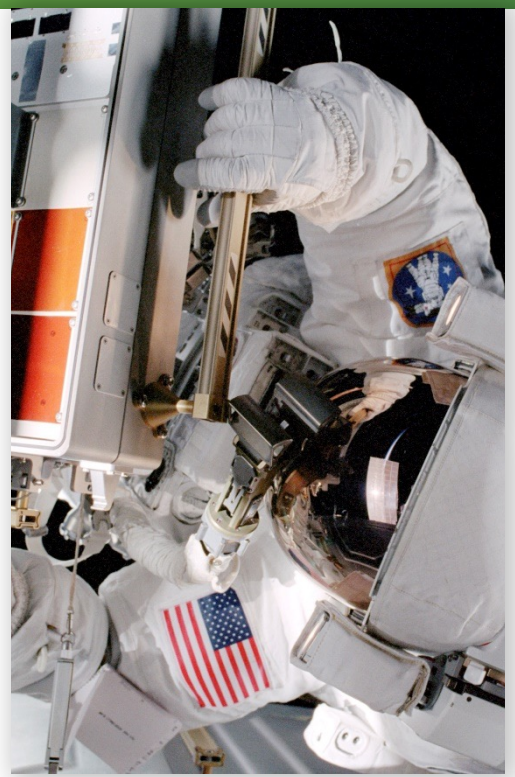
4. The NASA Administrator should ensure the CEO of CASIS establishes a timeframe for finalizing a succession plan for the UAC that allows current and new members' terms to overlap.

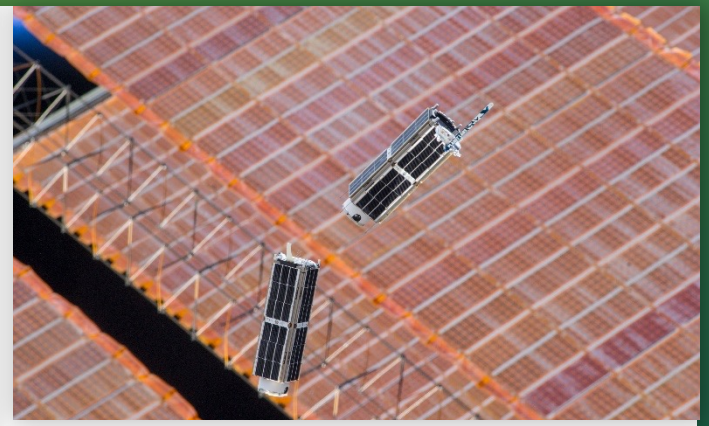
RESOURCE UTILIZATION PLANNING SYSTEM (RUPS)

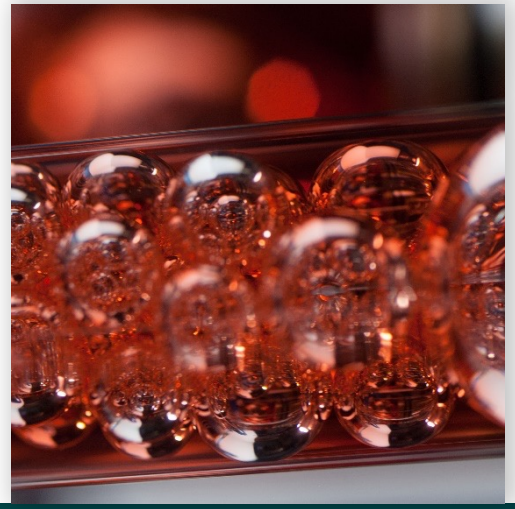
CHALLENGE

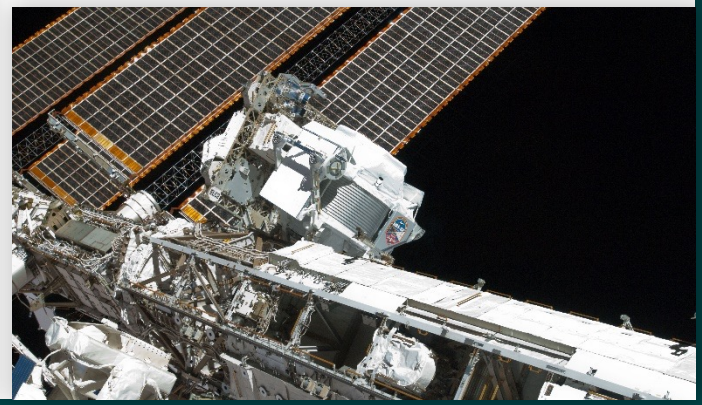
The dynamic space environment, launch vehicles, and payload development:

- Limited resupply opportunities
- Constrained resources
  - Crew-time
  - ISS Facility Throughput
  - Launch and Return Vehicle Capabilities
  - Upmass/Power/ Condition Stowage
- Long payload development lifecycle









GOAL: MAXIMIZE UTILIZATION OF THE ISS NATIONAL LAB RESOURCES

To achieve this goal, we developed the Resource Utilization and Planning System and have been operating and refining the system since 2018

Karen Nyberg gazes upon Earth through the Cupola

CREWTIME ALLOCATION DETERMINATION

Crewtime: Crewtime is allocated to the ISS National Lab on an Increment basis, roughly 6-month time periods coinciding with crew rotations.

