

# TriTech Small Business Development Center Presentations

Authored by:

Laura Fobel, Mark Davis, Janeya Griffin,  
Jerry Budd, John Del Frate, Hon (Patrick)  
Chan

Approved TN 37239



# Center Overview

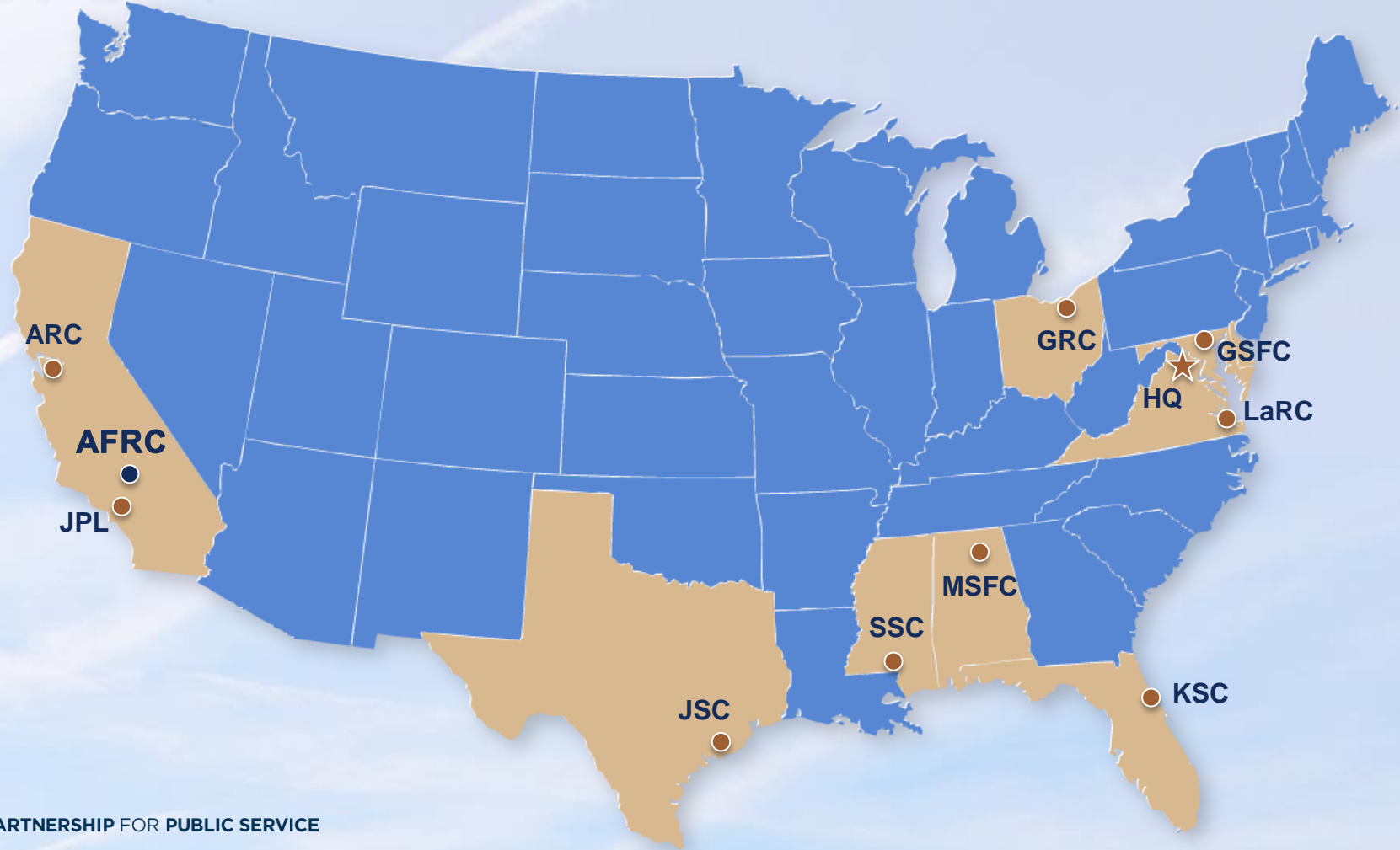
## NASA Armstrong Flight Research Center

