National Aeronautics and
Space Administration

Small Business Innovation Research
Small Business Technology TRansfer

Joseph Grant, PhD
NASA SBIR/STTR Deputy Program Executive
NASA Tech Day Conference
October 1, 2013

Why invest in Space Technology?

- Enables a **new class of NASA missions** beyond low Earth Orbit.
- **Delivers innovative solutions** that dramatically improve technological capabilities for NASA and the Nation.
- Develops technologies and capabilities that make NASA's missions **more affordable and more reliable.**
- Invests in the economy by **creating markets and spurring innovation** for traditional and emerging aerospace business.
- **Engages the brightest minds** from academia in solving NASA's tough technological challenges.

Addresses National Needs

A generation of studies and reports (40+ since 1980) document the need for regular investment in new, transformative space technologies.

Value to NASA **Value to the Nation**

Who:

The NASA Workforce
Academia
Small Businesses
The Broader Aerospace Enterprise

Challenges for Deep Space Exploration

Communication

Environment Control & Life Supporting Systems

Power Generation & Storage

Logistics

Navigation

Entry, Descent & Landing

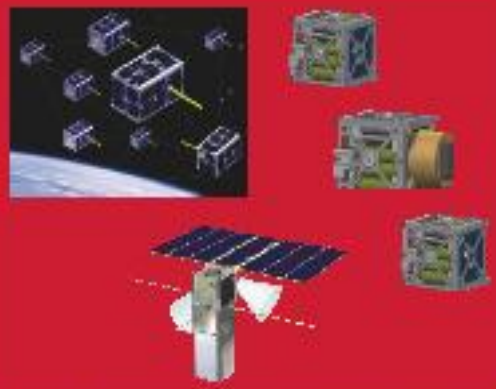
Manufacturing In Space & For Space

Radiation Mitigation

Propulsion

Trends in Space Technology

Small Spacecraft



Entry Descent & Landing

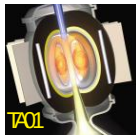
Propulsion

Robotics

Manufacturing

Communications

Space Technology Technical Areas

TA01 

• LAUNCH PROPULSION SYSTEMS

TA02 

• IN-SPACE PROPULSION TECHNOLOGIES

TA03 

• SPACE POWER & ENERGY STORAGE

TA04 

• ROBOTICS, TELE-ROBOTICS & AUTONOMOUS SYSTEMS

TA05 

• COMMUNICATION & NAVIGATION

TA06 

• HUMAN HEALTH, LIFE SUPPORT & HABITATION SYSTEMS

TA07 

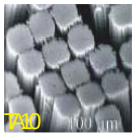
• HUMAN EXPLORATION DESTINATION SYSTEMS

TA08 

• SCIENCE INSTRUMENTS, OBSERVATORIES & SENSOR SYSTEMS

TA09 

• ENTRY, DESCENT & LANDING SYSTEMS

TA10 

• NANOTECHNOLOGY

TA11 

• MODELING, SIMULATION, INFORMATION TECHNOLOGY & PROCESSING

TA12 

• MATERIALS, STRUCTURES, MECHANICAL SYSTEMS & MANUFACTURING

TA13 

• GROUND & LAUNCH SYSTEMS PROCESSING

TA14 

• THERMAL MANAGEMENT SYSTEMS

What are the Space Technology Programs?

NASA Innovative and Advanced Concepts (NIAC) – "Study innovative, technically credible, advanced concepts that could one day 'Change the Possible' in aerospace"

Space Technology Research Grants and Fellowships –Graduate student research fellowships and grants to academia, NASA field centers and not-for-profit R&D laboratories

Center Innovation Fund (CIF) – stimulate innovation within the NASA Centers support emerging technologies and creative initiatives - NASA scientists and engineers lead projects, partnerships with other agencies, academia and private industry are encouraged.

Centennial Challenges – Prize Competitions

Small Business Innovative Research (SBIR)/Small Business Technology Transfer (STTR)

Small Spacecraft Technology Program - Accelerate the development of small spacecraft capabilities for NASA, commercial, and other space sector users.

Flight Opportunities - Create multiple paths through which innovative technologies may be matured from concept to flight by facilitating low-cost access to suborbital environments

Game Changing Development (GCD) – Develop technologies that produce "dramatic" impacts for NASA's Space Exploration and Science Missions; a balanced approach of guided technology development efforts and competitively selected efforts

Technology Demonstration Missions (TDM) - Seeks to mature laboratory-proven technologies to flight-ready status; system-level technology solutions are given the opportunity to operate in the actual space environment

