



# The NASA Small Business Innovation Research (SBIR) AND STTR Program

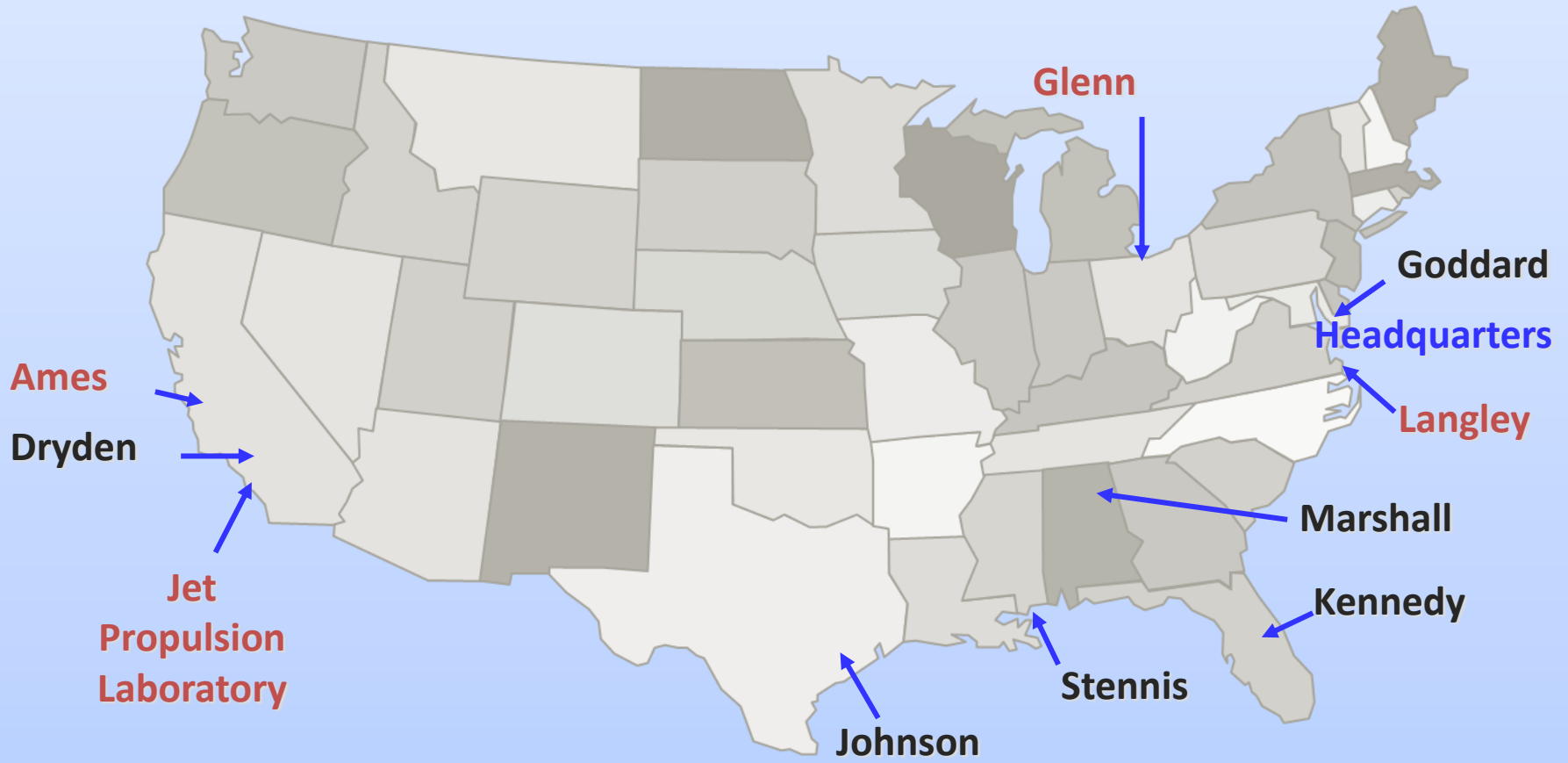
2011 FLC MAR Annual Meeting  
Cambridge, MD

