



- One of NASA's key goals is to utilize the ISS to enable future exploration missions
  - Systems that would benefit crewed missions beyond LEO
- Many of these same capabilities would benefit the creation of private LEO systems as well as enable transition to commercial sustainment of the ISS through 2024 and possibly beyond

# ISS can close these gaps for future missions



## Technologies & Capabilities

\* ECLSS & Environmental Monitoring

EVA

Fire Safety

\* Re-entry systems

\* Communications & Navigation

\* Long duration Cryogenic Storage Systems

\* Fission Power

\* Electric Propulsion

\* Mars Entry, Descent & Landing Systems

\* Solar Power & energy storage

Variable, low mass thermal systems

ISRU

Habitation and \* Lightweight Structures

\* Nuclear Propulsion

Docking systems

Autonomous AR&D

In-space manufacturing

## Human Health

\* Long Duration Health & Performance

\* Microgravity Biomedical Countermeasures/ Exercise Equipment

\* Radiation Monitoring

\* Radiation Protection

Operations

Crew Autonomy, Comm Delay

Telerobotics

Robotic crew assist

\* = NRC priority area

# Those that would benefit ISS sustainment



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EVA

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Communications & Navigation

Solar Power & energy storage

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Docking systems

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# Those that may benefit private LEO systems



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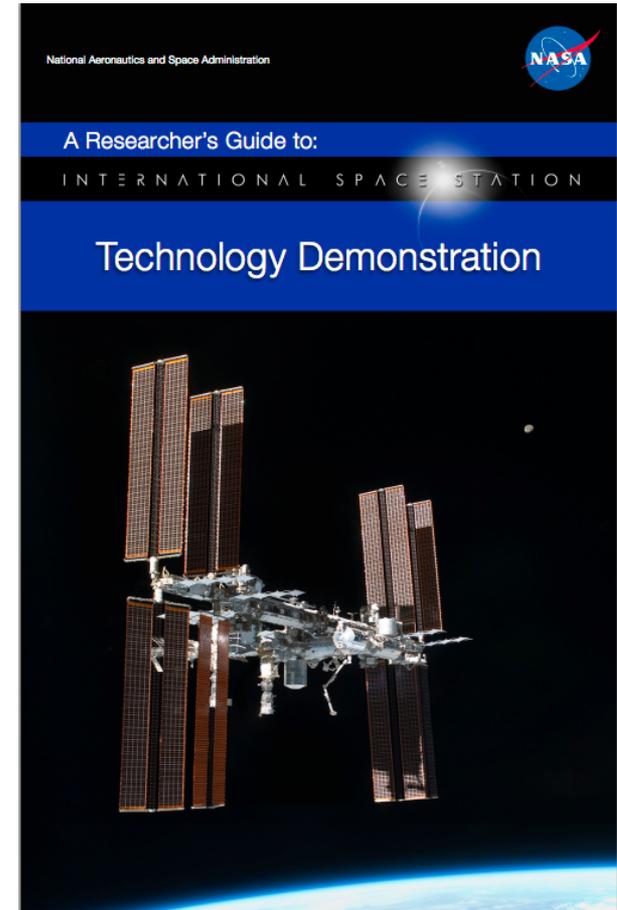
+ what other capabilities would enable private LEO endeavors?



# Current ISS System & Technology Demonstration Accommodations

- Internal
  - EXPRESS rack
  - Aisle-deployed
  - In-place system substitution or upgrade
- External
  - JEM Airlock provides access from internal to external
  - EXPRESS Logistics Carrier sites
  - Columbus Exposed Facility
  - JEM Exposed Facility

**How can we expand & more fully utilize our capabilities?**



[http://www.nasa.gov/mission\\_pages/station/research/ops/research\\_information.html](http://www.nasa.gov/mission_pages/station/research/ops/research_information.html)

# Key Questions



- Private companies now possess the capability to provide more of the space systems and technologies required without traditional NASA insight/oversight
- How do we transition to a more commercial model?
- How do we evolve our current ISS capabilities?
  - Into more sustainable commercial systems
  - Into systems which enable more commercial LEO opportunities
  - Into systems which enable future exploration missions