

Overview of the NASA Small Business Innovation Research (SBIR) Program

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In 1982, the Small Business Innovation Development Act was enacted to award federally funded research grants and contracts to small businesses meeting certain requirements. The program is employed by 11 Federal Agencies, including NASA, to promote technical innovation through infusion of agency-specific Research and Development (R&D) and private commercialization to increase the prosperity of the small business community. Not only do SBIR companies attend ICES conferences, but many NASA participants work directly with these SBIR companies as well. With R&D funding constraints a concern, the constancy of the SBIR Program remains an attractive funding vehicle for government and small business alike in the attainment of their research goals. This presentation will address the background, mechanics, eligibility requirements, and examples of past research projects and award and post award successes, including those currently on ISS, orbiting satellites, and on Mars. The ultimate goal is to increase awareness and participation in the SBIR Program and to provide information regarding technical and administrative assistance and partnership potential with this valuable resource.

Nomenclature

<i>AMC</i>	=	Ames Research Center
<i>ARMD</i>	=	Aeronautics Research Mission Directorate
<i>CCT</i>	=	Center Chief Technologist
<i>COR</i>	=	Contracting Officer Representative
<i>CRP</i>	=	Commercialization Readiness Program
<i>HEOMD</i>	=	Human Exploration and Operations Mission Directorate
<i>HQ</i>	=	Headquarters
<i>MMOD</i>	=	Micro-Meteoroid Debris
<i>PE</i>	=	Program Executive
<i>POC</i>	=	Point of Contact
<i>R&D</i>	=	Research and Development
<i>SBC</i>	=	Small Business Concern
<i>SBIR</i>	=	Small Business Innovation Research

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SMD = Science Mission Directorate
STMD = Space Technology Mission Directorate
STTR = Small Business Technology Transfer
TIM = Technology Infusion Manager

I. Introduction

The purpose of this paper is to present an overview of the NASA SBIR/STTR Program to inform the attendees of the 2015 ICES conference of the benefits, and unique attributes of the program to increase participation and partnering with the small business community.

II. Background of SBIR/STTR Program

The SBIR program was established in 1982 under the Small Business Innovation Development Act “to strengthen the role of innovative small business concerns (SBCs) in Federally –funded research and development (R/R&D)”¹

The Act has been extended through September 30, 2017 and requires any Federal Agency with an R&D budget over \$100,000,000 to participate in the Program and award at least 2.9% of this budget to small businesses for FY 2015.

A. Four Goals of the SBIR Program²

1. Stimulate technological innovation.
2. Meet Federal research and development needs.
3. Foster and encourage participation in innovation and entrepreneurship by socially and economically disadvantaged persons.
4. Increase private-sector commercialization of innovations derived from Federal research and development funding.

B. Participating Federal Agencies

There are currently 11 Federal Agencies participating in the program:

Department of Agriculture:
<http://www.csrees.usda.gov/fo/funding.cfm>

Department of Health and Human Services:
<https://sbir.nih.gov/>

Department of Transportation:
<http://www.volpe.dot.gov/work-with-us/small-business-innovation-research>

Department of Defense:
<http://www.acq.osd.mil/osbp/sbir/>

Environmental Protection Agency:
<http://epa.gov/ncer/sbir/>

Department of Education:
<http://www2.ed.gov/programs/sbir/index.html>

National Science Foundation:
<http://www.nsf.gov/eng/iip/sbir/>

Department of Energy:
<http://science.energy.gov/sbir/>

National Institute of Standards and Technology:
<http://www.nist.gov/tpo/sbir/index.cfm>

NASA:
<http://sbir.gsfc.nasa.gov/>

C. Eligibility

To be eligible to participate in the SBIR Program, the proposing small business must be for-profit, at least 51% American owned and independently operated, and located in the United States with the principal investigator's primary employment with the small business during the project. The small business must consist of 500 or few employees.

D. Solicitations

Each Federal Agency holds a separate solicitation each year. Per each agency's discretion, the solicitations may be held at any time during the year and this time may differ from year to year as well.

III. NASA SBIR/STTR Program

Four NASA Mission Directorates participate in the NASA SBIR Program. They are Human Exploration and Operations Mission Directorate (HEOMD), Science Mission Directorate (SMD), Aeronautics Research Mission Directorate (ARMD) and Space Technology Mission Directorate (STMD), each with their own technology portfolio. The program resides at NASA Headquarters (HQ) in Washington DC and at Ames Research Center (ARC) with one Technology Infusion Manager (TIM) serving as the Point of Contact (POC) for each center.