**Darryl Mitchell**

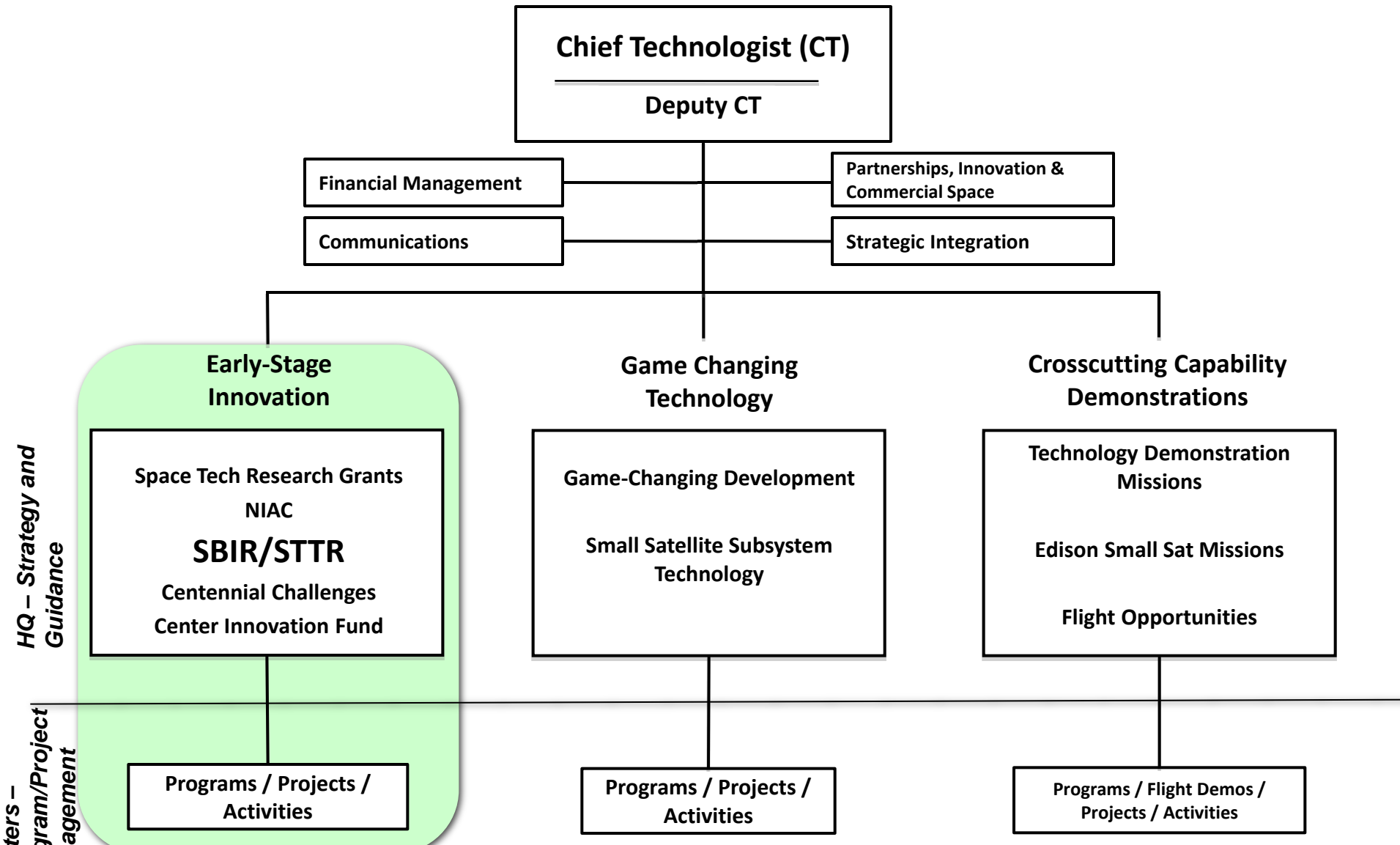
Senior Tech Manager  
NASA Goddard Space Flight Center

October 5, 2011

# NASA Participating Centers

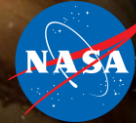


# NASA Office of the Chief Technologist (OCT)



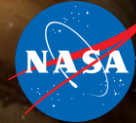
HQ – Strategy and Guidance  
Centers – Program/Project Management

