Flight Opportunities

Commercial Spaceflight Federation

NASA Flight Opportunities Overview

June 21, 2016

NASA Flight Opportunities Program

Technology Manager – Stephan Ord

Space Technology Pipeline

Early Stage

- NASA Innovative Advanced Concepts
- Space Tech Research Grants
- Center Innovation Fund

Commercial Partnerships

- SBIR /STTR
- Flight Opportunities
- Centennial Challenges
- Regional Economic Development

TECHNOLOGY PIPELINE

Space Technology Pipeline

Early Stage

- NASA Innovative Advanced Concepts
- Space Tech Research Grants
- Center Innovation Fund

Commercial Partnerships

- SBIR /STTR
- Flight Opportunities
- Centennial Challenges
- Regional Economic Development

TECHNOLOGY PIPELINE

Accessing Flight Opportunities

Multiple paths are available for developing and testing technologies:

- **SpaceTech-REDDI Appendix F1 Solicitations**
  - U.S.-based researchers receive funding to purchase proposed flight service directly from commercial providers
- **NASA Internal Calls for Payloads**
  - U.S. government researchers access testing via contracted commercial suborbital flight providers
- **Announcement of Collaborative Opportunity (ACO)/ Tipping Point Technology Awards**
  - Public-private partnerships to enhance NASA and commercial capabilities

Accessing Flight Opportunities

Multiple paths are available for developing and testing technologies:

- **SpaceTech-REDDI Appendix F1 Solicitations**
  - U.S.-based researchers receive funding to purchase proposed flight service directly from commercial providers
- **NASA Internal Calls for Payloads**
  - U.S. government researchers access testing via contracted commercial suborbital flight providers
- **Announcement of Collaborative Opportunity (ACO)/ Tipping Point Technology Awards**
  - Public-private partnerships to enhance NASA and commercial capabilities

SpaceTech-REDDI Appendix F1 Solicitations

Goal of Solicitation

- Demonstrate crosscutting space technologies in relevant space-like environments using currently available U.S. commercial reduced gravity, high-altitude balloon, and suborbital reusable flight capabilities

External

(Use Any Qualified Flight Vehicle)

SpaceTech-REDDI NRA Appendix F1 Solicitation

Universities

Private Entities (for-profit)

Private Entities (non-profit)

FFRDCs (incl. NASA JPL)

Foreign Entities

w/ Lead U.S. Partner

Internal

(Use IDIQ-2 Contract Flight Vehicles)

NASA Internal Call

STMD Programs

(e.g. GCD, NRA, CIF, SBIR, SST)

Other Mission Directorates

(e.g. ROSES, HOPE, USIP, HERO)

Other Government Agencies

(e.g. FAA)

REDDI F1 – Overview of Past 2016 Solicitation

Eligibility

- TRL 4 at time of submission - hardware should already have been bench tested
- U.S. entities (for-profit & non-profit)
- Foreign entities when in partnership with a U.S. entity – U.S. entity must be lead

Frequency

- External Calls – 2 per year – F1(A) & F1(B)

REDDI F1 Award Details

- Awards up to $300K
  - Max $250K for allowable flight costs (flight costs + indirect costs related to flight cost only)
  - Max $50K for other costs (indirect costs, travel, labor, materials to build flight hardware)
  - Max amounts include any indirect costs if applicable
  - Researchers contract directly with Flight Providers for flights

REDDI F1 – Overview of Past 2016 Solicitation

Topic 1: Demonstration of Space Technology Payloads

Technologies that address one or more needs described in Space Technology Roadmaps (STRs) , National Research Council (NRC) recommendations, Strategic Space Technology Investment Plan (SSTIP), and STMD focus areas