How the SBIR & STTR Programs are Structured at NASA
http://sbir.nasa.gov

SBIR

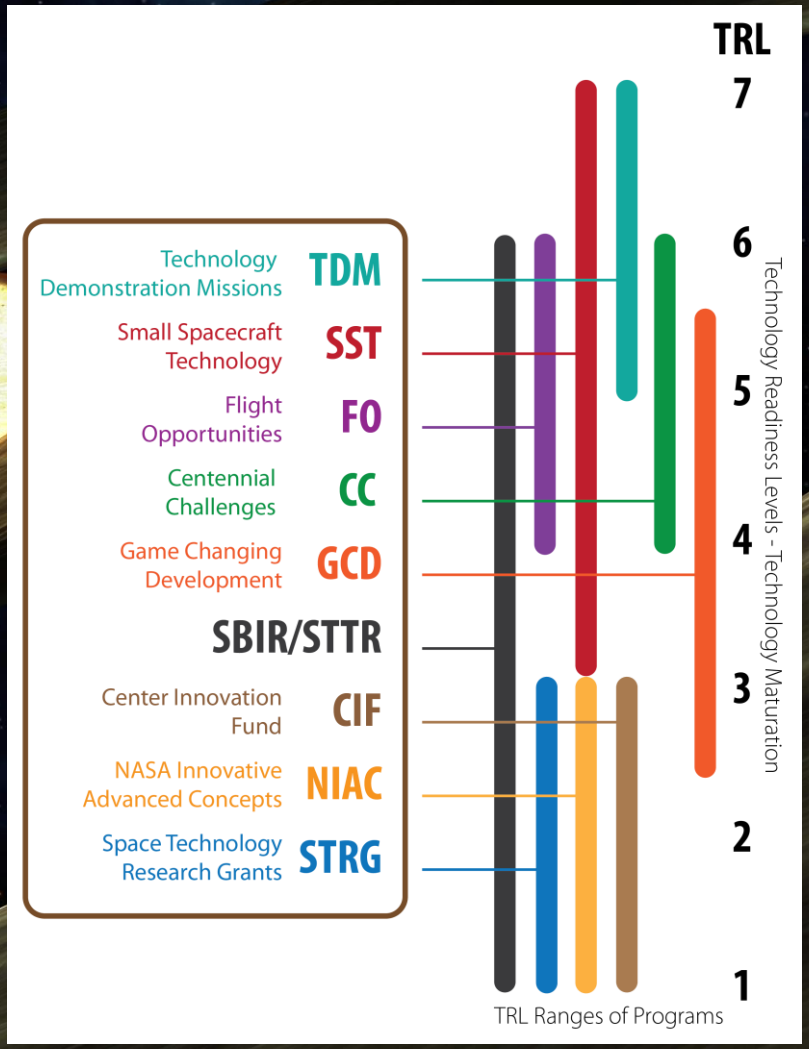
Topics/Subtopics developed to support the needs of NASA's Mission Directorates – Science, Human Exploration & Operations, Aeronautics Research

STTR

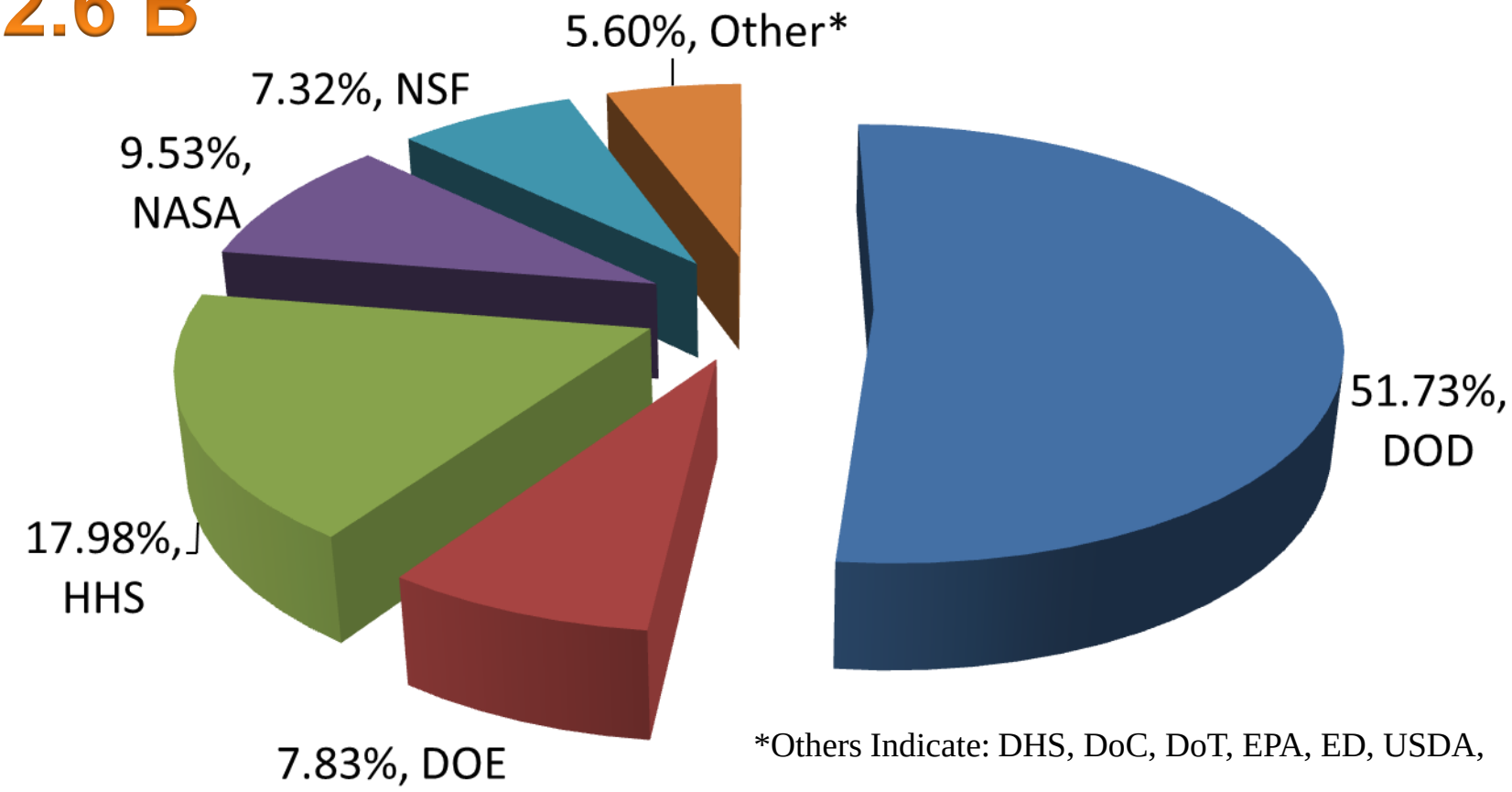
Topics/Subtopics developed to support mid- to long-term technology development needs identified in NASA's "Space Technology Roadmaps" or the National Aeronautics R&D Plan