# NASA Strategic Approach

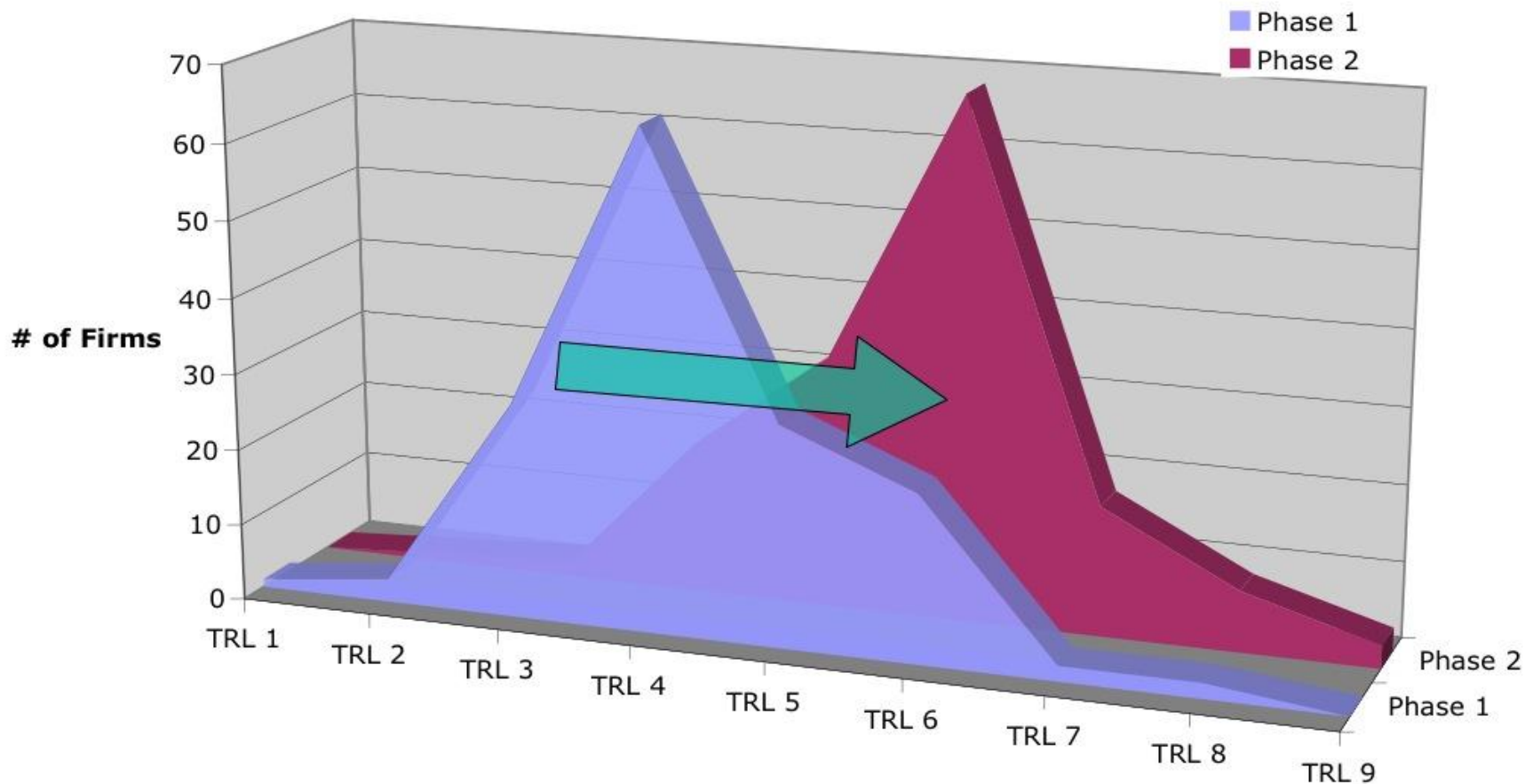


- **Every technology development investment dollar is critical to the ultimate success of NASA's mission**
  - Ensure alignment and integration with Mission Directorates' priorities
  - Investments should be complementary with technologies being pursued by
    - Other OCT investments and partnerships
    - Mission Directorates' programs and projects
    - Prime contractors
    - Other agency SBIR/STTR investments
- **Ultimate objective is to achieve infusion of critical technologies into NASA's Mission Directorates'**
  - Flight programs/projects
  - Ground or test systems
  - Other uses to advance NASA's mission
- **Mission Directorates establish high priority needs and existing gaps**
  - High priority needs are developed into topics for the annual solicitation
  - Subtopics may be clustered to support the development and maturation of critical technologies for infusion