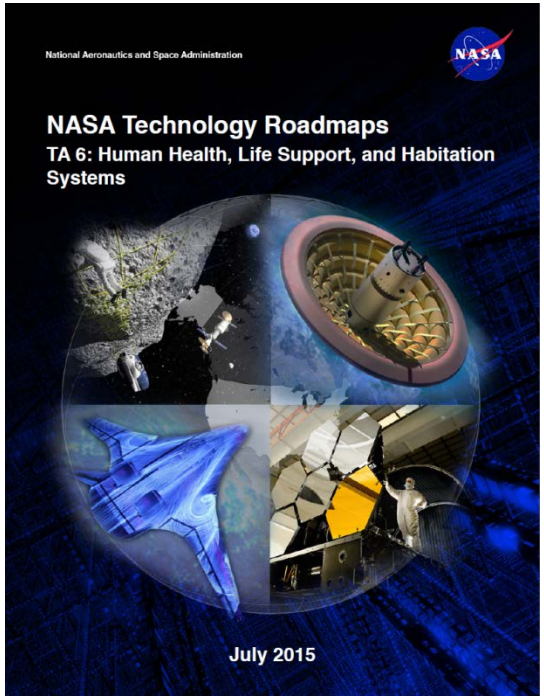

Table 16. Summary of Level 6.4 Sub-Goals, Objectives, Challenges, and Benefits

Level 1		
6.0 Human Health, Life Support, and Habitation Systems	Goals:	Enable long-duration, deep-space human exploration within permissible space radiation exposure limits, minimal resupply consumables, and increased Earth independence.
Level 2		
6.4 Environmental Monitoring, Safety, and Emergency Response	Sub-Goals:	Ensure crew health and safety by protecting against spacecraft hazards and to ensure effective response should an accident occur.
Level 3		
6.4.1 Sensors: Air, Water, Microbial, and Acoustic	Objectives:	Develop sensors capable of monitoring environmental health and accurately determining and controlling the physical, chemical, biological, and acoustic environments of crew living areas and their environmental control systems. Reduce crew time spent monitoring and controlling the spacecraft environment.
	Challenges:	Acoustic risks, such as increases in noise levels due to aging vehicle systems and off-nominal situations.
	Benefits:	Reduces crew time spent monitoring spacecraft environment. Provides physical, chemical, biological, and acoustic monitoring that can reliably provide information germane to the management of the habitable environment needed for human space exploration.
6.4.2 Fire: Detection, Suppression, and Recovery	Objectives:	Ensure crew health and safety by reducing the likelihood of a fire, or, if one occurs, minimizing risk to the crew, mission, and/or system.
	Challenges:	Verifying the flammability limit at length and time scales relevant for spacecraft. Predicting flammability, evaluating material toxicity, and potential toxic or corrosive gas generation in various environments and gravity fields. Advanced fire suppression agents, architectures, and hardware for various types of fires with various spatial configurations in spacecraft under low- and partial-gravity.
	Benefits:	Minimizes false alarms of both particulate and gaseous species detection, as well as distributed sensors. Reduces size and power consumption of both particulate and gaseous species sensors, as well as increased information content and sensor lifetime.

Flight Opportunities – Previous Selections

Topic 1: Demonstration of Space Technology Payloads

A few previous selections from Flight Opportunities:

Principle Investigator	Organization	Technology
George Pantalos	University of Louisville	Suborbital Evaluation of an Aqueous Immersion Surgical System for Reduced Gravity
Steven Collicott	Purdue University	Advancing Diaphragm Modeling Technology for Propellant Management
David Dunand	Northwestern University - Evanston	Microgravity Fabrication of Freeze-cast Titanium Foams
Kevin Crosby	Carthage College	Modal Propellant Gauging in Microgravity
Amir Hirsa	Rensselaer Polytechnic Institute	Droplet Pinning in Microgravity

REDDI F1 – Overview of Past 2016 Solicitation

Topic 2: Demonstration of Vehicle Capability Enhancements and Onboard Research Facilities for Payload Accommodation

Demonstration of new or enhanced onboard facilities for commercial suborbital reusable launch vehicles, reduced gravity aircraft, and high altitude balloons that will improve or enable use of vehicles for science research and/or technology flight test applications

- Desired capabilities include (but are not limited to) the following:
  - Access to the external environment above 80 km for payload exposure to the space environment, sampling, or remote sensing
  - Capabilities such as overboard venting to allow experiments with cryogenic or hazardous materials
  - Implementation of payload ejection at apogee for subsequent payload reentry testing or other operations
  - Interchangeable payload accommodation systems (facilities) that can be used across the industry
  - Payload accommodation systems (facilities) that enable integration of more payloads in the same payload volume
  - Improvements to the microgravity quality of existing suborbital systems through vehicle modifications such as de-spin mechanisms for spin stabilized rockets or payload isolation systems

REDDI F1 – Overview of Past 2016 Solicitation

REDDI F1 Evaluation Criteria

- **Criterion 1 - Relevance to U.S. Space Exploration and Utilization (40%)**
  - Alignment
  - Comparison to State of the Art
  - Infusion Potential