John Del Frate, Director for Advanced Planning and Partnerships

November 10, 2016



# NASA Centers



PARTNERSHIP FOR PUBLIC SERVICE

**THE BEST PLACES TO WORK** in the Federal Government®  
**NASA** rated #1 Large Agency four years running!



# Armstrong Flight Research Center



Edwards AFB, California,  
main campus:

- Year-round flying weather
- 301,000 acres remote area
- Varied topography
- 350 testable days per year
- Extensive range airspace
- 29,000 feet of concrete runways
- 68 miles of lakebed runways
- Supersonic corridor
- U.S. Air Force Alliance

Workforce:

550 civil servants

565 contractors

103 student interns



# NASA Armstrong Science Operations Building 703

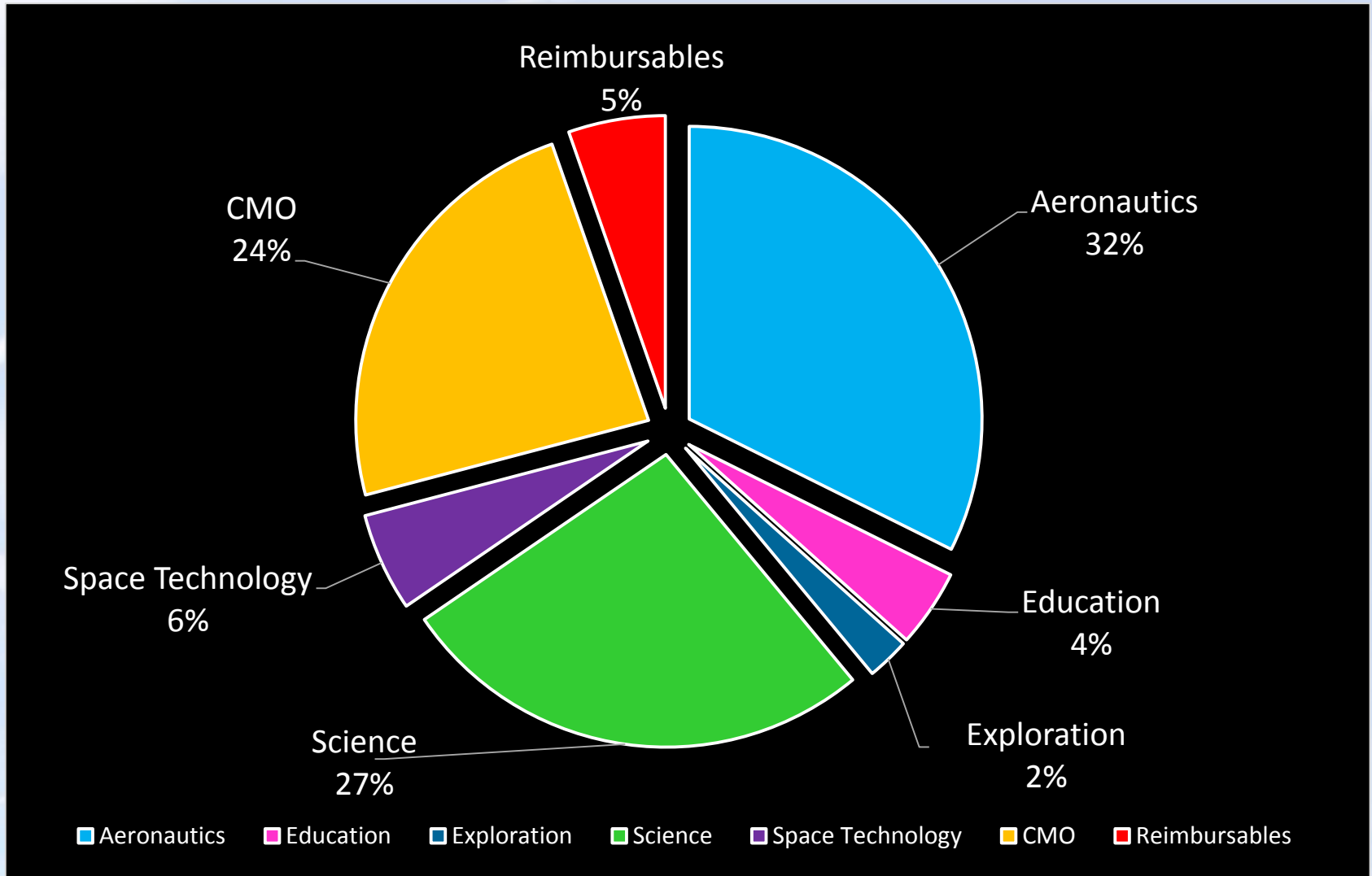
Palmdale, California



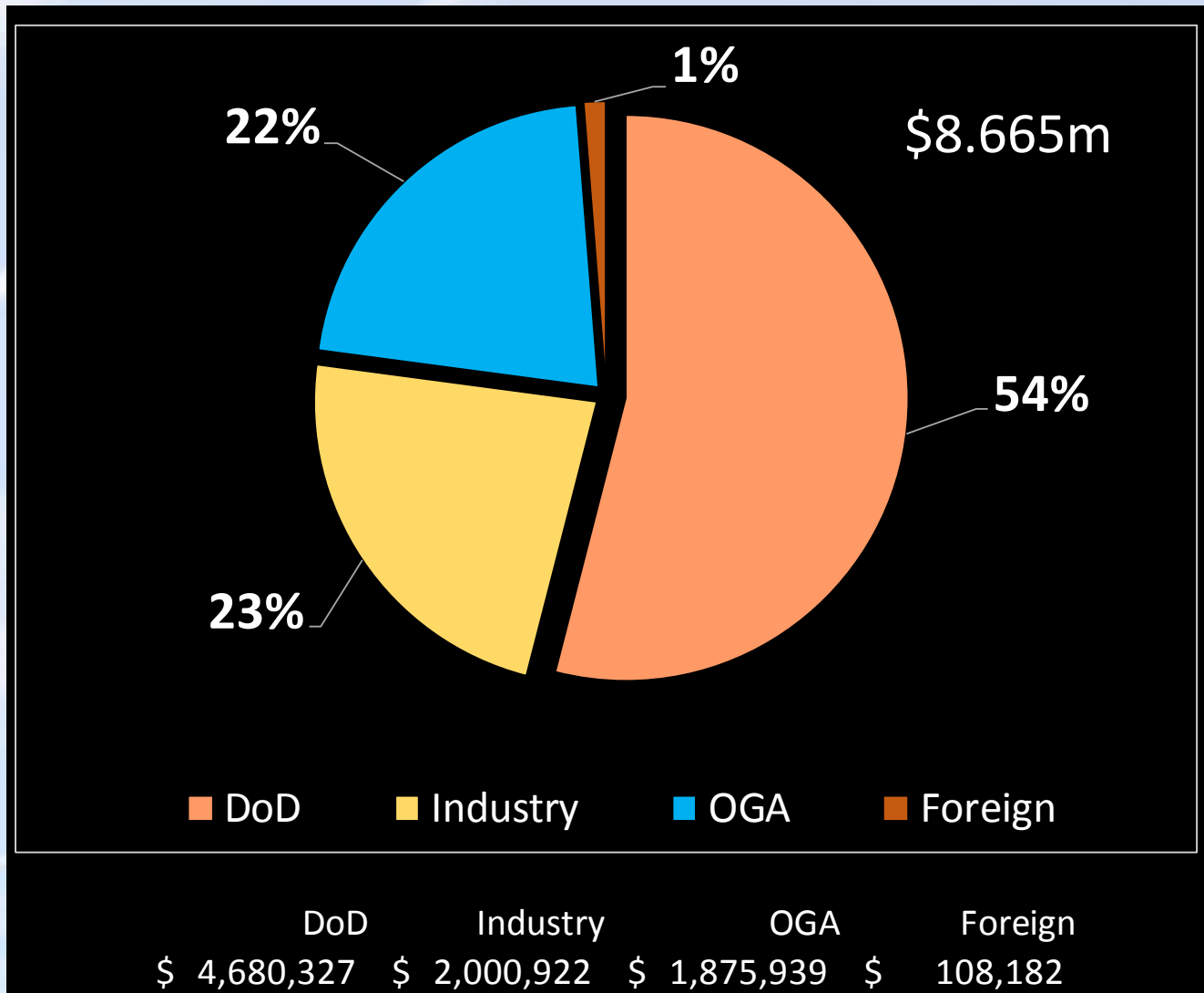
Home to

- Stratospheric Observatory for Infrared Astronomy (SOFIA) – Astrophysics
- Earth Science – Airborne Science

