



**National Aeronautics and Space Administration Johnson  
Space Center Human Exploration and Operations  
Mission Directorate 2101 NASA Parkway Houston, TX  
77058**

## **RESEARCH OPPORTUNITIES FOR ISS UTILIZATION**

**NASA Research Announcement: NNJ13ZBG001N**

**Soliciting Proposals for Exploration Technology Demonstration and  
National Lab Utilization Enhancements**

Catalog of Federal Domestic Assistance (CFDA) Number: 43.007

**ISSUED: November 14, 2012**

**UPDATED: December 7, 2012**

**PROPOSALS DUE STARTING November 30, 2012 THROUGH  
September 30, 2013**

## Research Opportunities for ISS Utilization

I. Funding Opportunity Description.....	3
A. Scope.....	3
B. Overview of ISS Utilization Thrusts.....	3
1. Technology Demonstration Office .....	3
2. National Lab Office .....	3
C. Research Emphases Specific to this Solicitation ... <b>Error! Bookmark not defined.</b>	
1. Technology Demonstration Office .....	4
2. National Lab Office .....	5
D. References to Unique NASA Capabilities.....	7
E. NASA Safety Policy .....	7
F. Availability of Funds for Award.....	7
G. Additional Funding Restrictions.....	8
H. Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreements Notice (CAN).....	8
II. Award Information.....	9
III. Eligibility Information .....	9
A. Eligibility of Applicants.....	9
B. Guidelines for International Participation.....	10
C. Cost Sharing or Matching .....	10
IV. White Paper, Proposal and Submission Information .....	10
A. Address to Request Proposal Package .....	10
B. Content and Form of Proposal Submission .....	11
1. Electronic White Paper and Proposal Submission .....	11
2. White Paper and Proposal Submission Information.....	12
3. Proposal Format and Contents.....	13
C. Submission Dates and Times.....	14
D. Funding Restrictions .....	15
V. Proposal Review Information .....	15
A. Evaluation Criteria.....	16
B. Review and Selection Process .....	16
VI. Award Administration Information .....	17
A. Award Notices .....	17
B. Administrative and National Policy Requirements.....	18
C. Program Reporting/Individual Researcher Reporting .....	18
VII. Contacts.....	18
VIII. Other Information .....	19
A. Proprietary Information .....	19
B. General References .....	19

# **I. Funding Opportunity Description**

## **A. Scope**

This announcement is for the development of experiment hardware with enhanced capabilities; modification of existing hardware to enable increased efficiencies (crew time, power, etc.); development of tools that allow analyses of samples and specimens on orbit; enhanced ISS infrastructure capabilities (ex. Communications or data processing); and specific technology demonstration projects as detailed below.

## **B. Overview of ISS Utilization Thrusts**

Within the NASA International Space Station (ISS) Research Integration Office, the Technology Demonstration Office (TDO) and National Lab Office (NLO) act as “gateways” to the ISS.

The Technology Demonstration Office serves as the gateway for NASA-funded technology demonstrations.

The National Lab Office serves as the gateway for non-NASA government funded investigations, as well as non-profit or commercially funded investigations.

Within the NASA Johnson Space Center, Office of Education, the ISS NASA Education Projects Office acts as a gateway to the ISS for students, educators, and institutions of learning. The objective of the ISS NASA Education Projects Office is to strengthen the link between the unique venue of the ISS and Science, Technology, Engineering, and Mathematics (STEM) education.

The unprecedented opportunity exists in using the ISS platform to advance several key technologies for the next steps in space exploration. The ISS is a one of a kind laboratory that offers access to microgravity, constant crew support, robotic servicing, and the harshness of the space environment.

### **1. Technology Demonstration Office**

The Technology Demonstration Office is soliciting proposals from parties who have concepts for practical and cost effective experiments or demonstrations that utilize the ISS as a platform or test bed for the demonstration of new, advanced or improved technologies, in-space capabilities, and systems.

Proposals are specifically being sought for experiments that develop exploration enabling technologies that support the advancement or enable the development of a system or capability. Advancements include reduced mass and volume, reduced power requirements, increased efficiency, increased reliability, reduced maintenance and logistics, and improved safety over the current state of the art.

### **2. National Lab Office**

The 2005 NASA Authorization Act designated the U.S. segment of the ISS as a national laboratory and directed NASA to develop a plan to "increase the utilization of the ISS by other Federal entities and the

private sector..." As the nation's newest national laboratory, the ISS will further strengthen relationships among NASA, other Federal entities, and private sector leaders in the pursuit of national priorities for the advancement of science, technology, engineering, and mathematics. The ISS National Laboratory will also open new paths for the exploration and economic development of Space.

The National Laboratory concept is an opportunity to expand the US economy in space-based research, applications and operations. The ISS represents a unique and highly visible national asset with surplus capacity available for a wide spectrum of applications. NASA will continue to cover the cost of operating and maintaining the ISS and is highly motivated to work with other agencies and organizations to pursue applications.

Proposals are being sought to enhance the unique capabilities of the ISS to benefit humankind on Earth, providing stimulus to the U.S. economy through the creation of jobs via development of goods and services using the ISS platform.

### **3. ISS NASA Education Projects Office**

The ISS NASA Education Projects Office serves as an education resource that enables ISS-related education activities onboard the ISS, in the classroom and through Web and mobile media that enables achieving the following goals:

- Provides university-level opportunities that contribute to knowledge and skill mastery necessary to further STEM education and thus enable employment in a STEM related career field.
- Provides opportunities for traditionally underrepresented and underserved groups to participate in the ISS mission.
- Emphasizes "hands-on" educational activities that are unique to the ISS mission.
- Develops educational partnerships with entities outside of NASA to achieve these goals.