# Phase II Technology Advancement Profile



### Firm Estimated TRL at Completion of Contract



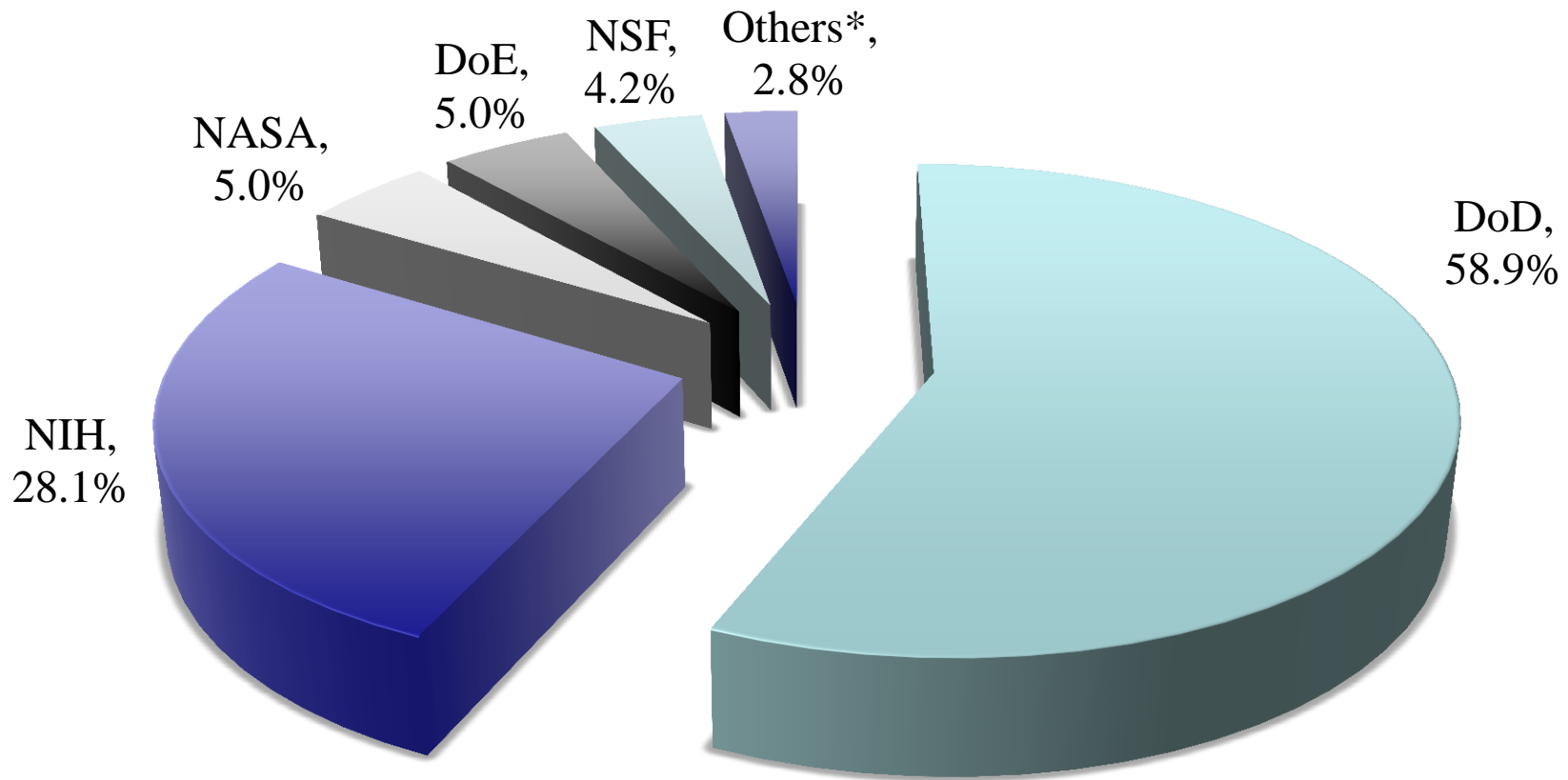
### All Mission Directorates Combined

# SBIR/STTR: 3-Phase Programs



- **Phase 1**
  - Feasibility study
  - **\$125K Contract Award**
  - 6 months duration (SBIR)
  - 12 months duration (STTR)
- **Phase 2**
  - Technology Development
  - 2-Year Contract Award
  - **\$750K (SBIR/STTR)**
  - **\$250K Phase-2E/Phase 3 Bridge Option (New program Feature)**
- **Phase 3**
  - Technology Infusion/Commercialization Stage
  - Use of non-SBIR Funding Agreements
  - Ability to award sole-source contracts without further need for Justification Other than Full and Open competition; (No JOFOC) based on specific SBIR authority

# SBIR/STTR Agency Funding FY2010 ~2.6 B



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

# Budget and Award Numbers



<b>SBIR</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11*</b>	<b>FY12</b>
<b>Millions of \$</b>	<b>113.4</b>	<b>124.1</b>	<b>124.1</b>	<b>154.7</b>
<b>Phase 1 Awards</b>	<b>335</b>	<b>366</b>	<b>450</b>	<b>TBD</b>
<b>Phase 2 Awards</b>	<b>143</b>	<b>152</b>	<b>215</b>	<b>TBD</b>
<b>Phase 2E Awards</b>	<b>N/A</b>	<b>N/A</b>	<b>25</b>	<b>TBD</b>

\* PY 2009 solicitation Phase 2 and PY 2010 solicitation Phase 1 awards

<b>STTR</b>	<b>FY09</b>	<b>FY10</b>	<b>FY11</b>	<b>FY12</b>
<b>Millions of \$</b>	<b>13.6</b>	<b>14.1</b>	<b>14.1</b>	<b>18.6</b>
<b>Phase 1 Awards</b>	<b>32</b>	<b>42</b>	<b>45</b>	<b>TBD</b>
<b>Phase 2 Awards</b>	<b>16</b>	<b>18</b>	<b>27</b>	<b>TBD</b>
<b>Phase 2E Awards</b>	<b>N/A</b>	<b>N/A</b>	<b>0</b>	<b>TBD</b>

