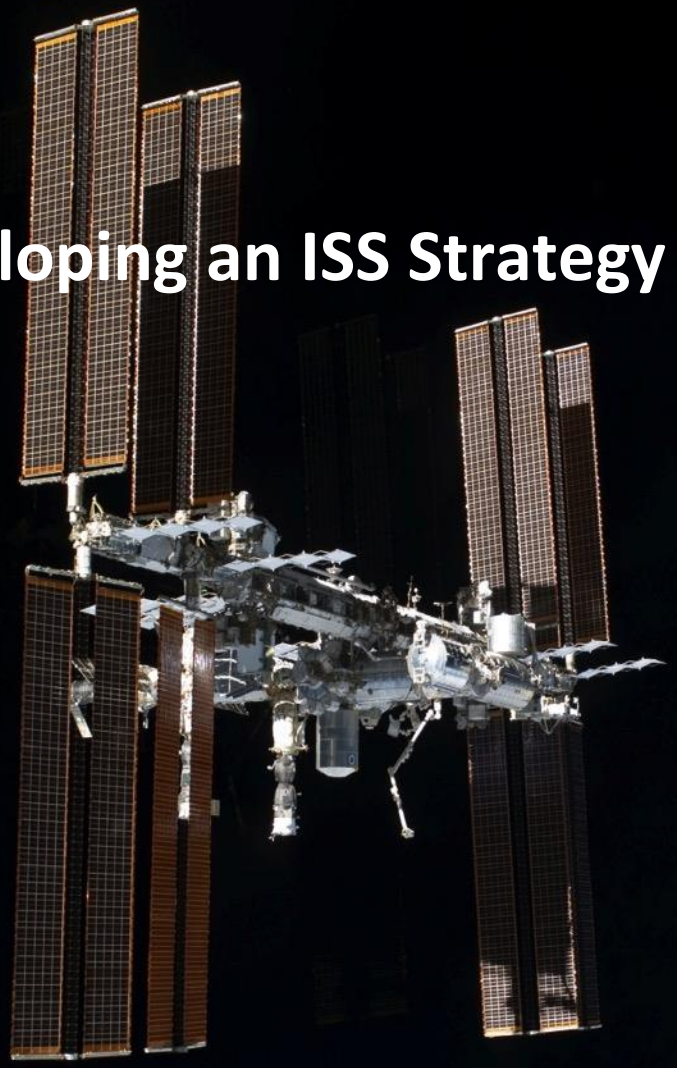
# Developing an ISS Strategy for Beyond 2024



June 20, 2017

Briefing to National Academies Committee on Midterm Assessment of Decadal Survey on Life and Physical Sciences

# Agenda

- ISS Landscape Today
- Projected Landscape in 2024
- Beyond 2024 Possible Considerations and Options

# ISS Landscape Today

- **Continuous US human presence for 16+ years**
  - Expected to be increased with the availability of commercial crew with additional crew member
- **International Partnership and US Leadership**
  - Current ISS Inter-Government Agreements (IGA) have been in place for nearly 20 years and provide treaty-level agreements between US, Russia, Canada, Europe and Japan
- **Deep space exploration testbed**
  - Human health and performance research and technology/system demonstrations for habitation systems, and other exploration systems are underway and are expected to be complete by 2024/2025
- **Enabling Commercial Activity in LEO**
  - Cargo and crew already supplied by private industry
  - CASIS developing demand for commercial research and tech dev via National Lab
  - Transitioning from government-provided services to private sector-provided services (Research, Engineering, Mission and Integration Services (REMIS))
  - Enabling other commercial uses of ISS – commercial airlock, BEAM, MUSES, etc

# ISS Landscape Today

- **Research and Development**
  - Over 300 investigations per increment, and >>35 hrs/week of utilization crew time.
  - RISE initiative has streamlined requirements and processes for users
  - National Lab has filled its pipeline with greatly expanded user base including private industry and other government agencies via CASIS
- **ISS Health**
  - Current assessment indicates that there is significant margin in the ISS structure through the end of the 2020s
  - Some systems, including the solar arrays, will need to be replaced by the end of the 2020s in order to maintain the current configuration
  - Systems sustainable at current failure rates; some upgrades to improve reliability (e.g. ECLSS) in work

# Projected Landscape in 2024

## A Fair Amount of Certainty

- Continuous US human presence sustained for over 24 years
- China is operating their newly complete space station with participation from other countries, including some of the ISS Partners potentially
- Commercial crew has increased US crew from 3 to 4
- Exploration related human research and technology/system demonstrations in LEO are nearly complete, with focus shifting to deep space.
- NASA will have some ongoing LEO research, technology demonstration, and other utilization needs (assessment in work)
- NASA is conducting human spaceflight missions in cislunar space

## Uncertainty

- Expectation is commercial cargo and crew are providing reliable transportation services; however, must be proven and long-term cost efficiencies must also be proven
- Private industry users may have established a business case for funding (a portion) of the integration, transportation and execution of their research or technology development
- Other government agencies hopefully have established long term requirements for conducting research in LEO and have allocated funds to pay for their overhead costs
- Commercial market demand (tourism, marketing, in-space manufacturing, etc.) may or may not have been established

# ISS Beyond 2024 Possible Considerations

- **When considering ISS transition options beyond 2024, some of the possible considerations include:**
  - ***Long-term US Presence in LEO***
  - ***Leadership of international partnership***
  - ***Continuing Support for Commercial Space Activities in LEO***
  - ***Ongoing Deep Space Exploration Objectives requiring LEO***
  - ***Ongoing LEO Research and Development for fundamental science and technology development***
  - ***Affordability and sustainability***

# ISS Beyond 2024 Possible Options

- **ISS extension based on fulfilling considerations**
  - Under current operating model
  - Various Public Private Partnership models
  - Incorporation of private modules for commercial business purposes

- **Transition to commercially provided services taking into account considerations**
  - Permanently crew long duration platform
  - Short duration crew-tended platform

- **All options:**
  - Consider re-use of ISS elements regardless of ISS life-time
  - Implications to National Lab

- **NASA is currently defining its long term LEO research and utilization requirements**
  - Also working with CASIS to define private industry and OGA needs

# Planning Horizon

- **2017 NASA Transition Authorization Act requires report delivered to Congress Dec 1, 2017 addressing ISS Transition**
  - Workshop to solicit stakeholder input being planned for early August