# 2016 Armstrong Budget Distribution



# Sources of Non-NASA Funding



# Capabilities and Core Competencies



## Research Engineering Enabling New Operational Concepts

- Airframe and power-plant maintenance, avionic technicians, experimental modification and fabrication, flight systems qualification, experimental test pilots, test operations planning
- Systems engineering and integration (SE&I), aerodynamics, propulsion, structures, flight controls, sub-systems, instrumentation



## Range and Test Facilities

- Dryden Aeronautical Test Range (DATR)
- Research Aircraft Integration Facility (RAIF)
- Flight Loads Lab (FLL) aerothermal/mechanical loads testing
- Building 703 SOFIA and Airborne Science Operations



## Atmospheric Flight Research

- Partnership, program and project development
- Mission, research, flight test objectives development
- Airworthiness certification, ground, flight and range safety
- Technology and systems development, integration, test
- Mission control and range operations



## Facility Capability

- Experimental and testbed aircraft
- Unmanned air systems
- Earth science and infrared astronomy platforms
- Real-time engineering simulation



# Facility Capabilities



## Support Aircraft and Maintenance Organization (SAMO)

Support aeronautics research and science missions; provide versatile aircraft to meet requirements for pilot proficiency, safety chase, photography, video, and research flights in dual-capacity roles



## Simulation Laboratory

Test simulation-supported software and hardware to develop, integrate, and validate highly complex aeronautics research and low Earth orbit vehicles



## Dryden Aeronautical Test Range Capabilities

Safely monitor and control aeronautics research and science flight activities; provide real-time acquisition and reduction of flight research telemetry and radar data, video tracking, and effective voice communications to flight and ground crews (including ISS/Soyuz VHF support)



## Flight Loads Laboratory (FLL)

Provide structural testing – mechanical, thermal, structural dynamic, mass properties – of large-scale structures to simulate subsonic through hypersonic flight conditions

# Doing Business with NASA

- **Mechanisms for doing business with NASA:**
  - › Space Act Agreements
  - › Cooperative Research & Development Agreements
  - › Cooperative Agreements
  - › SBIRs/STTRs
  - › Technology Licenses

## **NASA Resources:**

- Facilities
- Technology
- Expertise



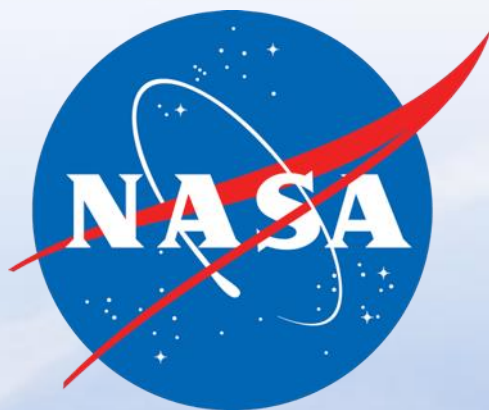
## **Business Needs:**

- Access to facilities
- Access to technology and technical experts

## **On what basis?**

- Common Interest
- Cost Reimbursement
- Keeps competencies sharp
- Keeps facilities in a state of readiness

<https://www.nasa.gov/centers/armstrong/business/index.html>





National Aeronautics and Space Administration



BRINGING NASA TECHNOLOGY DOWN TO EARTH

**Laura Fobel**

**Technology Transfer Officer**

**NASA Armstrong Flight Research Center**

**[Laura.J.Fobel@nasa.gov](mailto:Laura.J.Fobel@nasa.gov)**

**November 10, 2016**



# NASA Center Locations



**ARC** – Ames Research Center. Information technology, biotechnology, nanotechnology, aerospace operations systems, rotorcraft, and thermal protection systems.

**AFRC** – Armstrong Flight Research Center. Aerodynamics, aeronautics flight testing, aeropropulsion, flight systems, thermal testing, sensors, integrated systems test and validation.