- The allocation is determined by the NASA Research Planning Working Group (RPWG) and is documented by CASIS at the Increment start minus 3-month date.
- The number of planned United States Operational Segment (USOS) crewmembers for the increment primarily drives hours available for research

FLIGHT RESOURCES

- Flight resources consist of upmass/downmass utilization, Big Bags, Cold Stowage, and Powered Lockers. NASA does not provide a specific allocation for flight resources; estimates are used for planning purposes.
- Upmass/downmass vary by the needs of the ISS Program as a whole and are not officially allocated to any one group (i.e., vehicle, crew supplies, research).
    - The available mass utilization estimates are determined from averages of previous flights which inform planning for future flights.
    - NASA provides a best effort to split upmass/downmass between NASA and ISS National Lab
- "Big Bags" accommodate locker-sized payloads and larger. Each vehicle has a fixed layout for big bag accommodations. CASIS assumes a portion of the big bags (close to half) are available to the ISS National Lab.
- Cold Stowage and Powered Lockers are a known quantity on each vehicle. Cold stowage assets utilize both cold bags, and powered lockers, so these are tracked in tandem. CASIS assumes half of the resources are available to the ISS National Lab for planning purposes.

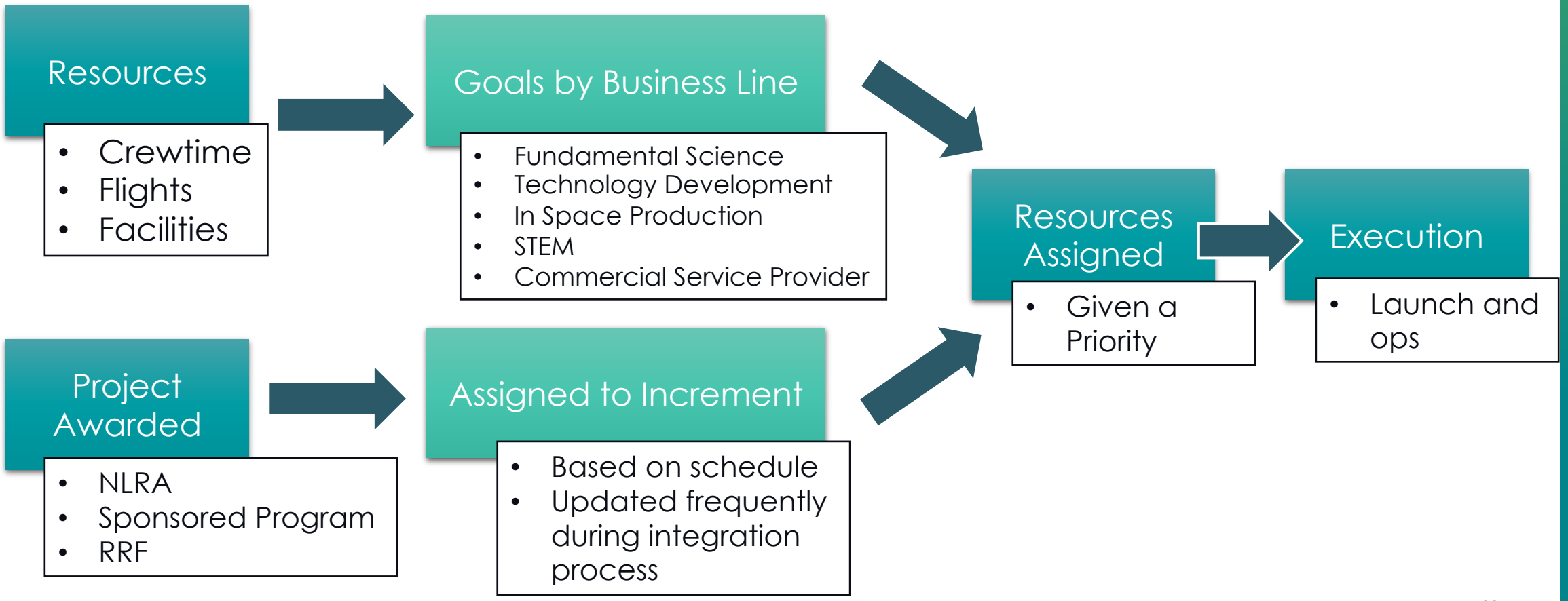
INCREMENT GOALS

- Goals (Targets) are developed in RUPS for each business line with the purpose of fully utilizing all of the resources in any given increment.
- Goals are provided to CASIS through the RUPS Working Group
- Goals are looked at 18-24 months in advance due to long lead times for solicitation process and payload integration timelines
- Progress towards achieving goals are tracked as new projects are awarded.