NASA Centers Play Critical Role

All SBIR/STTR projects are managed at one of NASA's 10 Centers – home to NASA's development projects, research facilities, and Subject Matter Experts



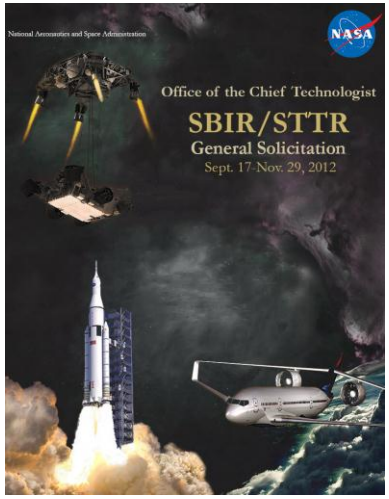
SBIR/STTR Agency Funding FY2011 ~2.6 B



*Others Indicate: DHS, DoC, DoT, EPA, ED, USDA,

2012 General & Select Solicitations

sbir.nasa.gov
www.nasa.gov/spacetech



SBIR/STTR General Solicitation

SBIR Select Solicitation

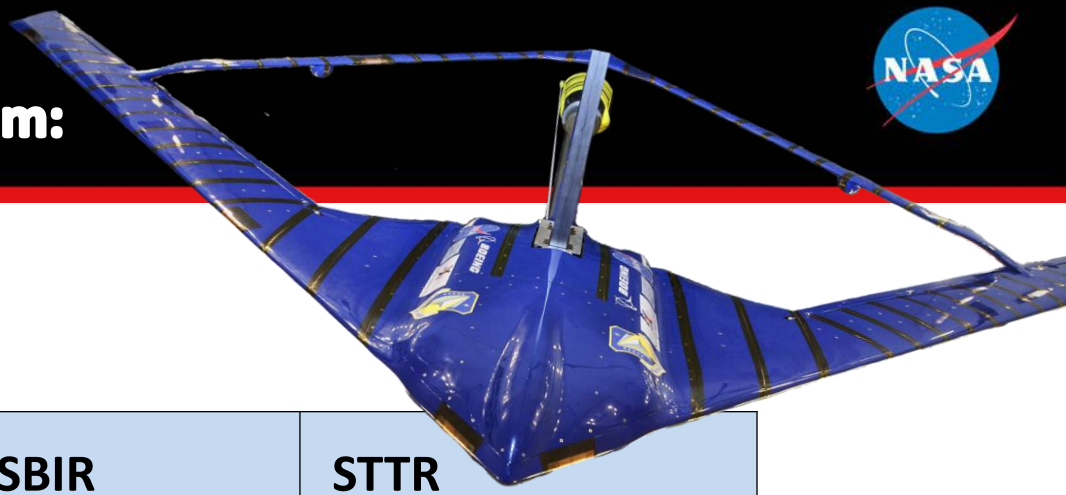
Also learn about NASA technology needs at NSPIRES:
http://nspires.nasaprs.com/external/index.do

ROSES – Research Opportunities in Space and Earth Sciences
http://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={01BFD3EE-87EF-FC55-1F52-EB37A9F139F0}&path=open