**GRC** – Glenn Research Center. Aeropropulsion, communications, energy technology, high-temperature materials research.

**GSFC** – Goddard Space Flight Center. Planetary science, LIDAR, cryogenic systems, tracking, telemetry, remote sensing, command.

**HQ** – NASA Headquarters.

**JPL** – Jet Propulsion Laboratory. Near- and deep-space mission engineering, microspacecraft, space communications, information systems, remote sensing, robotics.

**JSC** – Johnson Space Center. Artificial intelligence and human-computer interface, life sciences, human space flight operations, avionics, sensors, communications.

**KSC** – Kennedy Space Center. Fluids and fluid systems, materials evaluation, process engineering, command/control/monitor systems, range systems, environmental engineering and management.

**LaRC** – Langley Research Center. Aerodynamics, flight systems, materials, structures, sensors, measurements, information sciences.

**MSFC** – Marshall Space Flight Center. Materials, manufacturing, nondestructive evaluation, biotechnology, space propulsion, controls and dynamics, structures, microgravity processing.

**SSC** – Stennis Space Center. Propulsion systems, remote sensing, nonintrusive instrumentation.

# NASA Technology Transfer Spinoffs

Some of the best of over 2,000 recorded Spinoffs



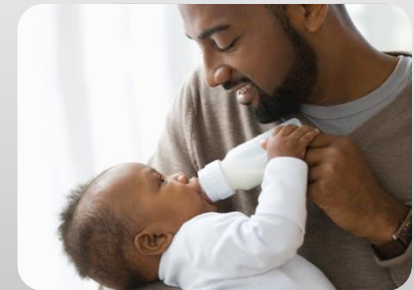
CMOS camera-on-a-chip technology used in nearly all digital cameras, including smartphones



International search-and-rescue system has saved 40k lives worldwide since 1982



Memory foam



Nutritional supplement used in over 90% of infant formulas



Ubiquitous aerodynamic innovations in airplanes and trucks



Voltage controller saves energy in nearly all load-bearing electrical machines



Precision GPS enabled self-driving tractors that are now used to work the majority of the world's farmland.



# Patent Portfolio



## Patent Portfolio

The NASA patent portfolio is available to benefit US citizens. Through partnerships and licensing agreements with industry, these patents ensure that NASA investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life. Click on each of the category icons for a list of patents in that category or use the search below to explore NASA's patent portfolio.

-   
Aeronautics
-   
Communications
-   
Electrical/  
Electronics
-   
Environment
-   
Health, Medicine,  
and Biotechnology
-   
IT  
and Software
-   
Instrumentation
-   
Manufacturing
-   
Materials and  
Coatings
-   
Mechanical and  
Fluid Systems
-   
Optics
-   
Power Generation  
and Storage
-   
Propulsion
-   
Robotics, Automation  
and Control
-   
Sensors



Information Technology and Software

### NETMARK

An advanced XML database integration technique for managing unstructured documents

NASA's Ames Research Center offers for license its NETMARK software, a unique innovation designed to seamlessly integrate structured, semi-structured, and unstructured data and documents across enterprise organizations. Originally developed to integrate the vast quantities of complex, heterogeneous documents existing within NASA, this schema-less integration technique and framework offers a highly scalable, open enterprise database architecture that eliminates or reduces the need for database design and administration, and converts information from a wide range of data types into a single, universal data type for storage, retrieval, and content and context-sensitive query and search. A production-ready, enterprise-level application, NETMARK rapidly assimilates and retrieves gigabytes of disparate information and can be easily integrated with existing applications as well as accommodate new data formats—fitting into the legacy data network while growing with evolving technologies and business practices.