The ISS NASA Education Projects Office is soliciting proposals from higher education institutions or consortia of organizations and institutions serving higher education who have concepts for flight experiments or demonstrations that utilize the unique ISS microgravity environment and can be conducted in a "1 unit" (1U) Nanoracks NanoLab.

Proposals are specifically being sought for experiments that address innovative, meaningful, and enduring research and technology development activities with a STEM-based context. The proposals must align with ISS Program research priorities in one of the following categories: technology demonstration, biology and biotechnology, and physical sciences.

### **C. ISS Integration Requirements**

Experiments must fit within the mass and volume constraints of existing ISS launch vehicles and must adhere to ISS integration requirements. Experiments can be launched pressurized or unpressurized. Unpressurized payloads must attach to the ISS using a Flight Releasable Attachment Mechanism (FRAM),

Payload Interface Unit (PIU), or Columbus External Payload Adapter (CEPA).

## **1. Technology Demonstration Office**

Exploration Enabling Technology areas and projects suitable for demonstration on ISS include but are not limited to:

- 1) In-Space Propulsion a) Electric Propulsion: Clustered Hall Thruster
- 2) Space Power and Energy Storage a) Solar (Photo-voltaic) Materials b) Regenerative Fuel Cells
- 3) Components of Highly Reliable, Closed-loop, Human Health, Life Support, and Habitation Systems a) Air Revitalization b) Water Recovery and Management c) Human Waste Management Systems
  - 1 Capable of collecting urine, fecal, menstrual, and emesis waste in a microgravity environment and controlling odor.
  - 2 Allow commonality between different vehicles with minor maintenance or reconfiguration.
  - 3 Support missions between one week and indefinite length with periodic quiescent periods.
  - 4 Allow transfer of collected waste to both storage and downstream processing. System shall have very low air inclusion in the urine (less than .5% V/V).

5 Be a significant improvement in installed equipment mass (less than 90 lbs) and volume (less than 5 ft<sup>3</sup>). d) Sensors (Air, Water, Microbial) e) Radiation (Modeling, Protection, Prediction, Monitoring)

4) Thermal Systems a) Active Thermal Control

1. Variable (turn-down) heat rejection during appropriate mission phases while allowing for heat rejection during peak loads and warmest environments

- a. Provide for a radiated heat rejection turn-down capability of at least 6:1 with a goal of 12:1
- b. Technologies may include, but are not limited to, advanced fluid loop architectures, radiator designs, materials, coatings, heat exchangers, control systems, etc., and combinations of these.
- c. Proposals should include a test coupon for demonstration on the ISS in a space environment. Test coupons should be approximately 1 ft<sup>2</sup> and capable of demonstrating the proposed technology during long-term exposure in a low-earth orbit environment. (zenith exposure) Coupon size will be coordinated with NASA for optimal experiment platform layout.
- d. Test coupons should provide heat rejection, power and communication interface, fluid loop, heaters and structure as appropriate.
- e. Test coupons will be integrated by NASA into a standard ISS exposure facility that may contain multiple experiments.

5) Robotics, Telerobotics, and Autonomous Systems a) Robotic Systems b) Automation c) Vehicle Autonomy d) Crew Autonomy

6) Human Exploration Destination Systems a) Food Production

## 2. National Lab Office

NASA seeks technological concepts related to the National Lab Thrust Areas. The topics listed in the Thrust Areas below span the broad interests of NASA but should not be considered as the entire scope. NASA welcomes white papers and proposals in all areas relevant to the national Lab mission, not only those listed in this document.

- 1) Innovative uses of the ISS or ISS hardware that leverage existing capabilities to stimulate both utilization of the ISS and economic development in the U.S.
- 2) Other improvements to existing ISS capabilities, including but not limited to infrastructure, in situ analytical tools, and communication/data transmittal, to increase the efficiency and effectiveness of the technology demonstrations and science investigations performed on the ISS.

3) Three-dimensional cell and tissue culture hardware a) State-of-the-art three-dimensional cell/tissue suspension culture supporting a wide variety of cell and tissue types in quantities that allow experimental screening of growth in microgravity of different tissue types and culture conditions, meeting the following scientific needs:

- 1 Fully self-contained system with all the necessary subsystems to ensure cell/tissue growth on ISS, and on Earth as ground control unit
- 2 Media replacement, oxygenation, waste removal, and thermal control system with minimal convective force effects
- 3 Capable of operating at least 32 simultaneous separate cultures
- 4 Capable of supporting a wide variety of tissues up to 1 mm in diameter
- 5 Controls % CO<sub>2</sub> in the gas exchange environment of the incubator
- 6 Capable of automated and manual injection and sampling, with sampling capability for cells, tissues, and spent media
- 7 Provides status data on temperature, CO<sub>2</sub>, O<sub>2</sub>, pH in tissue culture ranges, and humidity
- 8 Capable of supporting 30-day cell/tissue cultures
- 9 Still image capability to observe the formation and growth of tissue constituents in the range of 10 μm to 1 mm

b) Hardware serviceability and ISS compatibility, meeting the following interface and operational needs

- 1 Exchanging of serviceable components and/or passaging is possible to extend cultures up to 120 days
- 2 Rear-breathing hardware designed to operate in a single ISS EXPRESS rack, and meeting the EXPRESS rack interface requirements
- 3 Modular design allowing easy on-board servicing, allowing launch of cultures of minimal mass and volume for culture on ISS, and requiring minimal downmass for refurbishment
- 4 Capable of ground command and control of hardware and data downlink, with bypass controls for crew servicing in off-nominal operations
- 5 Media replenishment capability maximizing the flexibility for the user to translate cell/tissue culture practices from ground-based laboratories but also minimizing crew time for media changes and servicing as much as practicable
- 6 Compatible with the glovebox for harvesting tissue for fixation or freezing
- 7 Compatible with the Wetlab and Light Microscopy Module port sampling, fixation systems, and on-orbit analysis capabilities