PRIORITIES DETERMINATION

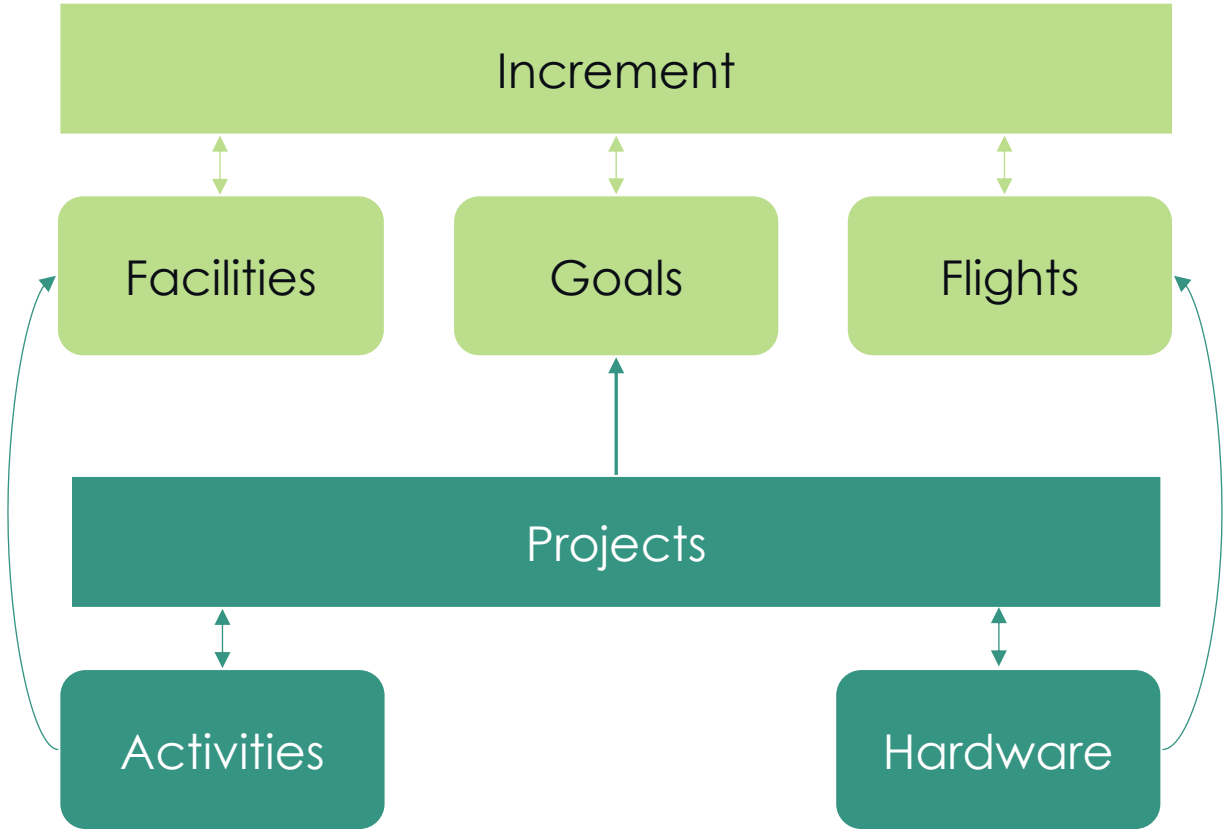
- For a payload to gain access to a specific resource it must be given a priority.
- Priorities are established at a "Master" level as new projects are awarded by CASIS.
- Increment specific priority lists are provided to NASA for planning purposes. Payloads targeted to be ready for a specific increments are prioritized amongst each other using the process defined in the CASIS Prioritization Policy:
    - Projected payload readiness for launch and flight operations
    - Peer reviewed vs non-peer reviewed
    - Results of the peer review process (adjectival score)
    - Selection date
    - Experiment Complexity/Resource Availability
    - Resource optimization and utilization metrics
- The priorities are developed at I-3 and are regularly sent to NASA planning to provide updates as timelines change and projects are added/ removed.