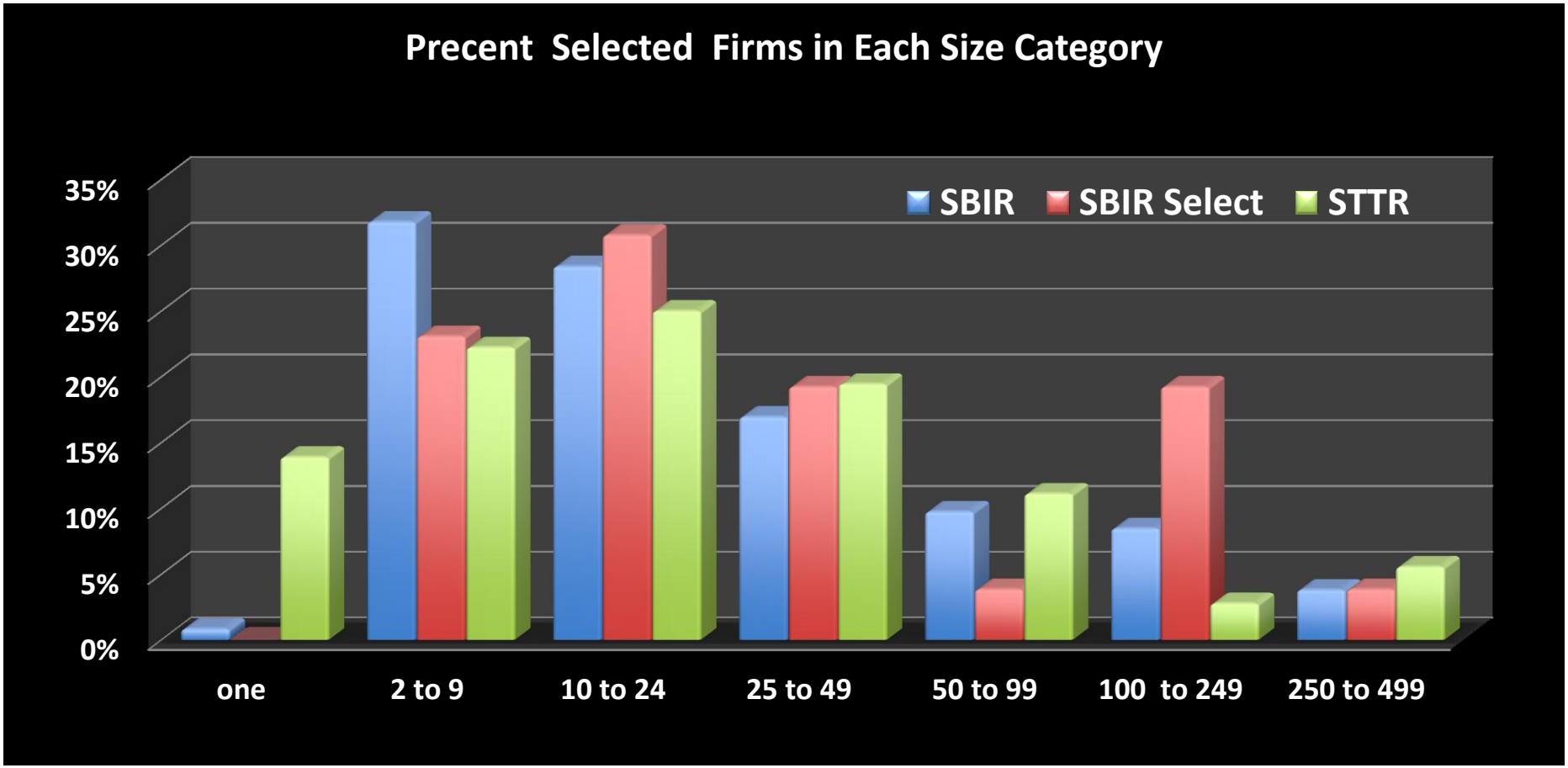
NASA Aeronautics – NASA Research Announcement (NRA)
http://www.aeronautics.nasa.gov/nra.htm

Human Research Program (HRP) – HRP NRA
http://www.nasa.gov/exploration/humanresearch/research_info/overview/SMO_NRA_info_detail.html

SBIR/STTR General Three Phase Program:

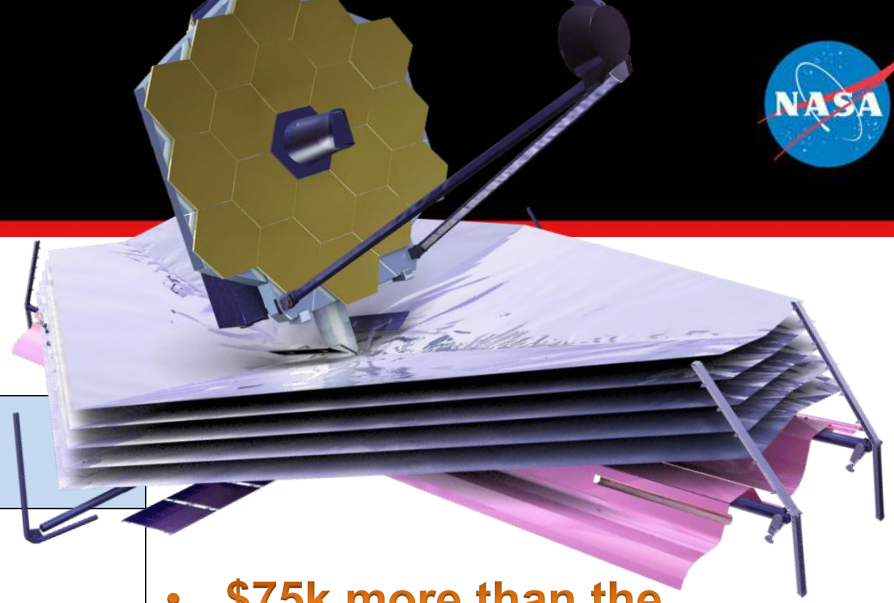


Phase I Contracts	SBIR	STTR
Maximum Contract Value	$125,000	$125,000
Period of Performance	6 months	12 months
Phase II Contracts	**SBIR**	**STTR**
Maximum Contract Value	$750,000	$750,000
Period of Performance	24 months	24 months



- 14% first-time proposer/first-time selectees
- 24% first-time selectees

SBIR Select Three Phase Program:



Select Phase I Contracts	SBIR
Maximum Contract Value	$200,000
Period of Performance	6 months
Select Phase II Contracts	**SBIR**
Maximum Contract Value	$1,500,000
Period of Performance	24 months

- **$75k more than the SBIR/STTR Phase I Contract Value**
- **$$ is double that of the SBIR/STTR Phase II Contract Value**

Only Small Business Concerns (SBC) are invited to submit proposals.