4) Protein crystal growth a) Flight Hardware that incorporates the following:

- 1 Hardware that maximizes number and types of samples that can be flown.
- 2 Accommodates vapor diffusion (sitting or hanging drop), Liquid-liquid diffusion, dialysis, or batch methods or protein crystal growth
- 3 X-ray or neutron diffraction within the growth chamber (optional)
- 4 Passive/ambient operations or operation within an existing ISS cold stowage asset

b) Ground Hardware that incorporates the following:

1. Pre-flight Preparations and Post-flight Handling and Analysis

- a. expression and purification of the target protein
- b. high-throughput devices for screening and optimizing growth conditions using a minimum volume of protein
- c. photo documentation devices for capturing images of the resultant protein crystal
- d. devices for the extraction, mounting, and cryo-preservation of the resultant crystal in preparations for x-ray or neutron diffraction analyses

e. x-ray sources suitable for diffraction analyses c) On-Orbit Analytical Tools that perform the following:

1. robotic hardware system suitable for flight, capable of:

- a. macromolecular crystal screening and documentation
- b. crystal harvesting and cryopreservation
- c. crystal mounting, alignment and x-ray diffraction analysis
- d. real-time downlink capabilities to give investigators information and partial control over their experiments

### **3. ISS NASA Education Projects Office**

Education proposal areas and projects suitable for demonstration on ISS include but are not limited to the topics listed as ISS research priorities below.

The ISS NASA Education Projects Office is soliciting proposals from higher education institutions or consortia of organizations and institutions serving higher education who have concepts for flight experiments or demonstrations that utilize the unique ISS microgravity environment and can be conducted in a “1 unit” (1U) NanoRacks NanoLab.

NASA welcomes white papers and proposals in all areas relevant to NASA’s education mission, not only those listed in this document.

- 1) Technology Demonstration
  - a) Air, Water, Surface Monitoring
  - b) Radiation Measurement
  - c) Communication & Navigation
  - d) Picosatellite Technologies
  - e) Spacecraft Materials
  - f) Robotics & Imaging
  - g) Orbital Environment
  - h) Avionics & Software
- 2) Biology and Biotechnology
  - a) Microbiology / Cellular / Other
  - b) Animal Biology
  - c) Plant Biology
- 3) Physical Sciences
  - a) Combustion Science
  - b) Material Science

- c) Complex Fluids
- d) Fluid Physics

#### **D. References to Unique NASA Capabilities**

NASA's HEOMD uses a variety of specialized test and high-end computational facilities to achieve its mission. Any need for these specific facilities for the proposed research must be explicitly described in the proposal, including the asset, rationale and justification of the need, how it supports the investigation, and when during the proposed period the resource will be required. As evaluation panels review the intrinsic merit of the proposed investigation, they will be asked to consider the realism and reasonableness of the request for unique NASA capabilities and whether it is an appropriate utilization of a highly constrained asset. Proposals selected for funding will be considered for an allocation of the requested NASA resources needed for their investigation, but availability of the resource to support the fully requested level cannot be guaranteed.

#### **E. NASA Safety Policy**

Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect the following: (1) the public, (2) astronauts and pilots, (3) the NASA workforce (including employees working under NASA award instruments), and (4) high-value equipment and property. All research conducted under NASA auspices shall conform to this philosophy.

#### **F. Availability of Funds for Award**

Prospective proposers to this NRA are advised that funds are not currently available for awards under this NRA. The Government's ability to make award(s) is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that NASA determines acceptable for award under this NRA. Successful proposals will have launch and integration costs covered by NASA. Successful proposals may also be eligible for additional funding, subject to the type of award that is offered. Proposals must indicate if NASA funding is requested.

## **G. Additional Funding Restrictions**

The construction of facilities is prohibited unless specifically required in this announcement. For further information on allowable costs, refer to the cost principles cited in the *NASA Federal Acquisition Regulations (FAR) Supplement Provision* and the *Guidebook for Proposers*. (References in Section VIII.)

Travel, including foreign travel, is allowed, as may be necessary, for the meaningful completion of the proposed investigation, as well as for publicizing its results at an appropriate professional meeting.

NASA does not allow for payment of profit or fee to commercial firms under grant awards. Regardless of whether functioning as a team lead or as a team member, proposing personnel from NASA Centers shall propose budgets based on Full Cost Accounting (FCA). Non-NASA U.S. Government organizations shall propose based on FCA unless no such standards are in effect; in that case such proposers shall follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board. For further information, see <http://www.hq.nasa.gov/fullcost/>.

## **H. Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreements Notice (CAN)**

All policies and procedures for the preparation and submission of proposals, as well as NASA's review and selection of proposals for funding, are presented in a separate document entitled *Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreements Notice (CAN)* (Guidebook) that is located at <http://www.hq.nasa.gov/office/procurement/nraguidebook/proposer2012.pdf>.

By reference, the newest edition of this Guidebook (January 2012) is hereby incorporated into this NRA, and proposers to this NRA are responsible for understanding and complying with its procedures before preparing and submitting their proposals. Proposals that do not conform to its standards may be declared noncompliant and returned without review.