Assumes

Phase I =125K

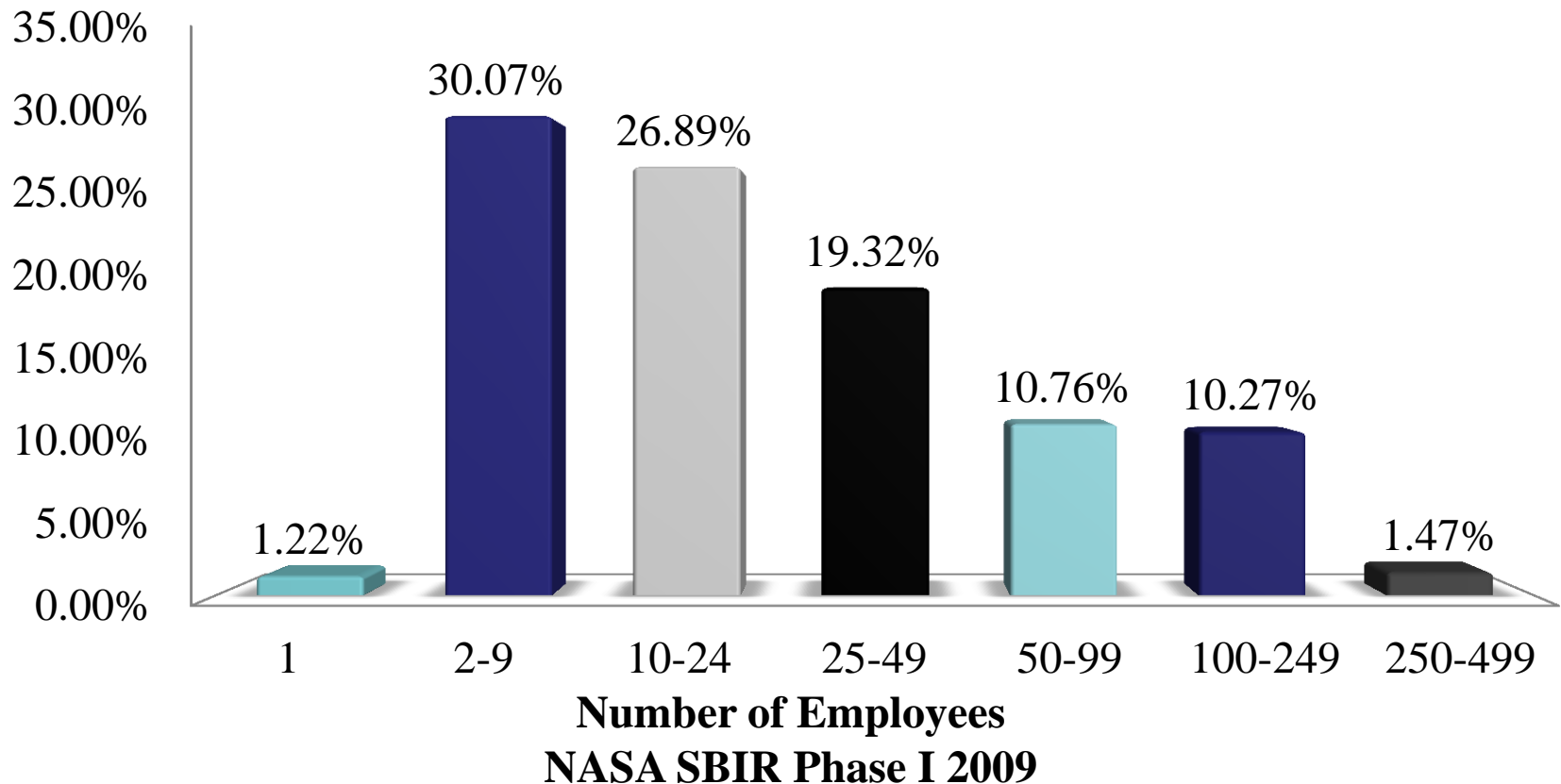
Phase II = 750K

Phase IIE =250K

# Who Participates in NASA SBIR?



- ✓ Firms are typically small and new to the program
- ✓ About 1/3 are first-time Phase I awardees.
- ✓ Small hi-tech firms from across the country.