### BENEFITS

- ❑ Economical—eliminates the need to design, develop, and maintain expensive, highly structured relational databases, lowering both software and administrative costs
- ❑ Flexible—combines information from heterogeneous structured, semi-structured, and unstructured data sources, and enables easy and unstructured data queries
- ❑ Adaptable—enables query-based composition of environments that support http and https protocols
- ❑ Secure—limits query results to the information that users and groups have permission to access
- ❑ Custom—includes configurable databases for tailored query workflows in diverse applications

technology solution



www.nasa.gov

### NASA Technology Transfer Program

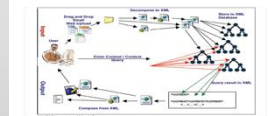
Bringing NASA Technology Down to Earth

#### THE TECHNOLOGY

NETMARK uses advantage of an object-relational model and the Oracle Map Language (XML) standard, along with an open, extensible database framework to dynamically generate arbitrary schemas stored within relational databases and an object-relational database management system. NETMARK maps XML-encoded information into a data model by employing a customizable data type definition structure, defined by an XSD, prior to loading the hierarchical structure of XML data regardless of any particular XML document schema representation.

By allowing a raw XML data model, NETMARK can help enterprise organizations make better use of the information they need to make business decisions by converting Web pages, text documents, PDF files, spreadsheets, presentations, and other document types into a single, universal data type, then storing it in an object-relational database. Users can query this database with searches that are based on content or contextual associations. Query results then can be composed into different data types, including presentations, spreadsheets, and text documents, enabling rapid reuse of information and broadening the scope of data from which users can gain knowledge and make decisions.

Most traditional document management systems do not provide an easy and efficient mechanism to store, manage, and query relevant information from heterogeneous and complex data types. To do so, database manager systems need a standard for content data and exchange. The industry standard, XML, offers structure within documents. The relational mapping model is limited because the hierarchy is different for each set of XML documents. In contrast, NETMARK's XSD prior models the documents themselves, and its structure is the same for all XML documents, providing independence of any particular XML document schema.



NETMARK's schema-less integration technique converts information from many different data types into a universal data type for unpreprocessed information assimilation and retrieval across the enterprise.

#### APPLICATIONS

- The technology has several potential applications:
- ❑ Enterprise knowledge management applications
- ❑ Document and content management systems

PUBLICATIONS  
U.S. Patent 6,966,338

"Managing Unstructured Data With Structured Legacy Systems," 2009  
DOI: 10.1109/AERO.2009.4526666  
Conference: Aerospace Conference, IEEE

National Aeronautics and Space Administration  
Technology Partnership Office  
Ames Research Center  
MSR200A  
Moffett Field, CA 94035  
info@ttsc.nasa.gov  
4150 Technology Transfer Road  
www.nasa.gov  
info@ttsc.nasa.gov

NASA Technology Transfer Program  
Provides the widest possible distribution of space technology to benefit US citizens through partnerships and licensing agreements with industry. The program increases the utilization of primary research and secondary uses for benefits for education, career jobs, and improve quality of life.  
4150 Technology Transfer Road  
Moffett Field, CA 94035  
info@ttsc.nasa.gov



[technology.nasa.gov/patents](http://technology.nasa.gov/patents)

# Startup NASA



TECHNOLOGY  
TRANSFER  
PROGRAM  
BRINGING NASA TECHNOLOGY DOWN TO EARTH

Calling  
All High Tech  
Entrepreneurs!



**Startup  
NASA**

NASA Technology Transfer Program  
is offering you a new opportunity to put  
NASA technologies to work for you.

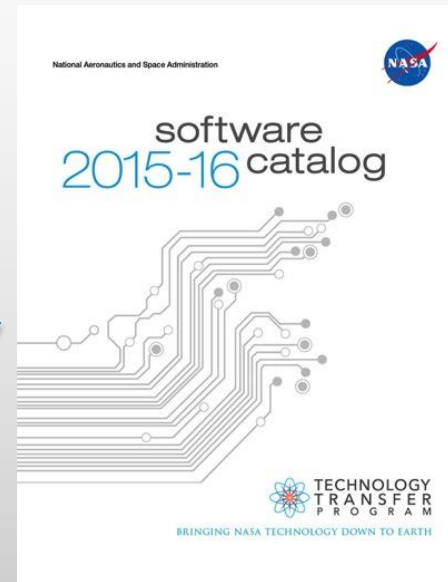
Our Startup NASA initiative helps address two of the biggest  
challenges faced by start up companies: raising capital and  
securing intellectual property rights.

The Startup NASA initiative offers startup companies a license with no up-front costs for commercial use of our patented technologies, we're letting companies hold onto their cash while securing the intellectual property needed to carve out competitive market space.