The other chapters and appendices of this Guidebook provide supplemental information about the entire NRA process, including NASA policies for the solicitation of proposals; guidelines for writing complete and effective proposals; the NASA policies and procedures for the review and selection of proposals; as well as for issuing and managing the awards to the institutions that submitted selected proposals; and Frequently Asked Questions about a variety of the NASA proposal and award processes and procedures. Note that the NASA policy for proposals involving non-U.S. participants is given in section (I) of Appendix B of this Guidebook.

Comments and suggestions of any nature about this Guidebook are encouraged and welcomed and may be directed to Sponsored Research Business Activity (SRBA) group of the NASA Office of Procurement, NASA Headquarters, 300 E Street SW, Washington, DC 20546-0001; e-mail: SRBA@nasa.gov. SRBA's URL is [http://prod.nais.nasa.gov/pub/pub\\_library/srba/poc.html](http://prod.nais.nasa.gov/pub/pub_library/srba/poc.html).

## **II. Award Information**

Awards made through this NRA will be in the form of grants, cooperative agreements, contracts, and intra-or interagency transfers, depending on the nature of the submitting organization and/or the specific requirements for awards given in each program element description. The type of award offered to selected proposers will generally follow the policies in Section D.1 of the *NASA Guidebook for Proposers*. A NASA awards officer will determine the appropriate award instrument for the selections resulting from this solicitation.

Grants and cooperative agreements will be subject to the provisions of the *NASA Grants and Cooperative Agreement Handbook*, hereafter referred to as the *Grants Handbook* (<http://prod.nais.nasa.gov/portals/pl/index.html>) and Appendix D of the *NASA Guidebook for Proposers*. In the case of any conflict, the *Grants Handbook* takes precedence. Contract awards will be subject to the provisions of the Federal Acquisition Regulations (FAR) and the NASA FAR Supplement <http://prod.nais.nasa.gov/portals/pl/index.html>.

Successor proposals, defined as proposals for renewal or supplementation of existing projects, are eligible to compete with proposals for new awards. Please reference the *NASA Guidebook for Proposers* Section 1.5 for policies relating to such successor proposals.

NASA does not provide separate funding for direct and indirect costs; thus, the amount of the award requested is the total of all costs submitted in the proposed budget. It is estimated that the initial selection will be announced by the date listed in Section IV.C and the grant will be awarded in a reasonable timeframe thereafter.

## **Eligibility Information**

### **Eligibility of Applicants**

Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, as well as NASA Centers, and other U.S. Government agencies. Historically Black Colleges and Universities, other minority educational institutions, and small businesses and organizations owned and controlled by socially and economically disadvantaged individuals or women are particularly encouraged to apply.

In all such arrangements, the proposing entity is expected to be responsible for administering the project according to the management approach presented in the proposal. The proposing entity must have in place a documented base of ongoing high quality research in science and technology, or in those areas of science and engineering clearly relevant to the specific programmatic objectives and research emphases indicated in this NRA. Present or prior NASA support of research or training in any institution or for any investigator is not a

prerequisite to submission of a proposal or a competing factor in the selection process.

## **B. Guidelines for International Participation**

Foreign entities are not eligible for funding from NASA. Therefore, proposals from foreign entities, or those including foreign entity participation, will not be eligible for award.

## **C. Cost Sharing or Matching**

Cost sharing is not required for contract awards except as provided in NASA FAR Supplement (NFS) 1816.303-70 for awards resulting from unsolicited proposals for research submitted by commercial organizations. NFS 1816.303-70 is located at [http://www.hq.nasa.gov/office/procurement/regs/1816.htm#16\\_303-70](http://www.hq.nasa.gov/office/procurement/regs/1816.htm#16_303-70).

For a NASA Center, an institution of higher education, hospital, or other non-profit organization seeking to receive a grant or cooperative agreement, cost sharing is not required; however, NASA can accept cost sharing if it is voluntarily offered. For those recipients, Section B, Provision & Section 1260.123 of the *NASA Grant and Cooperative Agreement Handbook*, entitled “Cost sharing or matching,” located at [http://prod.nais.nasa.gov/pub/pub\\_library/grantb.html#1260.123](http://prod.nais.nasa.gov/pub/pub_library/grantb.html#1260.123), describes the acceptable forms of cost sharing.

For a commercial organization seeking to receive a grant or cooperative agreement, cost sharing is required, unless the commercial organization can demonstrate that they will not receive substantial compensating benefits for performance of the work. If no substantial compensating benefits will be received, then cost sharing is not required, but can be accepted. Section B, Provision 1260.123, “Cost sharing or matching,” and the special conditions at section A, subpart 1260.4(b) describes cost sharing and allowability for awards with commercial firms that do not require cost sharing. Section D, Provision & Section 1274.204, “Cost and payments,” located at [http://prod.nais.nasa.gov/pub/pub\\_library/grantd.html#1274204](http://prod.nais.nasa.gov/pub/pub_library/grantd.html#1274204) of the *NASA Grant and Cooperative Agreement Handbook* describes the acceptable forms of cost sharing for commercial organizations.

## **White Paper, Proposal and Submission Information**

### **Address to Request Proposal Package**

All information needed to respond to this solicitation is contained in this NRA and in the companion document entitled *Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreement Notice (CAN)* (hereafter referred to as the *Guidebook for Proposers*) that is located at: <http://www.hq.nasa.gov/office/procurement/nraguidebook/>.

Additionally, applicants shall prepare proposals in accordance with NFS 1852.235-72 (NOV 2004), Instructions for Responding to NASA Research Announcements, hereafter referred to as the *NASA FAR Supplement Provision*, which is located at:

[http://www.hq.nasa.gov/office/procurement/regs/5228-41.htm#52\\_235-72](http://www.hq.nasa.gov/office/procurement/regs/5228-41.htm#52_235-72).

