TriTech Small Business Development Center Presentations

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Approved TN 37239

National Aeronautics and Space Administration

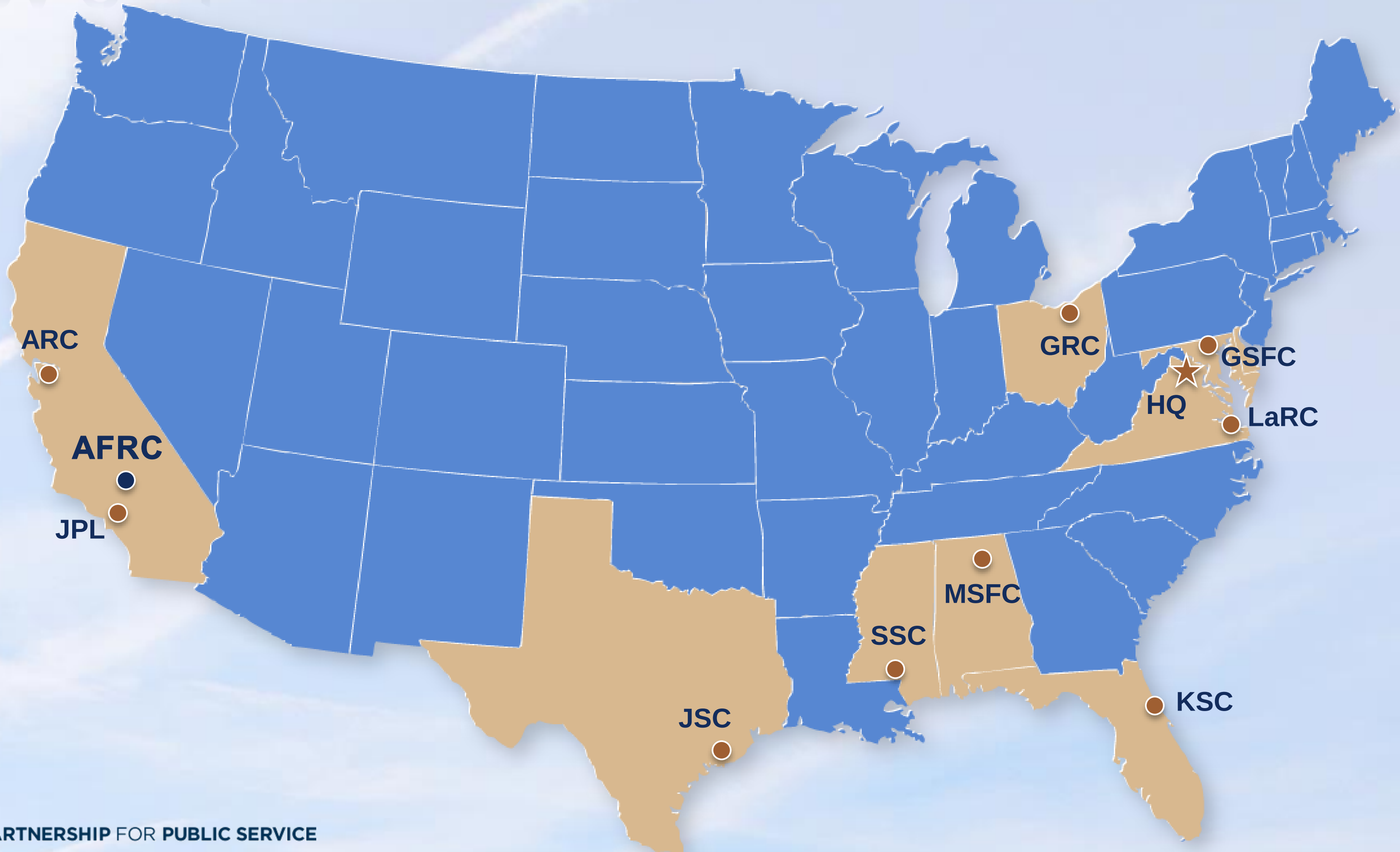