SBIR/STTR General Three Phase Program:

Phase II-Enhancement (II-E)

Phase II-E	Minimum non-SBIR/STTR Funding Required for Eligibility for Matching in Phase II-E	Corresponding SBIR/STTR Program Contribution	Anticipated Period of Additional Performance
	$25,000	$25,000	6-12 Months
	Maximum non-SBIR/STTR Funding to be Matched by SBIR/STTR Program in Phase II-E	Corresponding SBIR/STTR Program Contribution	Anticipated Period of Additional Performance
	$125,000	$125,000	6-12 Months

Phase II-eXpanded (II-X)

Phase II-X	Minimum Funding Required from non-SBIR/STTR NASA Source for Eligibility for Matching in Phase II-X	Corresponding SBIR/STTR Program Contribution	Anticipated Period of Additional Performance
	$75,000	$150,000	12-24 Months
	Maximum Funding Amount from non-SBIR/STTR NASA Source to be Matched in Phase II-X	Corresponding SBIR/STTR Program Contribution	Anticipated Period of Additional Performance
	$250,000	$500,000	12-24 Months

New in SBIR/STTR

- Considering STTR Phase I to be 6 months period of performance
- STTR Pilot Partnering Tool http://www.zyn.com/sbir/partnering/nasa.htm
- Consdiering new timeline for Phase II Enhancement proposals
- SBIR likely to continue Select Topics for 2013
- Required benchmark Transition Rate (P2/P1 awards) is 0.25 over a five year period.
- TAV via IP search tool (http://technology.nasa.gov)

Partnering in STTR

SBIR Gateway

NASA 2013 STTR Partnering Project

This is an independent and FREE service of the SBIR Gateway
and is not affiliated with any government agency
[**Terms of Use**]
Updated August 12, 2013

The STTR program **requires** the small business to partner with a qualified research institution (university, non-profit or FFRDC) in order to compete for funding. Finding the right partner in the limited time of an open solicitation is difficult. This site is designed to help you find a potential partner within a NASA STTR topic of interest, well before the solicitation is released.

STTR topics often have overlap from one year to the next, as several elements in one technology area are explored over the course of time. Therefore NASA is expected to use many of the same topics, with some variation, from their 2012 STTR. NASA's SBIR and STTR solicitations are targeted to be released in November of 2013. Be sure to check their official website for dates and information at www.sbir.nasa.gov.

Click on the "**Select Topics**" button below to register your areas of interest. Click "**Partnering List**" to view a listing of organizations already registered to find a partner on a selected topic. [The Partnering List page will open on or before (whatever date we want) and the database will be updated daily as more entries are received.]

The sooner your register the better your chances for finding a high quality partner.

Select Topics | Partnering List

Take me to NASA SBIR/STTR

Partnering in STTR

SBIR Gateway

NASA 2013 STTR Solicitation Partnering Form

This is an independent effort of the SBIR Gateway
and is not affiliated with DoD or any other government agency
[Terms of Use]

Quick Search NASA STTR Topics Descriptions GO

NASA 2012 STTR Topics

Click on the "**View**" link to see a list of potential partners for a particular topic. The information contained should be considered "as is" and has not been verified. Please see our Terms of Use statement above.

This is a database of Universities, small businesses, Federal Funded Research & Development Centers (FFRDCs), and non-profit research organizations that have expressed an interest in finding a partner for the upcoming NASA STTR 2013 solicitation.

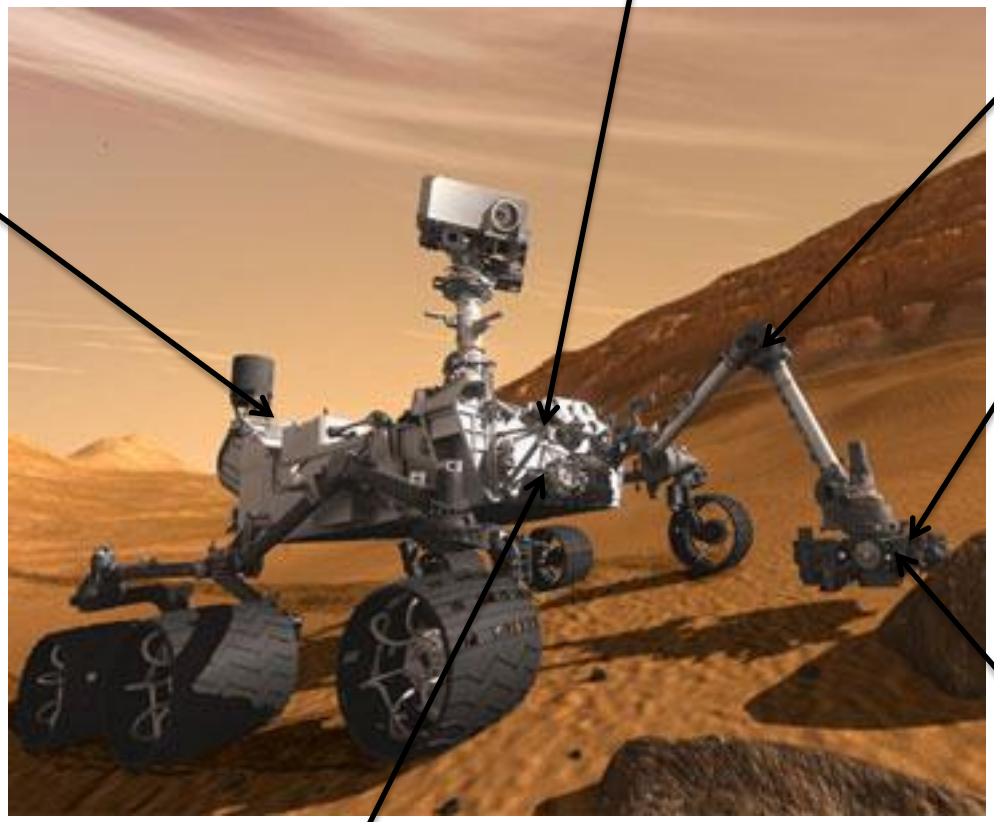
This database just opened so it may be a week before there are many organizations listed.