**The information in this NRA supersedes and provides additional direction to that found in the *Guidebook for Proposers the NASA FAR Supplement Provision*. At NASA's discretion, Proposals that do not conform to these standards may be declared noncompliant and declined without review.**

White paper and proposal submission questions received will be answered and published in a Frequently Asked Questions (FAQ) document. This FAQ will be posted on the NSPIRES solicitation download site alongside this NRA, and will be updated periodically between submission release and the Step-2 proposal due date.

## **B. Content and Form of Proposal Submission**

### **1. Electronic White Paper and Proposal Submission**

**All white papers and proposals submitted in response to this NRA must be submitted in a fully electronic form.** No hard copy of the white paper or proposal will be accepted. **Electronic white papers and proposals must be submitted by one of the officials at the proposal PI's organization who is authorized to make such submission;** electronic submission by the authorized organization representative (AOR) serves for the proposal as the required original signature by an authorized official of the proposing organization. All team members must be registered in NSPIRES and confirm their organizational affiliation when added to a proposal before the PI organization official can submit.

Proposers can use either NSPIRES (<http://nspires.nasaprs.com>) or Grants.gov (<http://www.grants.gov>) for white paper and proposal submission. All proposers, team members, and agency officials must be registered before submission with NSPIRES regardless of the electronic system used to submit white papers and proposals. Proposers are discouraged from submitting the same proposal to both electronic submission systems. NASA plans to use the NSPIRES system to facilitate the review process so all proposals received through Grants.gov will be transferred into NSPIRES.

Every organization that intends to submit a white paper or proposal to NASA in response to this NRA, including educational institutions, industry, nonprofit institutions, NASA Centers, the Jet Propulsion Laboratory, and other U.S. Government agencies, must be registered in NSPIRES. This applies equally for white papers and proposals submitted via Grants.gov, as well as for white papers and proposals submitted via NSPIRES. Such registration must be performed by an organization's electronic business point-of-contact (EBPOC) in the Central Contractor Registry (CCR).

Any organization requesting NASA funds through the proposed investigation must be listed on the Proposal Cover Page. NASA will not fund organizations that do not appear on the Proposal Cover Page. Each individual team member (e.g., PI, co-investigators, etc.), including all personnel named on the proposal's cover page, must be individually registered in NSPIRES. This applies equally for proposals submitted via Grants.gov, as well as for proposals submitted via NSPIRES.

Each individual team member (e.g., PI, co-investigators, etc.), including all personnel named on the proposal's electronic cover page, must specify an organizational affiliation. The organizational affiliation specified must be the organization through which the team member is participating in the proposed investigation. If the individual has multiple affiliations, then this organization may be different from the individual's primary employer or preferred mailing address.

Generically, an electronic proposal consists of one or more electronic forms, including an electronic cover page and one or more attachments. The attachments contain all sections of the white paper or proposal, including the science/technical/management section, as well as all required and allowed appendices; see Sections IV(b)(2) and (3) below for further requirements.

Submission of electronic proposals via either NSPIRES or Grants.gov requires several coordinated actions from the proposing organization. In particular, when the PI has completed entry of the data requested in the required electronic forms and attachment of the allowed PDF attachments, including the science/technical/management section, an official at the PI's organization who is authorized to make such a submission, referred to as the AOR, must submit the electronic proposal (forms plus attachments). Coordination between the PI and his/her AOR on the final editing and submission of the proposal materials is facilitated through their respective accounts in NSPIRES and/or Grants.gov. Note that if one individual is acting in both the PI and AOR roles, he/she must ensure that all steps in the process are taken, including submitting the proposal from the organization.

Requests for assistance in accessing and/or using this website may be directed by e-mail to [nspires-help@nasaprs.com](mailto:nspires-help@nasaprs.com) or by telephone to (202) 479-9376 Monday through Friday, 8:00 AM – 5:00 PM Eastern Time. Frequently Asked Questions (FAQs) may be accessed through the Proposal Online Help site at <http://nspires.nasaprs.com/external/help.do>. Tutorials of NSPIRES are available at <http://nspires.nasaprs.com/tutorials/index.html>.

## **2. White Paper and Proposal Submission Information**

Proposers are required to submit a white paper in advance of a full proposal. The NASA POC may contact you via written letter or email to further clarify the aspects of the idea in the white paper. This procedure is intended to minimize unnecessary effort in proposal preparation and review. White papers and proposals may be submitted at any time prior to the date and time specified in Section IV.C. NASA will acknowledge receipt of all submissions and assign a control number that should be used in all further correspondence regarding these submissions.

NASA will respond to white papers with a letter encouraging or discouraging the submission of a full proposal based on the proposed effort's relevance to the ISS Utilization mission and a preliminary assessment of the scientific or technical merit of the concept.

All full proposals deemed acceptable under the evaluation criterion "Relevance to ISS Utilization Mission," will be reviewed using the evaluation criteria and without regard to any comments resulting from the review of a white paper.

Proposers are required to submit full proposals by the time and date specified in the NRA.

The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be combined into a single proposal.

### **3. Proposal Format and Contents**

All proposals submitted in response to this NRA must include the appropriate required electronic forms available through either of the two proposal submission systems, NSPIRES or Grants.gov.