ALLOCATION OF RESOURCES

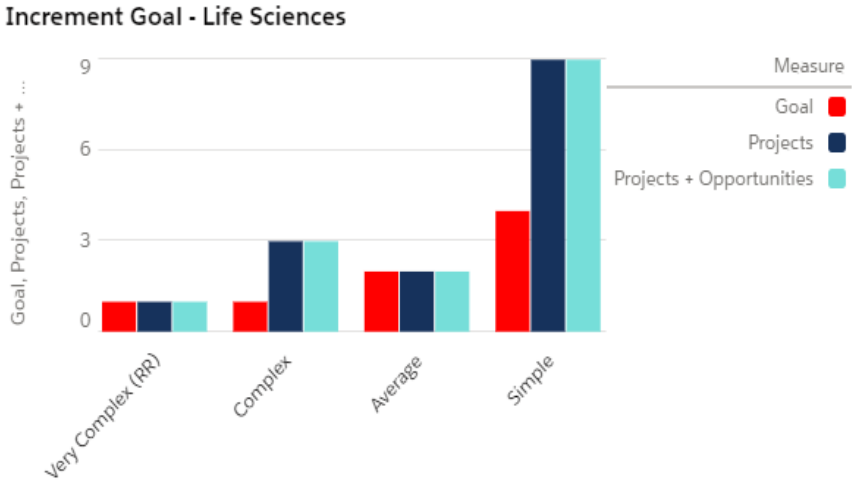


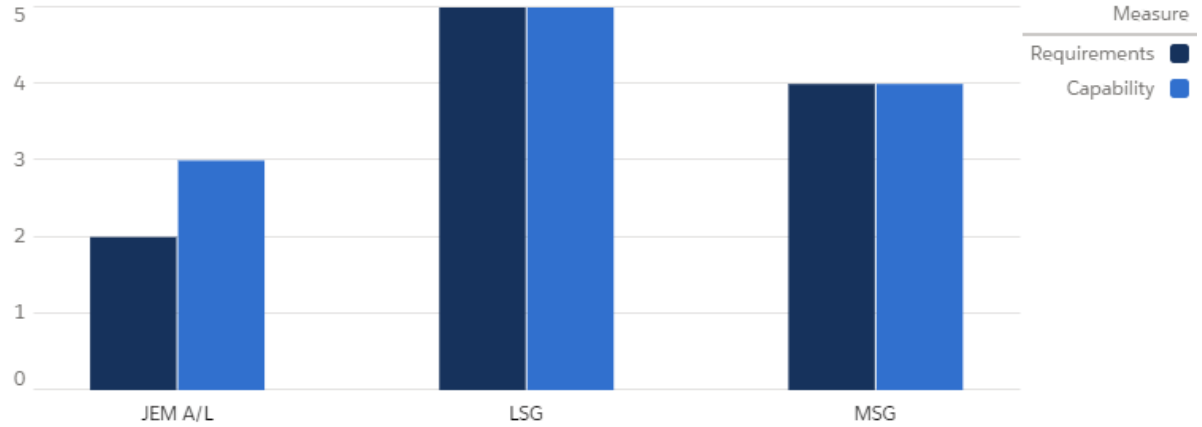
RUPS UTILIZES ISS NATIONAL LAB'S EXISTING SALESFORCE PLATFORM

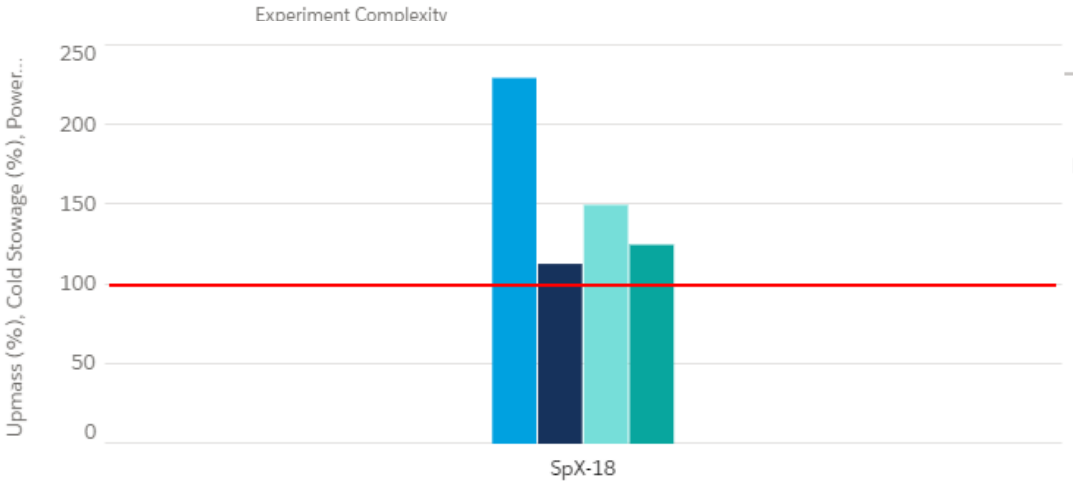
- Establish relational database objects
  - Enables monitoring and reporting to all ISS National Lab teams
  - Automatic Rollups
    - Large number of requirements utilizing a single capability
    - Multiple hardware/activities per project
  - Automatically Identify Resource Exceedance