View	T1.01	Launch Vehicle Propulsion Technologies
View	T2.01	Space Power and Propulsion
View	T3.01	Energy Harvesting Technology Development
View	T4.01	Information Technologies for Intelligent and Adaptive Space Robotics
View	T4.02	Dynamic Servoelastic (DSE) Network Control, Modeling, and Optimization
View	T4.03	Extreme Particle Flow Physics Simulation Capability
View	T5.01	Autonomous Navigation in GNSS-Denied Environments
View	T6.01	Space Synthetic Biology and Food Production Technologies for Space Exploration
View	T8.01	Innovative Subsystems for Small Satellite Applications
View	T8.02	Technologies for Planetary Compositional Analysis and Mapping
View	T8.03	Science Instruments for Small Missions (SISM)
View	T9.01	Technologies for Aerospace Experimental Capabilities
View	T10.01	Innovative Refractory Materials for Rocket Propulsion Testing
View	T11.01	Software Framework & Infrastructure Development of Spaceborne Hybrid Multicore/FPGA Architectures
View	T11.02	Distributed Simulation for Design and Manufacturing

Key Successes – Curiosity Rover

Yardney Technical Products, Pawcatuck, CT
Lithium ion batteries

Creare, Hanover NH
Space-qualified vacuum pump



Starsys Research, Boulder, CO
Gearboxes for robotic arm

Honeybee Robotics, NY, NY
Dust removal tool

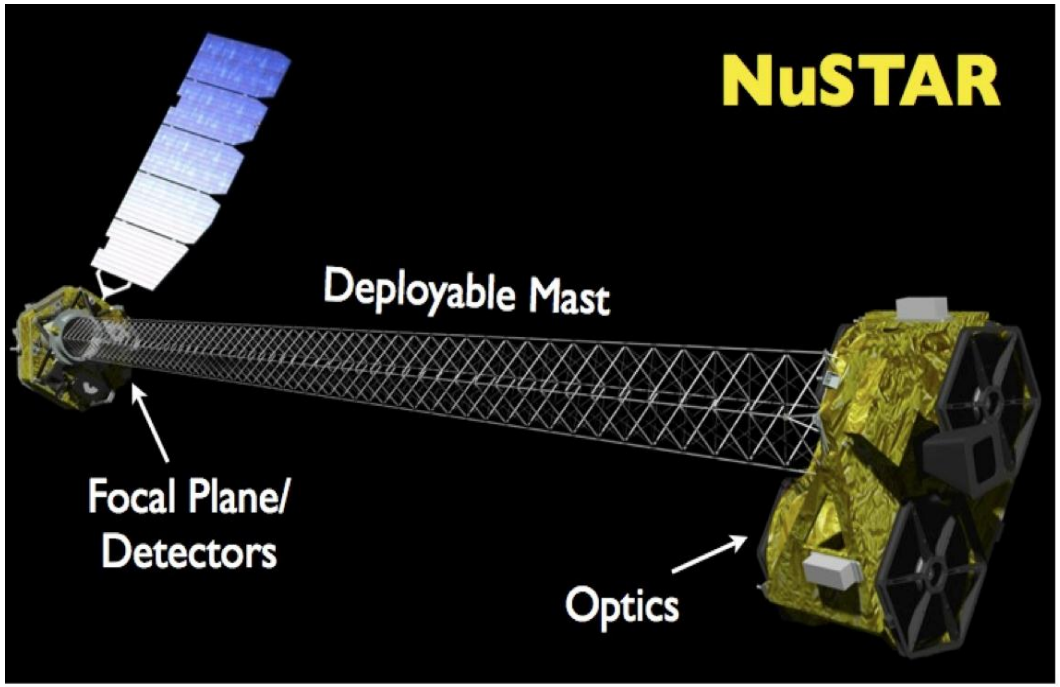
inXitu, Campbell, CA
Chemistry and Mineralogy experiment (CheMin) instrument

Grammatech, Ithica NY -
Software for rover operations

Key Successes – NuStar

"NuSTAR will help us find the most elusive and most energetic black holes, to help us understand the structure of the universe"

-Fiona Harrison, NuSTAR principal investigator



AEC-Able Engineering Company developed a 10 meter long boom for the Nuclear Spectroscopic Telescope Array (NuSTAR). The boom supports key focusing elements of the high energy X-ray observatory.