The science/technical/management section and other required sections of the proposal must be submitted as searchable, unlocked PDF files that are attached to the electronic submission using one of the proposal submission systems. Proposers must comply with any format requirements specified in this NRA and in the *NASA Guidebook for Proposers* (e.g. Section 2.3 of the *NASA Guidebook for Proposers*). Only appendices/attachments that are specifically requested in either this NRA or in the *NASA Guidebook for Proposers* will be permitted; proposals containing unsolicited appendices/attachments may be declared noncompliant. Section 2 of the *NASA Guidebook for Proposers* provides detailed discussions of the content and organization of proposals suitable for all program elements in this NRA, as well as the default page limits of a proposal's constituent parts.

#### **1. White Paper Format**

White paper submissions are required in advance of full proposals in order to provide potential proposers with a rapid response to minimize unnecessary effort. White papers should follow the format below. The cover sheet should be clearly marked "WHITE PAPER" and the total length shall not exceed 6 pages, excluding cover page and official transmittal letter. A page is defined as being no larger than electronically formatted page of 8.5" by 11.0" with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. No formal transmittal letter is required. All white papers must be written in English.

Section I. Administrative {not included in the page count}

A. Cover sheet to include:

- (1) NRA number (NNJ13ZBG001N)
- (2) Proposal title
- (3) Lead Organization submitting proposal
- (4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER

EDUCATIONAL”, OR “OTHER NONPROFIT”

(5) Contractor’s reference number (if any)

(6) Other team members (if applicable) and type of business for each

(7) NRA thrust Area Addressed

(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available)

(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available),

(10) Total funds requested from NASA, and the amount of cost share (if any) AND

(11) Date proposal was submitted.

B. Official transmittal letter. Section II. Summary of Proposal {6}

A. **Innovation.** Succinctly describe the uniqueness and benefits of the proposed investigation relative to the current state-of-art or alternate approaches.

B. **Results.** Provide a short description of the results, products, or process that may be expected at the end of the investigation.

C. **Technical Rationale.** Provide a short description of the impact of the proposed development on NASA missions or objectives.

D. **Technical Approach.** Provide a short description of the technical approach and constructive plan for accomplishment of technical goals in support of claims and deliverable production.

E. **Experience.** Provide a short general discussion of other research by corporate team members in the proposed technology area.

F. **Risk.** Provide a short description of the unique challenges that this Proposal may experience in meeting NASA Safety Policy (See Section E).

G. **Cost.** Provide rationale for the proposal cost and duration for the initial phase.

## 2. Proposal Format

The proposal format should follow the guidelines in the NASA Guidebook for Proposers. In addition to the requirements in the guidebook, the proposer should include specific requirements for mass, volume, power, and data from the ISS.

## C. Submission Dates and Times

Solicitation Announcement Identifier: NRA NNJ13ZBG001N

Cycle One End Date: March 1, 2013

White papers must be submitted on or before 4:00 p.m., CDT, December 7, 2012. Full proposals must be submitted on or before 4:00 p.m., CDT, January 28, 2013. [For Education proposals, white papers must be submitted on or before 4PM, CDT, January 23, 2012 and full proposals must be submitted on or before, February, 20, 2013.](#)

Cycle Two End Date: May 15, 2013

White papers must be submitted on or before 4:00 p.m., CST, February 15, 2013. Full proposals must be submitted on or before 4:00 p.m., CST, April 1, 2013.

Cycle Three End Date: August 15, 2013 White papers must be submitted on or before 4:00 p.m., CST, May 15, 2013. Full proposals must be submitted on or before 4:00 p.m., CDT, July 1, 2013.

Cycle Four End Date: November 15, 2013 White papers must be submitted on or before 4:00 p.m., CDT, August 15, 2013. Full proposals must be submitted on or before 4:00 p.m., CDT, September 30, 2013.

Proposals that are late will be handled in accordance with NASA's policy as given in Section (g) of Appendix B of the NASA Guidebook for Proposers (also see Sections 3.2 and F.23), and in accordance with NFS 1815.208. Proposals received after the due date may be returned without review. If a late proposal is returned, it is entirely at the discretion of the proposer whether or not to resubmit it in response to a subsequent appropriate solicitation. It is not possible to submit a late proposal electronically via NSPIRES unless the electronic Cover Page was initially created prior to the proposal due date. Late proposals may not be submitted via Grants.gov.

## D. Funding Restrictions

Allowable costs for contract awards are covered in Part 31 of the FAR, located at <http://www.acquisition.gov/far/current/html/FARTOCP31.html#wp253693> and Part 31 of the NASA Far Supplement, located at <http://www.hq.nasa.gov/office/procurement/regs/1831.htm>. Pre-contract costs are covered in FAR 31.109, located at NFS 1831.205-32 and NFS 1852.231  
70.

Allowable costs for grant and cooperative agreement awards with universities, hospitals, and other nonprofit

organization and awards with commercial organizations that do not involve cost sharing are covered in Provision & Section 1260.127 of the *NASA Grant and Cooperative Agreement Handbook*, located at [http://prod.nais.nasa.gov/pub/pub\\_library/grantb.html#1260127](http://prod.nais.nasa.gov/pub/pub_library/grantb.html#1260127). Pre-award costs are covered in Provision & Section 1260.125, located at [http://prod.nais.nasa.gov/pub/pub\\_library/grantb.html#1260125](http://prod.nais.nasa.gov/pub/pub_library/grantb.html#1260125).

Allowable costs for grant and cooperative agreement awards with commercial firms involving cost sharing are covered in Provision & Section 1274.204 of the *NASA Grant and Cooperative Agreement Handbook*, located at [http://prod.nais.nasa.gov/pub/pub\\_library/grantd.html#1274204](http://prod.nais.nasa.gov/pub/pub_library/grantd.html#1274204). Pre-award costs are covered in FAR 31.109, located at [https://www.acquisition.gov/far/current/html/Subpart%2031\\_1.html#wp1089616](https://www.acquisition.gov/far/current/html/Subpart%2031_1.html#wp1089616), and with NFS 1831.205-70, located at [http://www.hq.nasa.gov/office/procurement/regs/1831.htm#31\\_205-70](http://www.hq.nasa.gov/office/procurement/regs/1831.htm#31_205-70).

