Science Requirements*

- Rigorous, unbiased scientific peer review of research proposals and flight experiments with an assessment of NASA relevance and/or the need for microgravity
- Engineering review of flight proposals for initial assessment of technical feasibility and cost
- Ground and on-orbit resources to support a broad and vigorous research program that produces timely results
- Routine and assured access to space
- Adherence to microgravity and contamination requirements on ISS
- Development of flight research apparatus that is driven by science requirements
- PI access to ground laboratories, facilities, and personnel needed to prepare for flight (e.g. drop towers, parabolic aircraft, electrostatic levitator, etc.)
- Experienced project scientists that serve as liaisons between the PI and NASA (requires mentoring of young scientists)
- Flexible template for development of flight experiments (e.g. fast track for mature science)
- Science liaison with National Academy of Sciences / Engineering / National Research Council, Federal Agencies, and Professional Societies
- Timely dissemination of scientific results to the research community and the American public

** Information supplied from Office of Biological and Physical Research*

Technology Requirements ‡

- Identification of Technology Flight Experiments (TFEs) and Technology Flight Demonstrations (TFDs) will be based upon an annual review process to support the “Technology for Human/Robotic Exploration and Development of Space” (THREADS)
- TFE and TFD selection process will be based upon the development of a technology investment portfolio to support future THREADS mission needs
- ISS support of THREADS will require:
  - Stable and reliable access to space to support specific future mission needs
  - Access to internal and external payload locations on-board the ISS
  - Certain payloads may require a higher degree of non-standard interaction (analytical and physical) with existing ISS systems than science and commercial payloads
  - Potential for TFEs and TFDs to enhance the ISS vehicle resource capabilities

‡ Information supplied from Office of Space Flight

Commercial Requirements †

- Provide stable and reliable access to space environments for extended periods of time.*
- Enable fast turnaround times.*
- Ensure frequent and reliable opportunities for return of samples.*
- Provide consistent easy to understand policies and procedures, including allocation of flight opportunities.
- Protect industry proprietary information.
- Support the creation of a public and media environment that values industry participation in space research
- Accommodate market-driven industrial product development objectives selected on the basis of the ratio of private-to-public investment.

Note: requirements for microgravity and other aspects of space environment are similar to those for science and technology programs.

† Information supplied from Office of Biological and Physical Research
** e.g. 30 – 90 days*

S/T/C Requirement Similarities

- Frequent, reliable access to space
- The space environment provided by the ISS
- Frequent and reliable opportunities for return of samples and data
- Provide consistent easy to understand policies and procedures, including allocation of flight opportunities
- Access to ground and on-orbit resources to support payload utilization
- Flexible templates for the development of flight experiments

S/T/C Requirement Differences

Selection

- Science has requirement for scientific peer review
- THREADS selections use a multi-Center technical review process
- Non-subsidized commercial selections are based on the ratio of private-to-public investment on a negotiated basis
- CSC commercial selections are based on the application of conventional venture capital parameters

Payload Development

- Science requires experienced project scientists as liaisons between PIs and NASA (or its equivalent) - mentoring young scientists
- Technology has more requirements for external payloads
- Commercial payloads willing to take more performance risk with associated reduction in reliability requirements

S/T/C Requirement Differences, cont'd

Integration

- Commercial has greater emphasis on fast turnaround for all commercial payloads
- Certain technology payloads may require a high degree of non-standard interaction (analytical and physical) with existing ISS systems requiring direct interface with the ISS vehicle

Data and Data Products

- Commercial requires handling of proprietary information
- Science requires timely public dissemination of scientific results and access to data and samples by the research community

S/T/C Requirements Summary

- The ISS interface and program requirements are virtually the same for science, technology, and commercial payloads, as is the fundamental need for access to space and resources
- The primary differences between science, technology, and commercial payloads lie in their funding sources, modes of selection, and handling of data
- In order for an NGO to be responsive to all payload categories, it must
  - Accommodate different selection methods
  - Be responsive to the requirements of all funding/owner organizations
  - Protect the rights of proprietary data