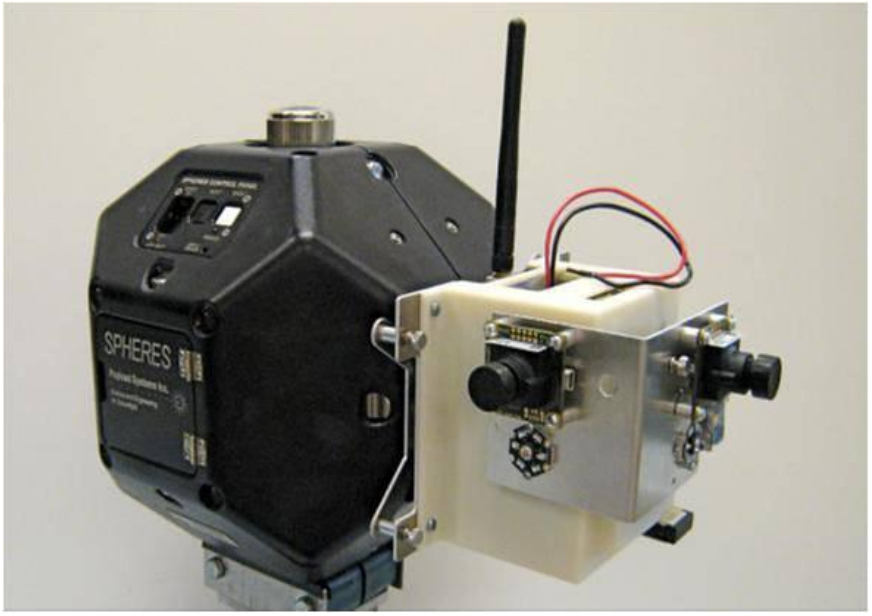
NuSTAR, a NASA SMD SMEX mission, successfully deployed the first focusing telescopes to image the sky in the high energy X-ray region of the electromagnetic spectrum on June 13, 2012 with the boom following on June 21, 2012.

Key Successes - SPHERES

"The tests that we are conducting with Smart SPHERES will help NASA make better use of robots as assistants to and versatile support for human explorers -- in Earth orbit or on long missions to other worlds and new destinations"

-Terry Fong, Project Manager of the Human Exploration Telerobotics project and Director of the Intelligent Robotics Group (Ames)

Aurora Flight Sciences Corp. – receives Phase III funding in July 2012 to further develop the Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES). These are bowling-ball sized spherical satellites that are used inside the space station to test a set of well-defined instructions for spacecraft performing autonomous rendezvous and docking maneuvers.



NASA Small Business in the Press

USA TODAY | NEWS | SPORTS | LIFE | MONEY | TECH | TRAVEL | OPINION | WEATHER

NASA gung-ho about small business

Oliver St. John, USA TODAY

Comments | Share

(Photo: Honeybee Robotics)

STORY HIGHLIGHTS

- NASA has surpassed its annual small-business contracting goal by over 28%
- Tech developed by small businesses played "significant role" in Mars Curiosity mission, says NASA
- NASA program raises rewards for small-business innovation in select topics up to $1.5 million

11:22PM EDT October 9. 2012 - You don't have to be a giant like Lockheed Martin or Boeing anymore to make out-of-this-world stuff for space missions.

That's because small businesses are no longer being treated like so much space dust by the federal government. There's a new recognition that small businesses are innovation hubs and can turn around space jobs more quickly for less cash. Perhaps that's why NASA has surpassed its annual small-business contracting goal by over 28%, spending $2.6 billion on small-business contracts.

Honeybee Robotics, for example, is a small space technology company of about 40 employees based in Manhattan. On its résumé: a sample storage system that acts as a robotic lab assistant for the Mars Curiosity Rover, which landed in August, as well as a robotic dust-removal tool to brush off Martian rock samples.

"We have a very lightweight overhead system that allows us to be agile, flexible, and maneuver quickly to customer needs," says Honeybee President Kiel Davis. The "behemoths" that get the bulk of NASA contracts are "very expensive. They're slow, and there's a lot of bureaucracy," he says.

"Sources of Innovation"

Now more than ever, small businesses have a crack at working with NASA. Sept. 17, NASA raised the stakes on its Small Business Innovation Research program, or SBIR, adding higher rewards for small businesses developing concepts or prototypes in areas of space technology.

Comment | Share | Print | Feedback

USA Today, Money Secion

http://www.usatoday.com/story/money/business/2012/10/09/small-business-contracts-nasa-mars-rover/1592105/

NASA SBIR/STTR Economic Impact

http://www.nasa.gov/offices/oct/partnership/economic_impacts.html

National Aeronautics and Space Administration

NASA's Impact in Ohio: A Tech Transfer Perspective

You know that NASA studies our planet, our sun, the solar system, and the Universe.
But did you know about the space program's economic impact here on Earth?

In 2011, NASA invested nearly **$270 million** in the state of Ohio.

Since 2001, NASA's SBIR/STTR Program has invested almost **$40 million** in **51 Ohio companies** and more than **$1.2 billion** nationwide.

How NASA's SBIR/STTR Program Benefits Ohio

NASA is committed to moving technologies and innovations into the mainstream of the U.S. economy, and the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) program helps fulfill this goal.

SBIR/STTR stimulates technological innovation by encouraging small, high-tech companies—particularly minority and disadvantaged businesses—to partner with NASA to help meet its research and development needs in key technology areas. At the same time, this program strengthens small companies by enabling them to bring cutting-edge new products into the U.S. economy.

The list to the right highlights Ohio businesses that received SBIR/STTR contracts from NASA since 2001. (Visit http://sbir.nasa.gov for more information on the SBIR/STTR program.)