Important for STMD investment decision

- **Criterion 2 - Technical Approach (35%)**
  - TRL Assessment
  - Technology Development Plan
    - Steps required to mature technology towards its intended application
    - Includes degree of support/funding provided to date by other sponsors
    - Demonstrate flight test is required
  - Flight Test Plan
  - Qualifications and Capabilities
- **Criterion 3 - Cost, Value, and Schedule (25%)**
  - Cost – i.e. test plan makes optimal use of flight(s))
  - Value
    - Technology reduces mission and life-cycle costs, increases safety, or reduces risk, etc.
    - Potential to benefit more than one customer or mission type
    - Extent of cost-sharing provided by proposer
  - Schedule

Important Things to Communicate

Technology Need

- Describe current state of the art
- Describe need for improvement
- Describe how your technology will advance the state of the art
- What will I now be able to do?

Technology Concept

- Describe your technology – how does your technology work
- If the technical review panels don't understand how your technology works, it's difficult to evaluate

Flight Test Plan

- Make sure that you have worked out the flight test with the flight provider – minimum number of parabolas, minimum altitude, etc.
- First time flyers – suggest you fly more than once

How Does Your Technology Get Infused?

- Is there a mission requiring it? Technical papers given at conferences?

REDDI F1 – Overview of Past 2016 Solicitation

REDDI F1 Qualified Flight Vehicles

- Reusable suborbital launch vehicles, reduced gravity aircraft, and high altitude balloons
- Proposer's organization will directly purchase the proposed flight(s) on currently available U.S. commercial platforms
- Proposer is responsible for choosing which platform best meets their needs

- **Proposer is not restricted to flight providers historically used for the Flight Opportunities Program**

- Flight Providers must have conclusively demonstrated successful flight(s)
  - Test flights or flights for pay
  - Launched and recovered successfully with payload intact
  - Salient characteristics closely approach one or more of required characteristics, including payload mass and altitude achieved

REDDI F1 – Overview of Past 2016 Solicitation

Qualified Flight Vehicles Cont.

- Vehicle should also meet minimum requirements for reusability
  - With the exception of aircraft used for reduced gravity flight, all vehicles must be capable of achieving minimum altitude of 30 km above MSL OR use propulsion system of a class that can operate in vacuum
  - Rocket propelled vehicles shall be capable of reusing a minimum of 80% of vehicle's mass (excluding propellants and other expendables) within 60 days between flights
  - High-altitude balloons and other types of flight vehicles shall be fully recoverable and reusable, excepting items that are expended in normal flight operations of vehicle

NSPIRES Can be Daunting

Get Started Early!!

NSPIRES - NASA Research Opportunities Online - Mozilla Firefox

File Edit View History Bookmarks Tools Help

nspires.nasaprs.com/external/

NSPIRES - NASA Research Opportunities...

Home NASA Research Help Login

NSPIRES NASA Solicitation and Proposal Integrated Review and Evaluation System

|NSPIRES Time: Nov 27, 2012 02:50PM EST

NSPIRES Home

- Solicitations

Getting Started

- NSPIRES Help
- Getting an Account

Help Desk

If you need help or have any questions regarding the NSPIRES website, please contact the NSPIRES Help Desk at (202) 479-9376 Monday through Friday, 8:00 AM to 6:00 PM EST/EDT, or by email at nspires-help@nasaprs.com.

NASA Web Sites
Click for Links

NASA Research Opportunities

Supporting research in science and technology is an important part of NASA's overall mission. NASA solicits this research through the release of various research announcements in a wide range of science and technology disciplines. NASA uses a peer review process to evaluate and select research proposals submitted in response to these research announcements. Researchers can help NASA achieve national research objectives by submitting research proposals and conducting awarded research. This site facilitates the search for NASA research opportunities.

NASA Research

Solicitations

Search for and view open, closed, past, and future NASA research announcements. The full text of the solicitation announcements can be viewed and downloaded.

Solicitations and selected proposals for years prior to NSPIRES implementation, January 1, 2005, were posted manually; therefore, some postings for years 2000-2004 may not be as complete as those posted through the NSPIRES system from 2005 to the present.

Getting Started

To submit a research proposal to NASA, individuals and the organizations with which they are affiliated must be registered in NSPIRES. Individuals may register at any time.