[technology.nasa.gov/startup](https://technology.nasa.gov/startup)

# Software Catalog

The screenshot shows the NASA Software Catalog website. At the top, there are navigation links for NEWS, MISSIONS, MULTIMEDIA, CONNECT, and ABOUT NASA. Below this is a header for the 'software catalog 2015-16' with the TECHNOLOGY TRANSFER PROGRAM logo. A featured software section titled 'It is rocket science!' highlights software tools used by NASA engineers. A search bar is provided for finding software. A 'Browse by Category' section lists various technical areas such as business systems, system testing, operations, design and integration tools, vehicle management, data servers, propulsion, structures and mechanisms, crew and life support, data and image processing, materials and processes, electronics and electrical power, environmental science, autonomous systems, and aeronautics.



The NASA Software Catalog offers an extensive portfolio of free software products for a wide variety of technical applications. You may browse the catalog online or download the catalog in PDF format.

[software.nasa.gov](https://software.nasa.gov)




# Public Domain




The screenshot shows the NASA Technology Transfer Program Public Domain page. At the top left is the NASA Technology Transfer Program logo with the tagline "BRINGING NASA TECHNOLOGY DOWN TO EARTH". The main heading is "Public Domain" in large blue letters, followed by "NASA TECHNOLOGIES" in white. Below this is a search bar with "Search" and "Newly Disclaimed" buttons. A central graphic shows an open cardboard box overflowing with various colorful icons representing different technologies. The text below the search bar states: "To stimulate the innovation economy, NASA makes a portion of its technology portfolio **freely available** for anyone to use." and "The technologies in this public domain portfolio do not require a license agreement, and anyone may freely pursue independent product development right away without the need to contact NASA in any way."

The NASA Public Domain technologies are available for anyone to freely develop products without a license agreement or NASA involvement.

[technology.nasa.gov/publicdomain](https://technology.nasa.gov/publicdomain)



## Portable Runway Intersection Display and Monitoring System



Portable Runway System

Developed at Marshall Space Flight Center (MSFC), this technology consists of a portable airport runway/taxiway intersection lighting system and signage designed to prevent incursions. The innovation aids in the management and prevention of airport runway accidents through aircraft/control tower interfacing.

[Read more about this Featured Technology...](#)

**Search QuickLaunch**

### Welcome to NASA QuickLaunch

Welcome! NASA is pleased to offer a specially selected portfolio of technologies available for commercial nonexclusive licensing. These QuickLaunch licenses have a set initial fee, annual royalty and standard terms. With QuickLaunch licensing NASA has a goal of quickly turning your license application into a license agreement and transferring the technologies to you. For many technologies you may request an evaluation license for a short term prior to requesting a commercial license. [Browse our portfolio now!](#)

### The QuickLaunch Difference

NASA is where ideas take flight! Browse this site for a selection of specially priced licenses with a quick turnaround. [Learn more about NASA QuickLaunch Licensing.](#)

Please visit our [Frequently Asked Questions](#). If you have any other questions please contact us using the Questions/Contact Us link available on the technology description pages.

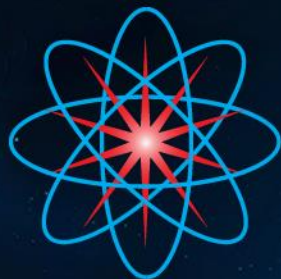
NASA offers a specially selected portfolio of technologies available for commercial nonexclusive licensing with set license terms. With QuickLaunch licensing, the goal is to quickly grant a license.

[quicklaunch.nasa.gov](http://quicklaunch.nasa.gov)

## NASA technologies save lives, create jobs, and increase revenue







# TECHNOLOGY TRANSFER PROGRAM

BRINGING NASA TECHNOLOGY DOWN TO EARTH

## NASA Armstrong Flight Research Center

How to License NASA Technologies  
Thursday, November 10<sup>th</sup>, 2016



## **AFRC Technology Transfer Office**

Janeya Griffin - Technology Transfer Specialist  
Technology Management, Partnerships, Patents, Licensing

## **Federal Laboratory Consortium**

Executive board member – Member at Large

## **Integrated Technology Transfer Network**

Certificate – *Entrepreneurial Technology Commercialization*  
California State University San Bernardino

## **Grambling State University**

B.S. Forensic Chemistry  
B.S. Criminal Justice

### **Contact Info:**

[Janeya.T.Griffin@nasa.gov](mailto:Janeya.T.Griffin@nasa.gov)

### **Social Media:**

@JaneyaGriffin

# How to license NASA Technology



# Licensing Process



## Exclusivity:

The categories of exclusive licenses include exclusive in all fields of use, co-exclusive, and partially exclusive with a limited field of use.