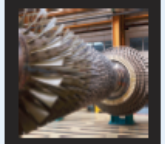
NASA SBIR/STTR Companies in Ohio

A&P Technology	Cincinnati
ADMA Products, Inc.	Hudson
Advanced Coatings International	Akron
Alphaport, Inc.	Cleveland
AP Solutions, Inc.	Brookpark
Applied Sciences, Inc.	Cedarville
BIOMEC, Inc.	Cleveland
Cleveland BioLabs, Inc.	Cleveland
Cognitive Systems Engineering, Inc.	Ostrander
Cornerstone Research Group, Inc.	Dayton
Edaptive Computing, Inc.	Dayton
Energy Focus, Inc.	Solon
Essential Research, Inc.	Cleveland
General Nano, LLC	Cincinnati
Genvac AeroSpace, Inc.	Cleveland
H-Cubed, Inc.	Olmsted Falls
Hyper Tech Research, Inc.	Columbus
Innovative Scientific Solutions, Inc.	Dayton
Iten Industries	Ashtabula
KJB Consultants	Strongsville
Lake Shore Cryotronics, Inc.	Westerville
Lambda Technologies	Cincinnati
Modern Computational Technologies, Inc.	Cincinnati
N&R Engineering	Cleveland
Nastec, Inc.	Brook Park
NexTech Materials, Ltd.	Lewis Center
NTI, Inc.	Fairborn
Orbital Research, Inc.	Cleveland
Pentalim Corporation	Findlay
pH Matter, LLC	Columbus
PHPK Technologies	Columbus
Powdermet, Inc.	Euclid
RHAMM Technologies, LLC	Bellbrook
RNET Technologies, Inc.	Dayton
SenAnTech, Inc.	Columbus
Sest, Inc.	Middleburg Hts.
Sierra Lobo, Inc.	Fremont
Spectra Research, Inc.	Dayton
Spectral Energies, LLC	Dayton
Sun Valley Technology	Warrensville Hts.
Sunpower, Inc.	Athens
SynGenics Corporation	Delaware
Syscom Technology, Inc.	Columbus
Taitech, Inc.	Beavercreek
TechLand Research, Inc.	North Olmsted
Technology Management, Inc.	Cleveland
Teraphysics Corporation	Cleveland
UES, Inc.	Dayton
WebCore Technologies, LLC	Miamisburg
Wright Materials Research Company	Beavercreek
ZIN Technologies, Inc.	Middleburg Hts.

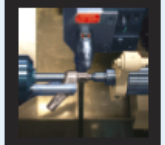
ohio

www.nasa.gov

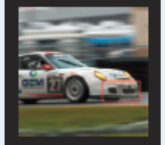
How NASA Spinoffs Benefit Ohio



Coatings Extend Jet Engine Life and Protect Steel Structures *(Euclid)*
A NASA scientist's groundbreaking work in thermal barrier coatings has led to advanced coating techniques that enhance jet engine performance, improve fuel economy, and increase component life by 50 percent. The groundbreaking technology, developed and commercialized by MesoCoat, Inc., also offers an environmentally friendly method for extending the maintenance life of steel structures, such as oil and gas pipes, bridge beams, ships, water pipes, and mining equipment.



SBIR Partnership Strengthens Orthopedic Implants *(Cincinnati)*
Low plasticity burnishing (LPB), a process developed to extend the life of metal components on aging aircraft, is now being used to strengthen and enhance orthopedic implants. NASA funding helped Lambda Technologies develop LPB processes that have increased the fatigue life of more than 3,400 hip implants. LPB increases the life span of hip implants by over 100 times, reducing the need for costly and time-consuming replacements.



Durable Patch Allows For Quick Repairs *(Dayton)*
CRG Industries, LLC has created tough, reusable patches that enable quick repairs on cars, trucks, and outdoor recreational equipment. NASA funded the design of a lightweight, moldable material to assist astronauts in making repairs on the International Space Station. The patches are now helping campers, boaters, vacationers, and adventurers when they need an emergency, temporary structural patch, and they enable quick repairs on damaged motor vehicles.

Partnership Enables More Efficient Wind Energy *(Miamisburg)*
Through a NASA SBIR contract, A&P Technology has adapted lightweight, high-strength composite materials to help create lighter, larger, and more efficient wind turbine blades. A&P's fiber-reinforced foam sandwich panel can also be used for a wide variety of industrial and consumer applications; e.g., developing lighter weight, higher strength vehicles, bridges, cargo shipping containers, military shelters, manhole covers, and more.

Light Filter Improves Medical Imaging *(Westerville)*
Lake Shore Cryotronics, Inc. partnered with NASA to create robust infrared optical filters that enable scientists to peer into the universe without being impeded by cosmic dust clouds. The partnership has since provided Lake Shore Cryotronics with a cross-cutting technology that can be used in other markets, including the growing field of terahertz imaging, opening up new applications in biomedical imaging, security screening, and the detection of explosives.

Liquid-Sensing System Monitors Supercooled Liquids *(Fremont)*
An innovation originally developed for monitoring supercooled liquids on NASA rockets and space systems is now benefitting companies that routinely use or store cryogens. Sierra Lobo, Inc., a small, minority-owned enterprise, has patented a system that accurately measures the fluid level and temperature profiles of liquid helium, hydrogen, nitrogen, and oxygen. The NASA-derived technology enables more efficient monitoring of cryogenic liquids in the medical, metals processing, and semiconductor manufacturing industries.

NASA actively seeks partnerships with U.S. companies that can license NASA innovations and create "spinoffs" in areas such as health and medicine, consumer goods, transportation, renewable energy, and manufacturing. When businesses leverage NASA technologies to develop new products, it not only benefits the regional economy, but significantly strengthens the nation's competitiveness in the global marketplace.

NASA's centers across the country—including Glenn Research Center in Ohio—have helped 79 Ohio companies develop revolutionary spinoff technologies.

Learn more about how NASA innovations benefit the public in *Spinoff*, an annual publication that highlights NASA's most significant technology transfer successes. (Available at: http://www.sti.nasa.gov/tto)

National Aeronautics and Space Administration

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www.nasa.gov

NP-2012-01-818-HQ | 01.31.12