# SBIR FY 2011 Solicitation Program Content



## Aeronautics Research

Topic	Topic Title
A1	Aviation Safety
A2	Fundamental Aeronautics
A3	Airspace Systems
A4	Aeronautics Test Technologies
A5	Integrated System Research Project (ISRP)

## Science

Topic	Topic Title
S1	Sensors, Detectors and Instruments
S2	Advanced Telescope Systems
S3	Spacecraft and Platform Subsystems
S4	Low-Cost Small Spacecraft and Technologies
S5	Robotic Exploration Technologies
S6	Information Technologies

## Space Operations

Topic	Topic Title
O1	Space Communications
O2	Space Transportation
O3	Processing and Operations
O4	Navigation

## Exploration Systems

Topic	Topic Title
X1	In Situ Resource Utilization
X2	Propulsion
X3	Life Support and Habitation Systems
X4	Extra-Vehicular Activity Technology
X5	Lightweight Spacecraft Materials and Structures
X6	Autonomous Systems and Avionics
X7	Human-Robotic Systems
X8	High-Efficiency Space Power Systems
X9	Entry, Descent, and Landing (EDL) Technology
X10	Cryogenic Propellant Storage and Transfer
X11	Exploration Crew Health Capabilities
X12	Exploration Medical Capability
X13	Behavioral Health and Performance
X14	Space Human Factors and Food Systems
X15	Space Radiation
X16	In-flight Biological Sample Preservation and Analysis

# 2011 NASA STTR Topics



- Center 2011 Technology Investments
- Atmospheric Flight Research and Technology Demonstration
- Technologies for Space Exploration
- Innovative Sensors, Support Subsystems and Detectors for Small Satellite Applications
- Technologies for Compositional Analysis and Mapping
- Innovative Technologies and Approaches for Space
- Ground Effects of Launch Acoustics, Payload Integration, and Flexible Polymer Foam Systems
- Autonomous Systems
- Technologies for Human and Robotic Space Exploration Propulsion Design and Manufacturing
- Rocket Propulsion/Energy Conservation

# Proposal Review & Selection Criteria



- Proposal Review
    - Factor 1: Scientific/Technical Merit and Feasibility (50%)
    - Factor 2: Experience, Qualifications and Facilities (25%)
    - Factor 3: Effectiveness of the Proposed Work Plan (25%)
    - Factor 4: Commercial Merit and Feasibility (adjectival)
    - Factor 5: Price Reasonableness
  - Proposal Ranking and Selection
    - Phase I: Technical Merit > Commercial Merit
    - NASA Project/Mission Alignment
    - Value, Priority and Infusion Potentials
    - Champion/Advocate
- 
- The diagram consists of three vertical curly braces on the right side of the slide. The first brace groups Factors 1, 2, and 3, with the label "Technical Merit" written vertically to its right. The second brace groups Factors 4 and 5, with the label "Selection for Negotiation" written vertically to its right. The third brace groups the entire list of factors (1 through 5), with the label "Selection for Award" written vertically to its right.



- **NASA SBIR "TAV" Subtopics**

- Technology Available (TAV) Subtopics
    - NASA-owned patents
    - NASA developed public domain technology
  - Research license required for patented technology
    - Non-exclusive
    - Royalty-free
  - Use of NASA IP and/or technology not required
  - Follow-on license required if commercialization desired
  - Based on pioneering effort at NIST
- 
- S3.05 Power Electronics and Management, and Energy Storage
    - Patent [6,461,944](#), Methods for growth of relatively large step-free SiC crystal surfaces Neudeck, et al. October 8, 2002
  - S3.08 Unmanned Aircraft and Sounding Rocket Technologies
    - Patent [7,431,243](#) Guidance and Control for an Autonomous Soaring UAV, Allen, Michael J., October 7, 2008



- **Phase II Enhancement (PII-E) SBIR**
  - Encourage transition of Phase II contracts into Phase III awards
  - Cost shared extension of efforts to current Phase II
  - Requires third-party investor
  - Matching SBIR/STTR funds up to \$250,000
  - Total cumulative award can not exceed \$1,000,000
- **Goddard Next Steps Workshops**
  - Spring & Fall workshops annually
  - Focus on SBIR Program and alternative routes to Phase III

## Virginia Diodes, Inc.

### – High Reliability Oscillators for Terahertz Systems

#### **INNOVATION:**

Developed frequency multipliers and multiplier chains with improved performance and reliability for NASA missions.



Complete Oscillator System with Enhanced Frequency Multiplier

#### **NASA APPLICATIONS**

- Radio Astronomy
- Earth & Atmospheric Studies
- Planetary Exploration

#### **ACCOMPLISHMENTS:**

- Designed, developed and demonstrated series of varactor multiplier circuits suitable for use in space based radio astronomy and Earth remote sensing programs.
- Developed methods to investigate complex interactions between cascaded frequency multipliers.
- Demonstrated a new directional coupler technology

#### **COMMERCIALIZATION:**

- \$2.3 million in sales attributable to the work done under this contract.
- Customers in government agencies, university, industry, in the US and abroad.
- New designs in use on a few commercial satellite projects and as prototypes for future missions.

