Evolving ISS into a LEO Commercial Market

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Background

- **Early this year, NASA announced the extension of ISS at least until 2024**

- **With the extension, NASA has at least 10 more years to accomplish its goals**
  - Enable human spaceflight beyond LEO through research and technology/systems demonstrations
  - Enable the development of a commercial market in LEO
    - Expose commercial industry to the benefits of space based research in their industrial field
    - Allow medical community to understand the benefits of microgravity to their terrestrial research
  - Return benefits to humanity through research
  - Basis for international exploration cooperation

- **This RFI is meant to help NASA plan our future steps to accomplishing these goals**
  - One of NASA's objectives is to transition out of the ISS after its useful life to private/ commercial endeavors in LEO
  - NASA expects to be able to perform this transition in a step-wise approach while the ISS is still operational
  - By the time ISS has ended, NASA expects through the investments made to stimulate the commercial space industry, commercial demand and supply in LEO has been established

Success criteria for ISS

Advance benefits to humanity through research

Has the ISS life been fully exploited to the benefit of science and research?

Enable human missions beyond LEO

Have the critical technologies to conduct human and robotic exploration mission been demonstrated?

Has the fly off plan to reduce human health and performance risk for long duration deep space mission been completed?

Have extended duration crew health and performance operations been fully demonstrated?

Enable commercial LEO market

Has a non-government commercial crew/cargo transportation market supply and demand been established in LEO?

Has a commercial LEO platform been established that can provide services to NASA and other customers?

Has a non-government commercial demand for micro-gravity research and application been established?

Basis for international exploration cooperation

Has an exploration partnership been established?

LEO Demand

- **CASIS is chartered by NASA to develop the non-NASA (commercial, academia, other government agencies) demand for ISS research and application**
  - Across industries such as pharmaceutical, medical, materials, biological, earth sensing, etc.
  - NASA expects that the partnerships established by CASIS would transition from ISS at its end of life to private/commercial LEO capabilities

- **NASA may have residual research requirements for limited objectives beyond the life of the ISS in LEO**
  - Human health and performance research
  - Radiation research

- **NASA also expects private industry to pursue their own objectives in LEO**
  - Tourism or other leisure activities
  - Research
  - Applications

LEO Supply

- **NASA expects that all the capabilities and functions that today are either managed or provided by NASA to operate, maintain and sustain the ISS will be needed to sustain a commercial LEO platform**
  - Crew and cargo transportation
  - Habitation (life support, crew support, etc.)
  - Orbit maintenance
  - Communication networks
  - Training
  - Mission Operations
  - Payload Integration
  - Sustaining engineering
  - Avionics and electrical power systems

- **NASA has already begun this transition**
  - Commercial cargo transportation is already operational
  - Commercial crew transportation is in development
  - Portions of the life support system and crew support systems are commercial, or soon will be
  - This RFI is meant to expand this transition into other areas as appropriate where the knowledge and capability is within private industry

Operational Use of ISS

- **Are there alternative or new ways of utilizing the ISS, including transportation, that would enable commercial demand or supply in LEO?**
  - Crew rotations (e.g. alternative or shorter increments for research)
  - Habitation demonstration (e.g. whole module or portion of systems)
  - Communications (e.g. service provider)
  - Others areas?

Utilization Integration

- **Are there certain types of ISS payload integration that could be turned over to a commercially provided service?**

Are there other areas?

- **Is there benefit in international commercial cooperation?**
- **Would the transition of certain ISS elements or capabilities to a commercial platform be beneficial?**
- **Would the ISS demonstration of COTS based systems such as avionics and communication equipment benefit a commercial LEO platform?**

LEO Platform and Exploration

- **Many of the capabilities and functions needed to sustain a human presence in LEO are the same for spaceflight beyond LEO, such as:**
  - Habitation
  - Life support and atmospheric monitoring
  - Crew health and countermeasures
  - Crew performance (exercise equipment)
  - Communications
  - Other capabilities?

- **NASA's deep space exploration missions are expected to be more human-tended than permanently crewed like ISS**
  - It will be important to maintain long duration run time on human support systems, like ECLSS, to characterize and validate performance for deep space missions

Summary

- **NASA is looking for industry input into planning how we transition out of the NASA owned and operated ISS into a commercial market in LEO where possible future NASA needs along with other customer needs can be met**
  - Supply and Demand

- **NASA also wants to leverage commercial capabilities in LEO that are applicable to deep space exploration missions**

RFI links and notes

- **https://prod.nais.nasa.gov/cgibin/eps/synopsis.cgi?acqid=160471**
- **Responses due June 30**
- **PLEASE NOTE THE FOLLOWING CORRECTION:**
  - Correct email address for responses is HQ-ISS-LEO-RFI@mail.nasa.gov, NOT HQ-ISS-LEO-RFI@nasa.gov