## **V.Proposal Review Information**

## A. Evaluation Criteria

White papers and proposals will be evaluated against the following criteria:

- A. The proposal must show a clear need for the use of the ISS and its unique capabilities
- B. The proposal must demonstrate relevance to the ISS Utilization Thrust Areas and Research Emphases
- C. For technology demonstration investigations, the proposal must clearly document why the demonstration is necessary to support NASA's exploration goals. This will include but is not limited to how the demonstration may advance the state of the art with respect to the following criteria
  - a. reduced mass
  - b. reduced volume
  - c. reduced power requirements
  - d. reduced maintenance and logistics
  - e. increased efficiency
  - f. increased reliability
  - g. improved safety
- D. Evaluation of the intrinsic merit of the proposal includes consideration of the following factors:
  - a. Overall scientific or technical merit of the proposal and/or unique and innovative methods, approaches, concepts, or advanced technologies demonstrated by the proposal;
  - b. Offeror's capabilities, related experience, facilities, techniques, or unique combination of these which are integral factors for achieving the proposal's objectives;
  - c. The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives; and
  - d. Evaluation against the state-of-the-art. Review panels are instructed not to compare proposals to each other; all comparative evaluations are conducted by NASA personnel.
- E. Cost Realism
  - a. The proposal must demonstrate a reasonable and manageable cost that is in-scope with the complexity of the proposal.
- F. Schedule Realism
  - a. The schedule must include realistic milestones that will result in flight hardware ready for launch within a reasonable duration.
- G. For education investigations, the proposal must clearly document strong evaluation plan that documents outcomes and demonstrates progress toward achieving objectives of proposed education activities. The forms of evaluation are based upon reputable models and techniques appropriate to the content and scale of the program. Evaluation methods should provide useful metrics and should include input into ISS NASA Education data management systems. Outline a plan to work with ISS NASA Education management in addressing internal and external evaluation and reviews.

It is imperative that we account for the Agency's investment of public funds. The return of this investment must be captured in the evaluation plan. Specifically:

- Number of educators and students involved in ISS NASA Education activities

- Percentage increase per fiscal year in number of educators and students involved in ISS NASA Education activities
- Assessment of the value of ISS NASA Education activities for educators and students

The evaluation plan should clearly state the objectives of the evaluation, the questions that will be answered, the information that will be collected to answer these questions, and when collection of information will begin and end. Additionally, the evaluation plan should align with the ISS NASA Education requirements for providing performance metrics and should detail the practices and procedures for successfully conducting the evaluation.

## **B. Review and Selection Process**

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort. Award(s) may be made to any proposer(s) whose proposal(s) is determined selectable regardless of its overall rating.

NASA's policy is to ensure impartial, equitable, and comprehensive evaluation of all proposals and to select the source(s) whose offer(s) best meet(s) the Government's technical, policy, and programmatic goals in accordance with the evaluation criteria contained in this NRA. Pursuant to NASA FAR 1835.016 and FAR 35.016, the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. In order to provide this evaluation, cognizant personnel will review each submission and will convene panels of experts in the appropriate areas when necessary. The results of these reviews will be documented in the form of recommendations and will be provided to the manager of the NASA ISS Research Integration Office. These recommendations will indicate those proposers with whom negotiations or discussions will be conducted. They will also include questions arising from the reviews and, when appropriate, issues that need to be resolved prior to making awards.

Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. NASA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons. For evaluation purposes, a proposal is the document described in "Proposal Format and Content", Section IV.B.3 of this announcement. Other supporting or background materials submitted with the proposal will be considered for the reviewer's convenience only and are not considered part of the proposal. All proposals must first be deemed relevant to ISS and likely to contribute to the mission as described in paragraphs I.B. "Overview of ISS Utilization Thrusts" and I.C. "Research Emphases Specific to this Solicitation".

Restrictive notices notwithstanding, proposals may be handled for administrative purposes by support contractors. These support contractors are bound by appropriate non-disclosure requirements.

Subject to the restrictions set forth in FAR 37.203(d) and NASA FAR 1837.204, input on technical aspects of the proposals may be solicited by NASA from non-Government consultants /experts who are strictly bound by the appropriate non-disclosure requirements.

It is the policy of NASA to treat all proposals as competitive information and to disclose their contents only for the purpose of evaluation. No proposals will be returned. After proposals have been evaluated and selections made, the original of each proposal will be handled in accordance with NASA record retention policy.

## **Award Administration Information**

### **Award Notices**

At the end of the selection process, each proposing organization will be notified of its selection or non-selection status. NASA will provide debriefings to those investigators who request one. Selection notification will be made by a letter signed by the designated NASA selecting official. The selection letters are not an authorization to begin performance. The selected organization's business office will be contacted by a NASA Contracting Officer to negotiate an award. Any costs incurred by the investigator in anticipation of an award are at their own risk until contacted by NASA. The NASA Contracting Officer will determine the type of award instrument, request further business data, and negotiate the resultant action. NASA Contracting Officers are the only personnel with the authority to make award and

obligate Government funds. NASA reserves the right to offer selection of only a portion of a proposal. In these instances, the investigator will be given the opportunity to accept or decline the offer. Additional information can be referenced in paragraph (d) of NFS 1835.016-71, located at [http://www.hq.nasa.gov/office/procurement/regs/1835.htm#35\\_016-71](http://www.hq.nasa.gov/office/procurement/regs/1835.htm#35_016-71), and in Appendix D of the *Guidebook*.