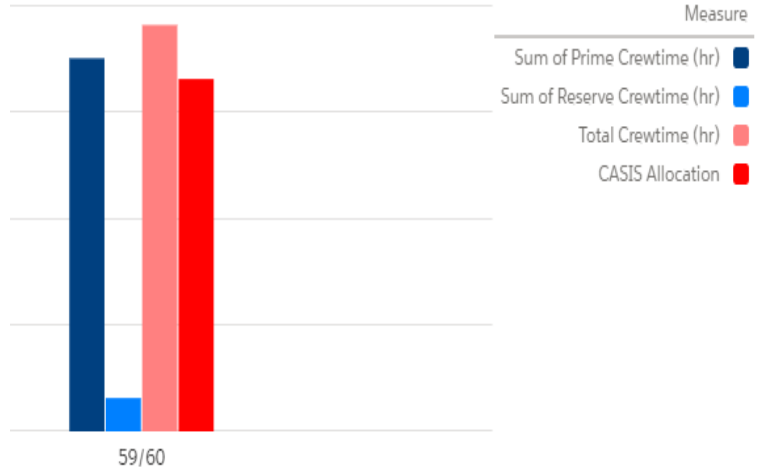


RUPS EXAMPLE DATA









RUPS METHODS

Inputs: ISS Crew, Current Facilities, Launch Vehicles

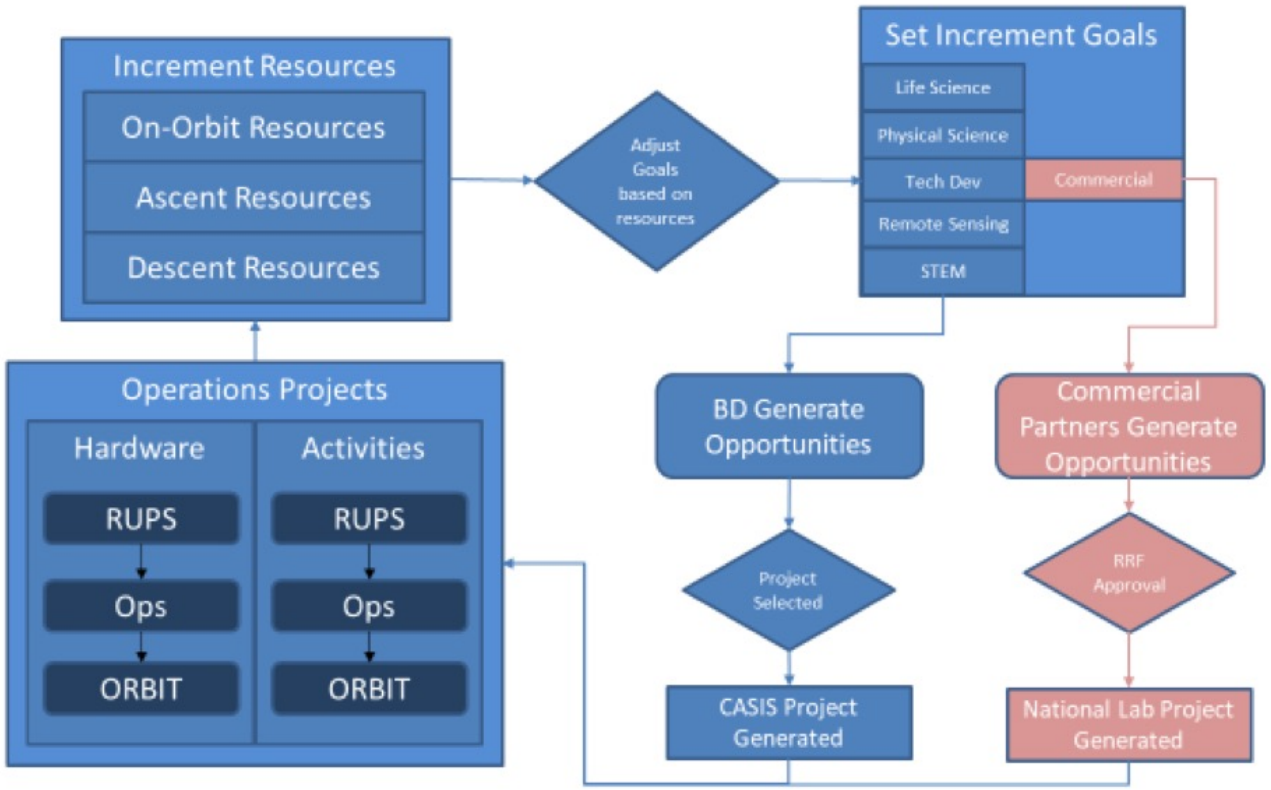
Goals: Based on Vertical & Complexity

Source Requirements: Through solicitations, sponsored programs, and CSPs

Requirements vs. Capabilities: Compare and Adjust Goals

Payload Lifecycle: Adjust maturity as payload is developed

Continuous Improvement: As new projects are generated, and requirements/capabilities evolve



RUPS Planning Cycle

RUPS AT WORK

Defining capabilities and requirements in a relational database allows the ISS National Laboratory to quickly and easily obtain a comprehensive look at all the resources it manages.

RUPS allows for:

- Identification of exceedances or underutilization of specific resources
- Automated reports that enable flexible, real-time view for ISS National Lab Teams

HISTORIC, CURRENT, AND FUTURE UTILIZATION

PURPOSE

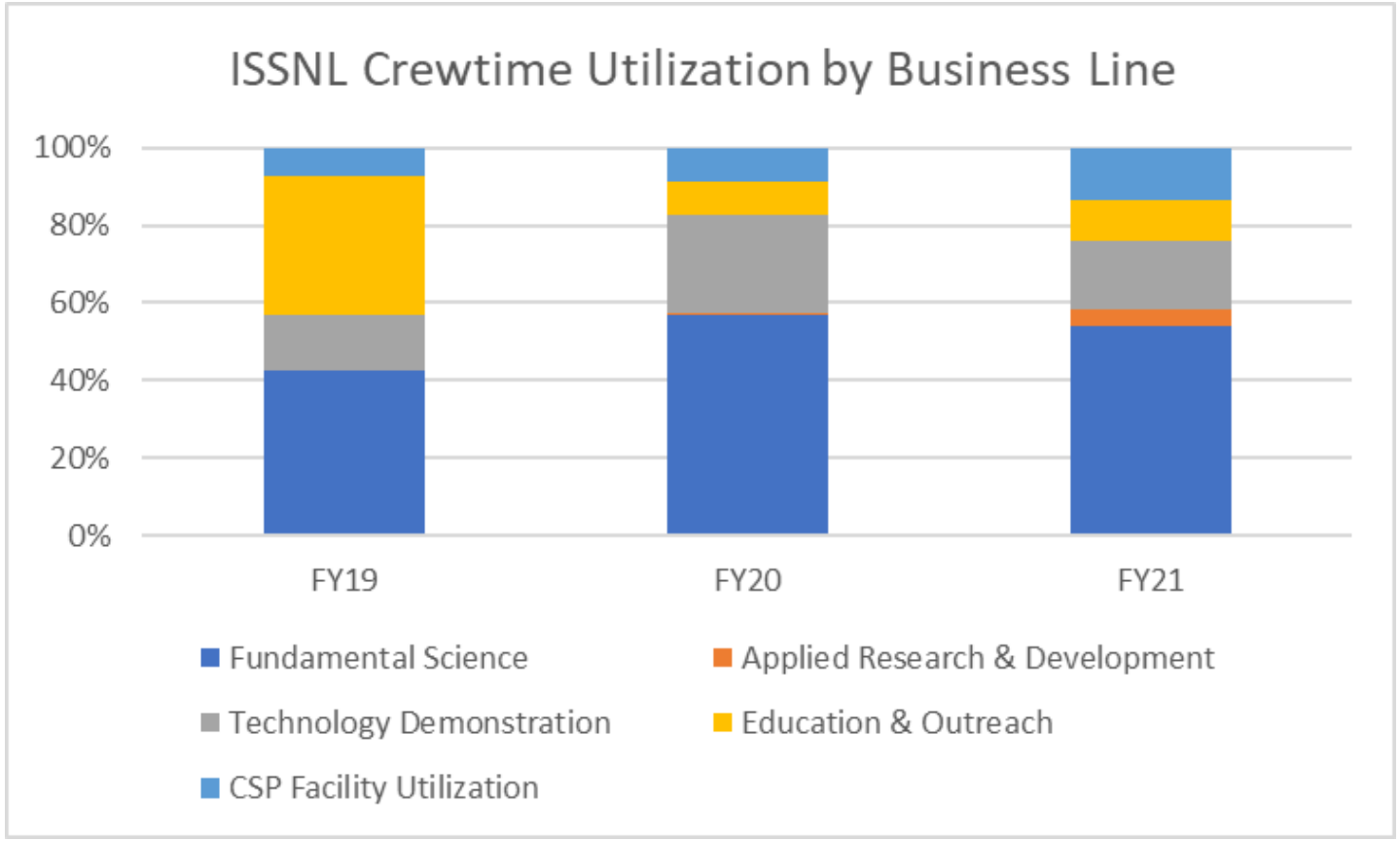
- Provide historical ISS National Lab Utilization by Business Line
- Provide insight into future projections
- Provide estimates for resource availability into coming year