A. NASA Technology Challenges

Many challenges exist to space exploration. Examples of such challenges are bone loss, radiation exposure, Micro-Meteoroid Debris (MMOD) resistant structures, adequate propulsion technologies, etc. SBIR/STTR awards and partnerships with small businesses and universities hope to mitigate some of these challenges through infusion of new technologies into NASA missions and projects.

B. Solicitation Cycle

a) Development

NASA scientists and engineers at all NASA centers are encouraged to participate in the development of the yearly SBIR/STTR portfolio in any of the four Mission Directorate portfolios.

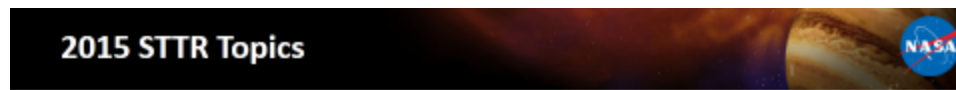
Once ideas are formulated, review boards are held to rank and choose topic and subtopics to be included in the next upcoming solicitation. During this process, the Center Chief Technologists (CCTs) are also asked to support solicitation development and to make sure that the topics and subtopics are aligned with the STMD Technology Roadmaps.

b) Current Portfolio



Aeronautics Research		Human Exploration/Operations	
Topic	Topic Title	Topic	Topic Title
A1	Air Vehicle Technology	H1	In Situ Resource Utilization
A2	Integrated Flight Systems	H2	Space Transportation
A3	Airspace Operations and Safety	H3	Life Support and Habitation Systems
Science		H4	Extra-Vehicular Activity & Crew Survival Sys. Tech.
Topic	Topic Title	H5	Lightweight Spacecraft Materials and Structures
S1	Sensors, Detectors and Instruments	H6	Autonomous & Robotic Systems
S2	Advanced Telescope Systems	H7	Entry, Descent, and Landing Technologies
S3	Spacecraft and Platform Subsystems	H8	High-Efficiency Space Power Systems
S4	Robotic Exploration Technologies	H9	Space Communications and Navigation (SCaN)
S5	Information Technologies	H10	Ground Processing
S6	Low-Cost Small Spacecraft and Technologies	H11	Radiation Protection
Space Technology		H12	Human Research and Health Maintenance
Topic	Topic Title	H13	Non-Destructive Evaluation
Z1	Adv. Power & Energy Storage Systems	H14	ISS Demo & Development of Improved Exploration Technologies & Increased ISS Utilization
Z2	Lightweight Mtls., Structures, Adv. Manuf./Assembly		
Z3	Entry, Descent, and Landing		
Z4	Small Spacecraft Technology		
Z5	Assistive Free-Flyers		
Z6	Advanced Metallic Mtls. & Processes Innovation		

Figure 1. Sample, Fiscal Year 2015 Solicitation Program Content



Example 2015 STTR Topics	
Topic	Topic Title
T1	Launch Propulsion Systems
T2	In Space Propulsion Technologies
T3	Space Power and Energy Storage
T4	Robotics, Tele-Robotics, and Autonomous Systems
T5	Communication and Navigation
T6	Human Health, Life Support, and Habitation Systems
T7	Human Exploration Destination Systems
T8	Science Instruments, Observatories and Sensor Systems
T9	Entry, Descent and Landing Systems
T10	Nanotechnology
T11	Modeling, Simulation, Information Technology and Processing
T12	Materials, Structures, Mechanical Systems and Manufacturing
T13	Ground and Launch Systems Processing
T14	Thermal Management Systems
T15	Aeronautics

Figure 2. Sample STTR Topics

2015 SBIR Select Topics

Example 2015 SBIR Select Subtopics	
Subtopic	Subtopic Title
H20.01	Solid and Liquid Waste Management for Human Spacecraft
S20.01	Novel Spectroscopy Technology and Instrumentation
S20.02	Advanced Technology Telescope for Balloon and Sub-Orbital Missions

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Figure 3. Example, SBIR Select Topics

c) Solicitation Release on the NASA SBIR Webpage

The solicitation release date is the prerogative of the NASA SBIR Program Executive (PE) and may change from year to year. Information of future release dates and the solicitation itself is found on the NASA SBIR Website, www.nasa.sbir.gov. Once the solicitation is released, there begins a “blackout period” in which no one in the NASA SBIR community may answer questions about the solicitation content. The blackout period begins with the release of the solicitation through the announcement of the phase 1 awards on the webpage. Questions regarding the process and administration of the solicitation are allowed, however.

d) Planning Number of Awards

During this period the NASA SBIR management will begin to determine the number of phase 1 awards they will be granting. This determination is based on the funding pool of each particular year and the consideration of other types of awards that must be funded during the fiscal year (see D below).

e) Project Selection

At the close of the solicitation for phase 1 and upon the submission of phase 2 proposals for phase 2, two reviewers are assigned per each proposal to judge them based on four factors: scientific/technical merit and feasibility (50%), experience, qualifications and facilities (25%), effectiveness of the proposed work plan (25%), and commercial merit and feasibility (adjectival). The scores are then averaged and submitted in the SBIR handbook.