# Outreach & Publications



<http://www.techbriefs.com/>

Electronics & Computers  
Semiconductors & ICs  
Mechanics  
Information Sciences  
Materials Software  
Manufacturing & Prototyping  
Machinery & Automation  
Physical Sciences  
Bio-Medical Test & Measurement



<http://www.sti.nasa.gov/tto/>



<http://ipp.nasa.gov/innovation/index.html>

<http://sbir.nasa.gov>

# SBIR/STTR Program Current Year Submission & Schedule



## 2011 Program Solicitation

- Opening Date: 07/18/2011
- Closing Date: 09/08/2011
- Announcement: 11/23/2011

<http://sbir.nasa.gov>



# SBIR/STTR Center Points of Contact



## SBIR Program Management:

- Program Executive: Dr. Richard Leshner, [Richard.B.Leshner@nasa.gov](mailto:Richard.B.Leshner@nasa.gov), Headquarters
- Program Manager, Gary Jahns, [Gary.C.Jahns@nasa.gov](mailto:Gary.C.Jahns@nasa.gov), Ames Research Center (ARC)
- Business Manager, Carlos Torrez, [Carlos.Torrez@nasa.gov](mailto:Carlos.Torrez@nasa.gov), Ames Research Center (ARC)
- Technology Infusion Manager, Rich Pisarski, [Ryszard.L.Pisarski@nasa.gov](mailto:Ryszard.L.Pisarski@nasa.gov), Ames Research Center (ARC)

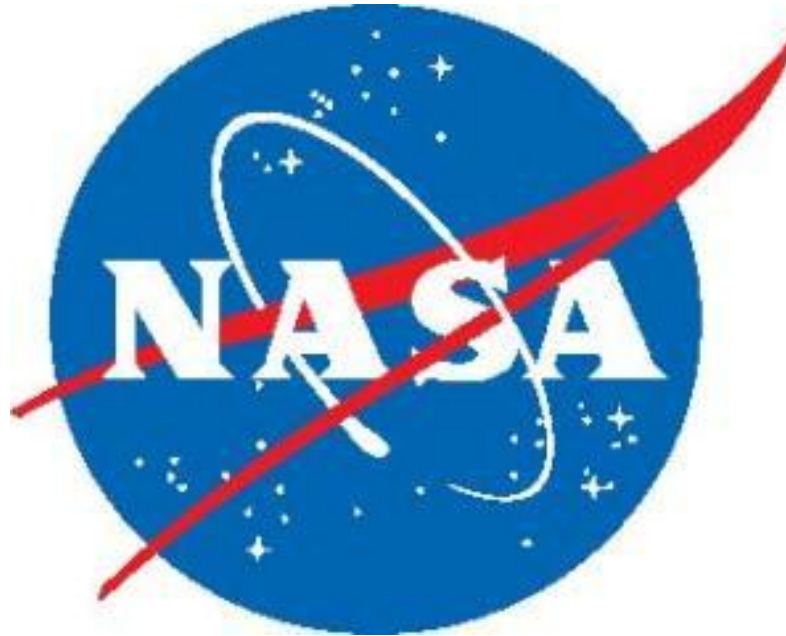
## SBIR Mission Directorate Liason Centers:

- Luis Mederos, [Luis.Mederos@nasa.gov](mailto:Luis.Mederos@nasa.gov) (SOMD)
- Robert Yang, [Robert.L.Yang@nasa.gov](mailto:Robert.L.Yang@nasa.gov) (ESMD)
- Indrani Graczyk, [Indrani.Graczyk@jpl.nasa.gov](mailto:Indrani.Graczyk@jpl.nasa.gov) (SMD)
- Gynelle Steele, [Gynelle.C.Steele@nasa.gov](mailto:Gynelle.C.Steele@nasa.gov) (ARMD)

## Center Technology Infusion Managers

- Kim Hines, [Kimberly.K.Hines@nasa.gov](mailto:Kimberly.K.Hines@nasa.gov), Ames Research Center (ARC)
- Ron Young, [Ron.Young@nasa.gov](mailto:Ron.Young@nasa.gov), Dryden Flight Research Center (DFRC)
- Hung Nguyen, [Hung.D.Nguyen@nasa.gov](mailto:Hung.D.Nguyen@nasa.gov), Glenn Research Center (GRC)
- Jennifer S. Geiger, [jennifer.s.geiger@nasa.gov](mailto:jennifer.s.geiger@nasa.gov), Goddard Space Flight Center (GSFC)
- Dr. Carol Lewis, [Carol.R.Lewis@jpl.nasa.gov](mailto:Carol.R.Lewis@jpl.nasa.gov), Jet Propulsion Laboratory (JPL)
- Kathy Packard, [Kathryn.B.Packard@nasa.gov](mailto:Kathryn.B.Packard@nasa.gov), Johnson Space Center (JSC)
- Joni Richards, [Joni.M.Richards@nasa.gov](mailto:Joni.M.Richards@nasa.gov), Kennedy Space Center (KSC)
- Kimberly Graupner, [Kimberly.E.Graupner@nasa.gov](mailto:Kimberly.E.Graupner@nasa.gov), Langley Research Center (LaRC)
- Lynn Garrison, [Virginia.B.Garrison@nasa.gov](mailto:Virginia.B.Garrison@nasa.gov), Marshall Space Flight Center (MSFC)
- Ray Bryant, [Ray.Bryant-1@nasa.gov](mailto:Ray.Bryant-1@nasa.gov), Stennis Space Center (SSC)

# Thank You



Help us determine how we can create a more effective partnership between the genius of the American entrepreneur and the power of the federal government.