HISTORICAL RESOURCE UTILIZATION

Fiscal Year	Payloads Delivered	Cargo Flights	Crewtime Allocation	Crewtime Utilization	Upmass Allocation	Upmass Utilization
FY19	89 of 89	SpX-16, NG-10, SpX-17, SpX-18, NG-11	933 hrs	976 hrs (104%)	2,463 kg	1,980 kg (80%)
FY20	65 of 65	NG-12, SpX-19, NG-13, SpX-20, NG-14	737 hrs	765 hrs (104%)	2,805 kg	2,339 kg (83%)
FY21	88 of 88	SpX-21, NG-15, SpX-22, NG-16, SpX-23	1,250 hrs	949 hrs (76%)	3,082.9	1,291.3 (42%)

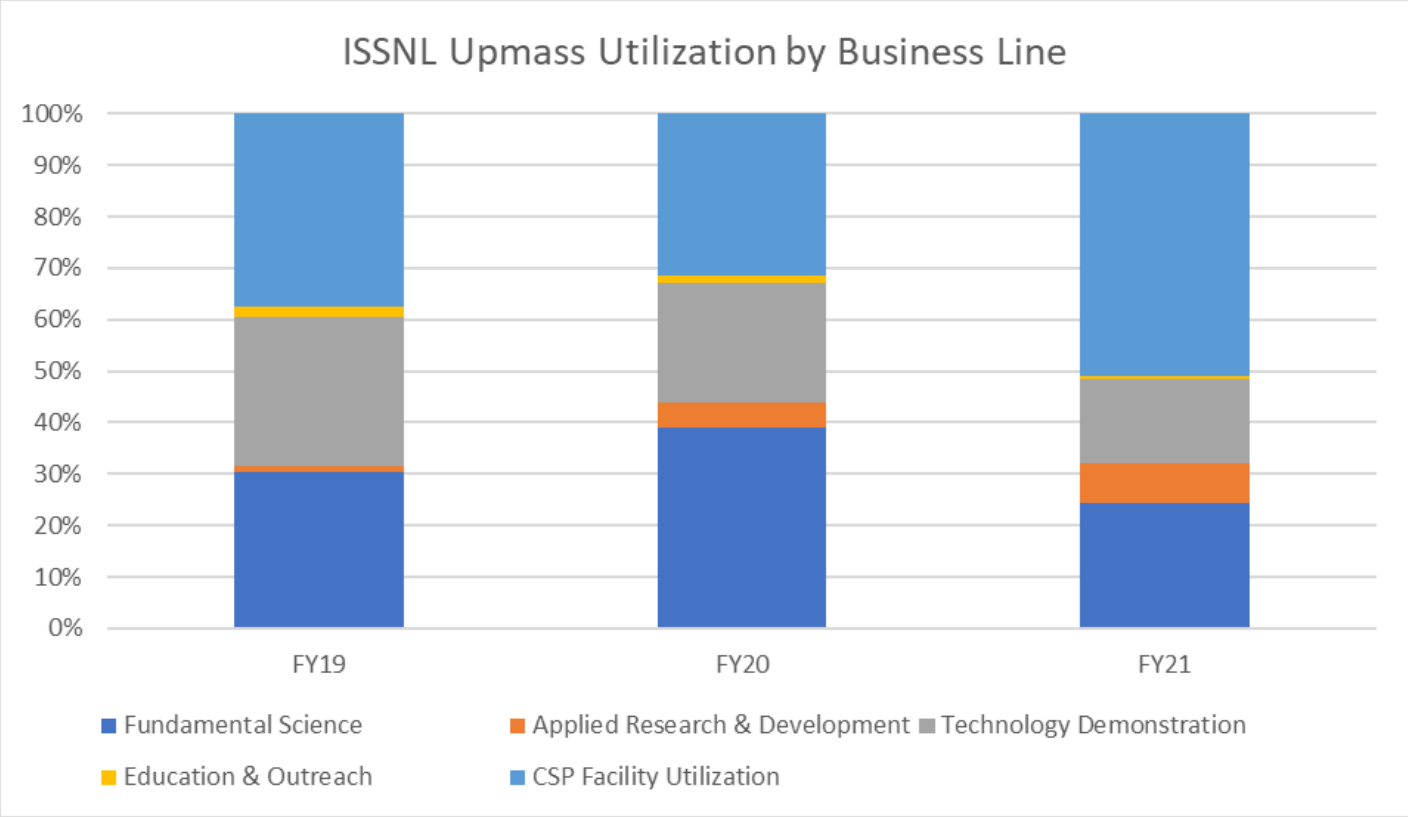
- All payloads delivered that were ready to fly, no payloads left on the ground
- Upmass allocation was determined by a retrospective analysis of utilized upmass (NASA+NL/2)

CREWTIME UTILIZATION BY BUSINESS LINE



Business Line	Avg Rate
Fundamental Science	51%
Applied Research	1%
Technology Demonstration	19%
Education & Outreach	19%
CSP Utilization	10%

UPMASS UTILIZATION BY BUSINESS LINE



Business Line	Avg Rate
Fundamental Science	31%
Applied Research	5%
Technology Demonstration	23%
Education & Outreach	1%
CSP Utilization	40%

PROJECTED ALLOCATIONS

- Crewtime estimated to be 650 hrs per increment
- To determine upmass allocation, an analysis of the last 5 cargo flights for SpaceX and Northrup Grumman was performed.
    - ISS National Lab allocation estimated to be:
        - Dragon – 287 kg
        - Cygnus – 416 kg
    - Does not include external payloads, or multi-user facilities (i.e. cold stowage)