Upon the completion of the rankings of each proposal, several review boards are held. The first board occurs within each Topic area in each individual mission directorate. Next, the mission directorates hold their overall boards to lock down the content for the new solicitation. Many discussions are held and some combination(s) of subtopics occur during this period so that the number of subtopics are compatible with predictions of proposals and adequate funding for awards.

f) Announcement of Awards

The date of the announcement of the phase 1 and 2 awards (as well as other awards) is posted to the SBIR website as are the awards themselves on the posted date.

g) CORs/training

Upon the announcements above, the subtopic managers assign a Contracting Officer Representative (COR) to each award to monitor and work with the small business as their NASA POC. Each COR must be certified as having had a COR training class before beginning work with the company.

C. Types of NASA SBIR/STTR Awards

a) Phase 1 awards

Phase 1 awards are for the purpose of the development of a feasibility study. They are funded at values up to \$125K per contract award. They are of six months duration for SBIR award and one year for STTR awards. There are two types of phase one awards, regular and select. Both are alike in funding and duration.

b) Phase 2 awards

Phase 2 awards are for the purpose of the technical development of the feasibility study in phase 1. As is phase 1, there are two types of awards, regular and select. Although both types of these awards last for 2 consecutive years, the regular awards are funded at values of up to \$750K, whereas the select awards are funded at values up to \$1.5M.

c) Phase 3 awards

Phase 3 awards are the follow-on funding provided by non SBIR Program funds. Funding provided by other sources of government funding are traditional phase 3 awards, whereas phase 3s funded by the private sector are called commercializations.

d) Matching Funding Awards

Per the discretion of the SBIR Program Executive, several matching programs may be put in place during the solicitation development that are unique to that specific solicitation. Currently, there are several matching programs in play. A phase 2-Enhancement award (i.e., Phase 2-E) is an SBIR/STTR award that will match up to \$150K. A phase 2-Expanded award will double match up to \$250K for an SBIR/STTR award of up to \$500K. This year, a new matching award, the Commercialization Readiness Program (CRP) award will match between \$100K and \$1.5M.²

e) Examples of SBIR Awards

Because of the strict Intellectual Property rights afforded the company, it is not always easy for the government to discuss the numerous and varied successes that these small business have afforded NASA over the years and this aspect of SBIR was not discussed in this paper at this time.

D. Handbook (who has access, what it is used for)

The SBIR “handbook” is an internal tool that is strictly used by the NASA SBIR community such as SBIR management, Topic Managers, subtopic managers, CORs, reviewers, TIMs and SBIR contractor support. The handbook allows for the submission of rankings, comments, certification of results, etc. as well as the generation of numerous reports, (e.g., the generation of a list of companies working on a specific technology challenge or a report of all SBIR companies in Washington state).

E. Before Submitting a Proposal

An interested small business new to the SBIR/STTR process should review the prior year’s solicitation at www.nasa.sbir.gov and search and identify specific subtopics pertaining to their area(s) of interest. A list of TIMs at each center is available on the website and are available to help the small businesses and even put them in contact with proper subject matter experts in which they may learn of technology needs and priorities prior to the solicitation release (and subsequent black-out period).

F. Intellectual Property and Other Rights

Although NASA may use and infuse the technology developed via an SBIR/STTR award, the company will own the resulting intellectual property, data, copyrights, patents, etc., and are eligible to secure a sole source contract with NASA without going through the rigorous bidding process.

IV. Conclusion

The information in this article serves to help educate Government and private stakeholders as to the many partnering attributes of the NASA SBIR program. The hope is to increase participation between small business and NASA to help solve the challenges NASA faces on the road to Mars. Many small business have been successful partnering and infusing their technologies into NASA missions and projects. With a greater expanse of the knowledge base, partnering can continue to proliferate.

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References

¹Small Business Innovation Research (SBIR) Program Policy Directive, February 24, 2014

²SBIR website (sbir.nasa.gov)