Organizations are required to have a valid registration with the System for Award Management (SAM) before they can register in NSPIRES. See Registration Information for more details on user and organization registration.

Research.gov

Research.gov is a partnership of federal research-oriented grant making agencies. Research.gov is led by the National Science Foundation.

WARNING:
This is a U.S. Government computer. By accessing and using the computer system, you are consenting to the use of system monitoring. Unauthorized use of, or access to, this computer system may subject you to disciplinary action and criminal prosecution.

Member Login:

Username:

Password:

Login

Forgot Your Password?

Registration Information

Site News

Gmail and NSPIRES email
Your Gmail could be flagging NSPIRES emails as Spam.
Continue Reading

Tutorials and User Guides
Tutorials and user guides are found by clicking the Help tab at the top of any NSPIRES web page.

NRA/CAN Proposer's Guidebook
Available online
Continue Reading

Curator: NASA Research and Education Support Services
NASA Official: Roger L. Sachse
NASA Web Privacy Policy and Important Notices
Website Comments / Technical Issues

Download Adobe Reader

NSPIRES Lessons Learned

Organization Registration

- Registering an org in NSPIRES can take several days
- Org must first be registered in System for Award Management (SAM)
- Start at least two weeks before proposal deadline to make sure enough time
- See NSPIRES FAQ on Organization Registration for more info

Member Registration

- All investigators named on proposal cover page typically have to be registered in NSPIRES
- Registering for individual account is quick, but to affiliate with your organization (required for Principal Investigator), the org has to approve affiliation – may delay process
- See NSPIRES FAQ on Member Registration for more info

Proposal Submission

- Proposal submission process is complex and involves multiple steps
- You are strongly encouraged to begin process well in advance of deadline
- Principal Investigator releases prepared proposal (proposal document upload and NSPIRES cover page elements) to organization, and Authorized Organizational Representative is person who submits proposal to NASA
- Coordination between PI and AOR is essential to submit proposals on time

NSPIRES Tutorials

https://nspires.nasaprs.com/tutorials/

https://nspires.nasaprs.com/tutorials/index.html

NSPIRES

NSPIRES Tutorials and User Guides

Close Window

Using the tabs below, you may access online tutorials on "General Information", "Proposals and NOIs" and "Organizations". These tutorials require special software described in the box called "Tutorial Requirements" immediately to the right. Also available, under "User Guides", are manuals in PDF format that explain typical scenarios and highlight enhancements to existing processes.

Help

If you have any questions or concerns regarding the tutorials, please contact the NSPIRES Help Desk at (202) 479-9376, or by email at nspires-help@nasaprs.com.

Tutorial Requirements

The tutorials for NSPIRES require a Javascript-enabled browser and use Flash for both animation and navigation. We recommend the following to get the full benefit of the tutorials:

- Macromedia Flash plug-in 7.0 or higher
- Screen size of 1024x768 or greater

General Information | Proposals and NOIs | Organizations | User Guides

- Lesson 1: General Information
  Learn about NASA's overall mission and programs in relation to the solicitations and proposals process.
- Lesson 2: Introduction to NSPIRES
  Learn how NSPIRES can help you create and submit proposals to NASA through this introduction to the basic modules of this web application.
- Lesson 3: Organizations
  Learn about the various roles within an organization, such as EBPOC, OAO, and OPOC, and how they participate in the proposal process. This lesson also defines the term affiliation.
- Lesson 4: Members
  Learn about the roles of Principal Investigator (PI), team member and support staff and how they participate in the proposal process. This lesson also defines the term associations.
- Lesson 5: Proposals
  Learn about the characteristics of a proposal, proposal sources, parts of a proposal, tips for writing proposals, and requirements for submitting proposals to NASA.
- Basic Navigation before Registration
  Learn how to navigate within NSPIRES before becoming a registered member.
- User Registration
  Learn how to register for a personal NSPIRES account.
- Basic Navigation after Registration
  Learn how to navigate within NSPIRES after becoming a registered member.

Curator: NASA Research and Education Support Services
NASA Official: Roger L. Sachse
NASA Web Privacy Policy and Important Notices
Website Comments / Technical Issues

Download Adobe Reader

If you have Questions . . .

Flight Opportunities Contact:

Stephan Ord – Flight Opportunities Technology Manager

650-604-5876

sord@nasa.gov

www.nasa.gov/flightopportunities - NASA Website

https://flightopportunities.nasa.gov/ - Technology Details