Note: FY22 Includes planned actuals to date

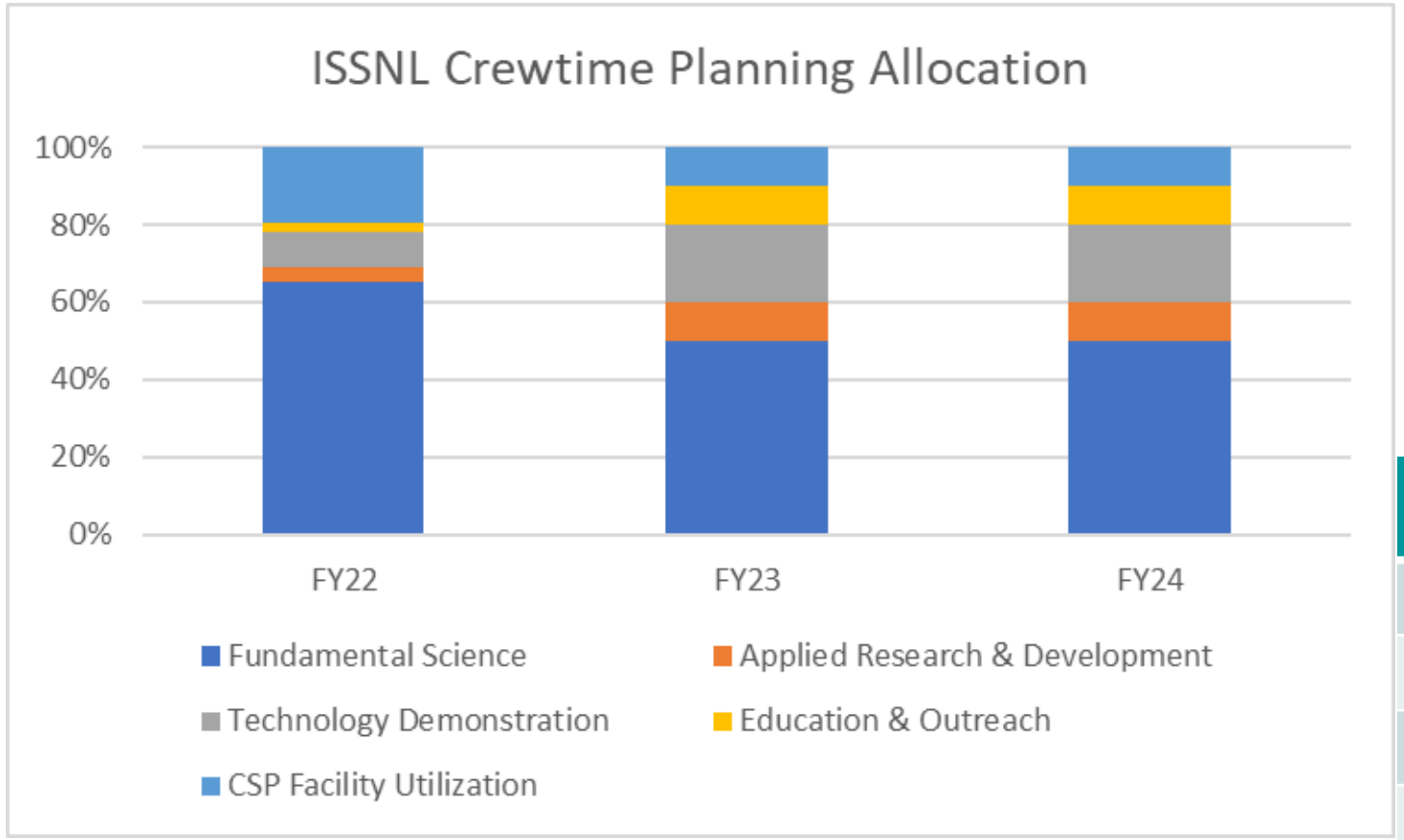
PROJECTED RESOURCE ALLOCATION

Fiscal Year	Increments	Cargo Flights	Crewtime Allocation	Upmass Allocation
FY22	66, 67	SpX-24, NG-17, SpX-25, NG-18	1,165 hrs	1,254 kg
FY23	68, 69	SpX-26, SpX-27, NG-19, SpX-28	1,300 hrs	1,277 kg
FY24	70, 71	NG-20, SpX-29, NG-21, SpX-30, DCC-?	1,300 hrs	1,406 kg