*Note: All prospective grants of exclusive licenses must be published in the Federal Register for 15 days before the license is granted.*

## Non-exclusivity:

The categories of non-exclusive licenses include evaluation/research, start-up, end-user, "Quick-Launch," and a traditional non-exclusive commercial license.

# Space Act Agreements



**Unique authority that enables NASA to collaborate with industry, non-profits, universities, etc. that have common goals aligning with NASA missions**

## Types of Space Act Agreements

### **Reimbursable:**

NASA has a unique resource that is not available on marketplace and will receive reimbursable funds

### **Non-Reimbursable:**

Achieve a common goal with industry with no exchange of funds

- Top-down agency commitment to technology transfer
- National Aeronautics and Space Act of 1958 (as amended)
  - “To provide for the widest practicable and appropriate dissemination of information concerning its activities and results thereof.”
- Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480)
  - Requires federal agencies to have a formal technology transfer program
- Bayh-Dole Act of 1980 (P.L. 96-517)
  - Permits universities, not-for-profits, and small businesses to obtain title to inventions developed with federal funding
- Federal Technology Transfer Act of 1986 (P.L. 99-502)
  - Makes technology transfer a responsibility of every federal laboratory scientist and engineer
  - Establishes CRADAs





# SSmall BBusiness IInnovation RResearch SSmall BBusiness TTechnology TTransfer

Nov. 10, 2016

Mark Davis

# Purpose of SBIR/STTR Programs



**Stimulate technological innovation**

**Foster technology transfer through cooperative R&D between small businesses and research institutions**

**Use small businesses to meet federal research and development needs**

**Increase private-sector commercialization of innovations derived from Federal research and development funding**

**Encourage participation in innovation and entrepreneurship by minority and disadvantaged persons**



# Overview



- Every technology development investment dollar is critical to the ultimate success of NASA's mission
  - Ensure alignment and integration with Mission Directorates' priorities
  - Ensure alignment and integration with the Office of the Chief Technology priorities
  - Investments are complementary with technologies being pursued by
    - other NASA programs and projects
    - prime contractors
    - other agency SBIR/STTR investments
- Ultimate objective is to achieve infusion of critical technologies into NASA
  - flight programs/projects
  - ground or test systems
  - or other uses to advance NASA's mission
- Mission Directorates and the Chief Technologist 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



# Difference between SBIR and STTR



- SBIRs are led by the Mission Directorates
  - There are 4 mission directorates
    - Science (SMD), Human Exploration and Operation (HEOMD), Aeronautical Research (ARMD), and Space Technology (STMD)
- STTRs are led by the Office Chief Technology
  - Each NASA center (10 in total) has a chief technologist
  - Each chief technologist sits on the Chief Technologist Council
- The awards are always to a small business
  - In SBIR, a research institution, e.g. a university may participate with the small business
  - In STTR, a research institute must participate with the small business





# 3-Phase Program



- **Phase 1**
  - The Program starts with the Phase I proposals
  - Feasibility study, 6 months duration (SBIR) or 12 months (STTR)
  - \$125K (maximum allowable \$150K)
  - Proposer uses funds to mature this concept to the next level
- **Phase 2**
  - Technology or Prototype Development/Demonstration, 2-Year Contract Award
  - \$750K (SBIR & STTR – maximum allowable \$1 million)
  - The concept may still require additional work
    - May need help to integrate into a system
    - May need help showing operation in a relevant environment
- **Phase 2 Extended, or Phase 2-E**
  - Funding to “bridge the gap” to a Phase 3 opportunity
  - Requires non-SBIR/STTR matching funding
- **Phase 3**
  - Technology Infusion/Commercialization Stage