--Charlie Bolden, NASA Administrator

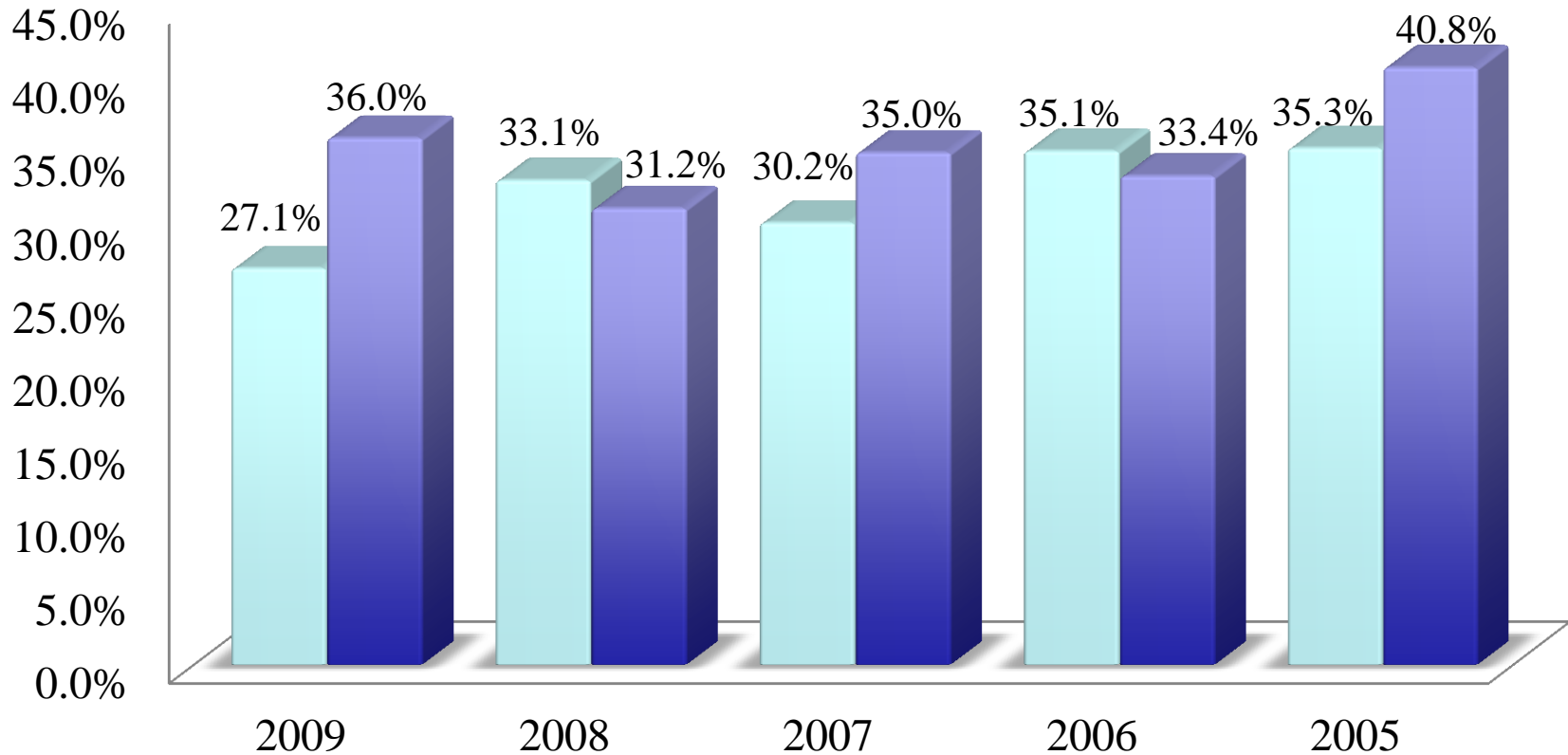
Darryl Mitchell: [Darryl.R.Mitchell@nasa.gov](mailto:Darryl.R.Mitchell@nasa.gov)



# Backup

# Five year span of NASA SBIR/STTR

## First time Awardee Firms Vs First time Proposing Firms



■ Percentage of First Time Awardee Frims ■ Percentage of First Time Proposing Firms

# Five year span of NASA SBIR/STTR

## First time Awardee Firms Vs Total Awardee Firms