## **B. Administrative and National Policy Requirements**

Grant and cooperative agreement awards are subject to the NASA Grant and Cooperative Agreement Handbook. This handbook consists of four sections that prescribe the policies and procedures relating to the award and administration of NASA grants. Section A provides the text of provisions and special conditions and addresses NASA's authority, definitions, applicability, amendments, publications, deviations, pre-award requirements and post-award requirements currently covered by 14 CFR part 1260. Section B relates to grants with institutions of higher education, hospitals, and other nonprofit organizations. Sections A and B, with the special considerations in subpart 1260.4(b), apply to awards with commercial firms that do not involve cost sharing. Section C adopts the administrative requirements of OMB Circular No. A-102 and relates to administrative requirements for grants to state and local governments. Section D relates to awards with commercial firms. The Handbook is located at [http://prod.nais.nasa.gov/cgi-bin/nais/nasa\\_ref.cgi](http://prod.nais.nasa.gov/cgi-bin/nais/nasa_ref.cgi). Contract awards are subject to the FAR and NASA FAR Supplement, located at <http://www.acquisition.gov/far/> and <http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>, respectively. Applicants are advised that contract awards are subject to the subcontracting requirements of FAR and NFS Part 19. The NASA Contracting Officer will choose the appropriate award instrument.

## **C. Program Reporting/Individual Researcher Reporting**

Required reports for contract awards will be negotiated with the contractor, subject to the terms and conditions of the FAR and NASA FAR Supplement, located at <http://www.acquisition.gov/far/> and <http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>, respectively. Required reports for grants and cooperative agreements are covered in Exhibit G, "Required Reports and Publications" of the NASA Grant and Cooperative Agreement Handbook. Required reports for Federal Demonstration Partnership (FDP) grant awards are covered in Exhibit H, "Federal Demonstration Partnership – Required Publications and Reports." The Handbook is located at [http://prod.nais.nasa.gov/pub/pub\\_library/grcover.htm](http://prod.nais.nasa.gov/pub/pub_library/grcover.htm).

## **VII. Contacts**

Additional technical information for this NRA is available from:

George C. Nelson Lyndon B. Johnson Space Center National Aeronautics and Space Administration Code 2101  
NASA Parkway Houston, TX 77058 Telephone: (281) 244-8514 E-mail: [george.nelson-1@nasa.gov](mailto:george.nelson-1@nasa.gov)

[Additional information for education proposals for this NRA is available from:](#)

Janejit T. Gensler  
Lyndon B. Johnson Space Center  
National Aeronautics and Space Administration  
2101 NASA Parkway  
Houston, TX 77058  
Telephone: (281) 244-1024  
[E-mail: janejit.t.gensler@nasa.gov](mailto:janejit.t.gensler@nasa.gov)

Additional contracting information for this NRA is available from:  
Julie K. Karr Lyndon B. Johnson Space Center National Aeronautics and Space Administration Code BG 2101  
NASA Parkway Houston, TX 77058 Telephone: (281) 483-9782 E-mail: [julie.k.karr@nasa.gov](mailto:julie.k.karr@nasa.gov)

## **VIII. Other Information**

### **A. Proprietary Information**

All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the Proposer's responsibility to clearly define to the Government what is considered proprietary data. Additional information can be referenced in Appendix D of the Guidebook.

### **B. General References**

**Guidebook for Proposers Responding to a NASA Research Announcement (NRA)** is available online at the following address:

<http://www.hq.nasa.gov/office/procurement/nraguidebook/>

**NASA Federal Acquisition Regulations Supplement Instructions for Responding to NASA Research Announcements (Provision NFS 1852.235-72 November 2004)** is available online at the following address:  
[http://www.hq.nasa.gov/office/procurement/regs/5228-41.htm#52\\_235](http://www.hq.nasa.gov/office/procurement/regs/5228-41.htm#52_235)

**Standard Format for NASA Research Announcements (NRAs) and other Announcements for Grants and Cooperative Agreements.** This document is available online at the following address:

[http://nodis.hq.nasa.gov/displayDir.cfm?Internal\\_ID=N\\_PR\\_5810\\_0001\\_&page\\_name=main&search\\_term=5810](http://nodis.hq.nasa.gov/displayDir.cfm?Internal_ID=N_PR_5810_0001_&page_name=main&search_term=5810)

**NASA Grant and Cooperative Agreement Handbook.** This document is available online at the following address:

[http://prod.nais.nasa.gov/cgi-bin/nais/nasa\\_ref.cgi](http://prod.nais.nasa.gov/cgi-bin/nais/nasa_ref.cgi)

**International Space Station Facilities and Accommodations Overview.** This document is available online at the following address:

[http://www.nasa.gov/pdf/558162main\\_ISS%20Overview\\_HSTI.pdf](http://www.nasa.gov/pdf/558162main_ISS%20Overview_HSTI.pdf)

**Overview of Attached Payload Accommodations and Environments on the International Space Station.** This document is available online at the following address:

[http://www.nasa.gov/pdf/190373main\\_TP-2007-214768.pdf](http://www.nasa.gov/pdf/190373main_TP-2007-214768.pdf)

**Reference Guide to the International Space Station.** This document is available online at the following address:

[http://www.nasa.gov/pdf/508318main\\_ISS\\_ref\\_guide\\_nov2010.pdf](http://www.nasa.gov/pdf/508318main_ISS_ref_guide_nov2010.pdf)