PLANNING ALLOCATIONS

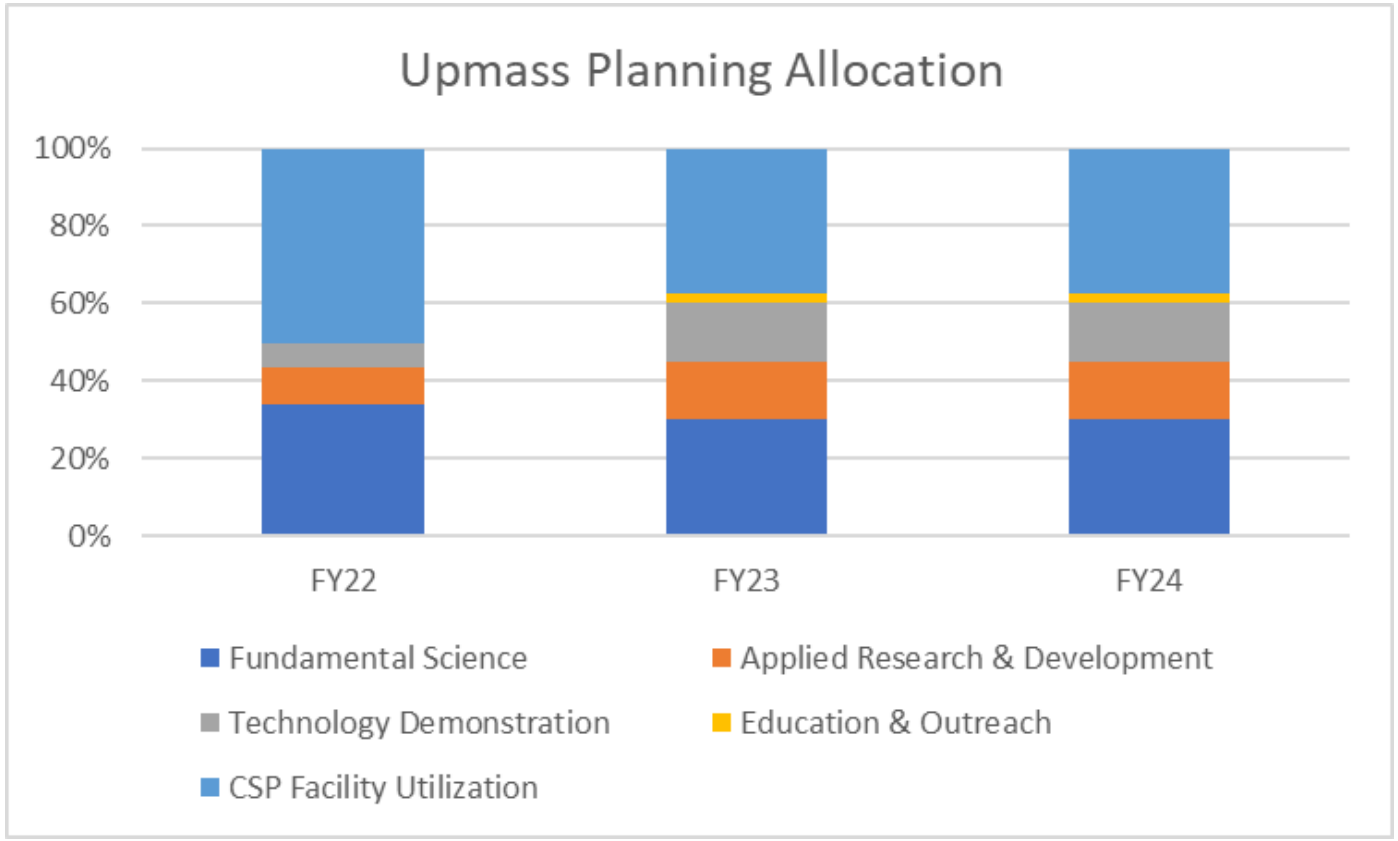
- Used historical average usage rates as starting point
- Modified to represent increased focus on Applied Research (InSpace Production Applications)
- Each year an analysis will be performed to review actuals and update planning targets

CREWTIME ALLOCATION BY BUSINESS LINE



Business Line	Planning Rate
Fundamental Science	50%
Applied Research	10%
Technology Demonstration	20%
Education & Outreach	10%
CSP Utilization	10%

UPMASS ALLOCATION BY BUSINESS LINE



Business Line	Planning Rate
Fundamental Science	30%
Applied Research	15%
Technology Demonstration	15%
Education & Outreach	2%
CSP Utilization	38%

CSP MINIMUM ALLOCATION POLICY

CSP MINIMUM ALLOCATION POLICY

Policy developed in response to IRT report and to address CSP concerns about "assured access" to their commercial facilities

Goals of New Policy

- A quantifiable maximum limit (i.e., "up to") level of ISS National Lab resources (crew time and upmass) for the exclusive use of the CSP community available within a certain time period . Each CSP would have access to a sub-allocation of the overall CSP Minimum Allocation within the designated time period .
- A unique multi-year user agreement between each CSP and CASIS which sets forth the agreed upon terms, conditions, and process by which CSPs will access their facility(ies).
- An expedited process for CSP's to secure access to the ISS National Lab allocated resources required to access their private facility(ies).

CSP MINIMUM ALLOCATION POLICY

Implementation

- CSPS with active 3UA are eligible for allocation consideration
- Initial pilot period for one year or two 6-month planning increments
- CSPs can access resources through the Resource Request Form (RRF).
- Assessment will be conducted at the end of the pilot period to determine if goals are being met and impact to scientific community
- Results of assessment will be shared with NASA and UAC for review and comment

CSP MINIMUM ALLOCATION POLICY

Allocation Prioritization

- Projects brought through an RRF are considered non-peer-reviewed science and would be prioritized lower than those projects that are peer reviewed
- CSP Projects would be prioritized for increment and flight resources in the following manner:
    - First come, first serve
    - Flight readiness
    - Adherence to the Payload Developers expectations
    - Business considerations
    - Scientific merit
- CSPs may also continue to access ISS National Lab resources through the peer-review solicitation process and NASA Commercial Low Earth Orbit Development Program.
- The planned apportionment of resources under a specific CSP sub-Allocation in any given planning increment, calendar year, or fiscal year, is an annual planning target and ***does not represent a guarantee of CSP access to ISS National Laboratory resources.***

UAC CHARTER UPDATES

UAC CHARTER

- The UAC Charter establishes the operating procedures for the UAC
- It is intended that the UAC Charter reflect the dynamic environment in which we operate. Consequently, it shall be updated when necessary to respond to changes in the environment.
- The original UAC Charter has been simplified and revised to include further clarity regarding succession planning, per the GAO recommendations
- Additional revisions have been included as a result of UAC recommendations.
- The updated UAC charter will be available on the UAC page of the ISS National Lab website. Feedback is welcome and encouraged.

Questions?

UAC Public Meeting
July 25, 2022
2:30 – 3:50 p.m. EST
Hybrid Event
Omni Shoreham Hotel
Washington, DC