Center Overview

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

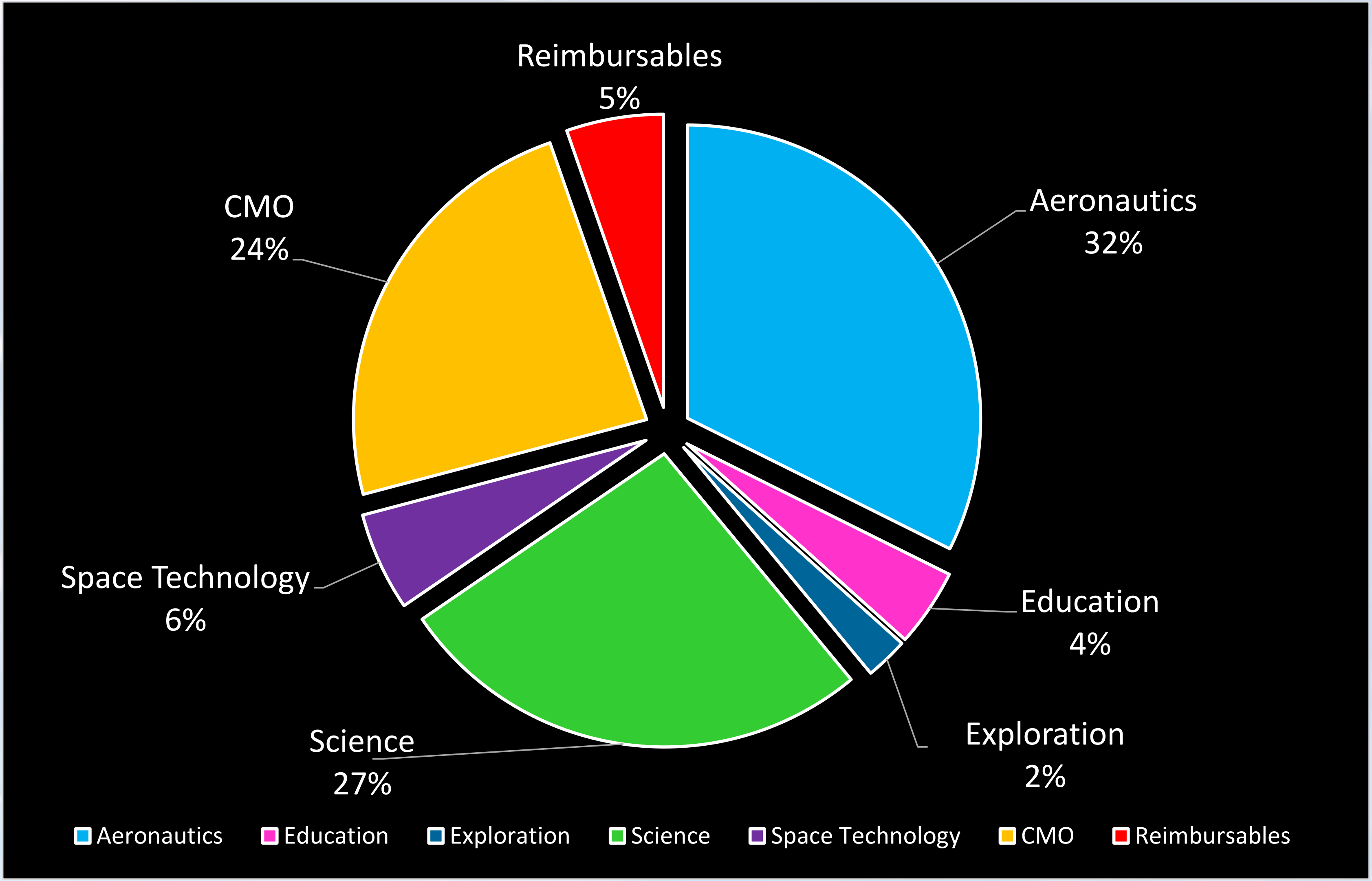
NASA Armstrong Science Operations Building 703

Palmdale, California

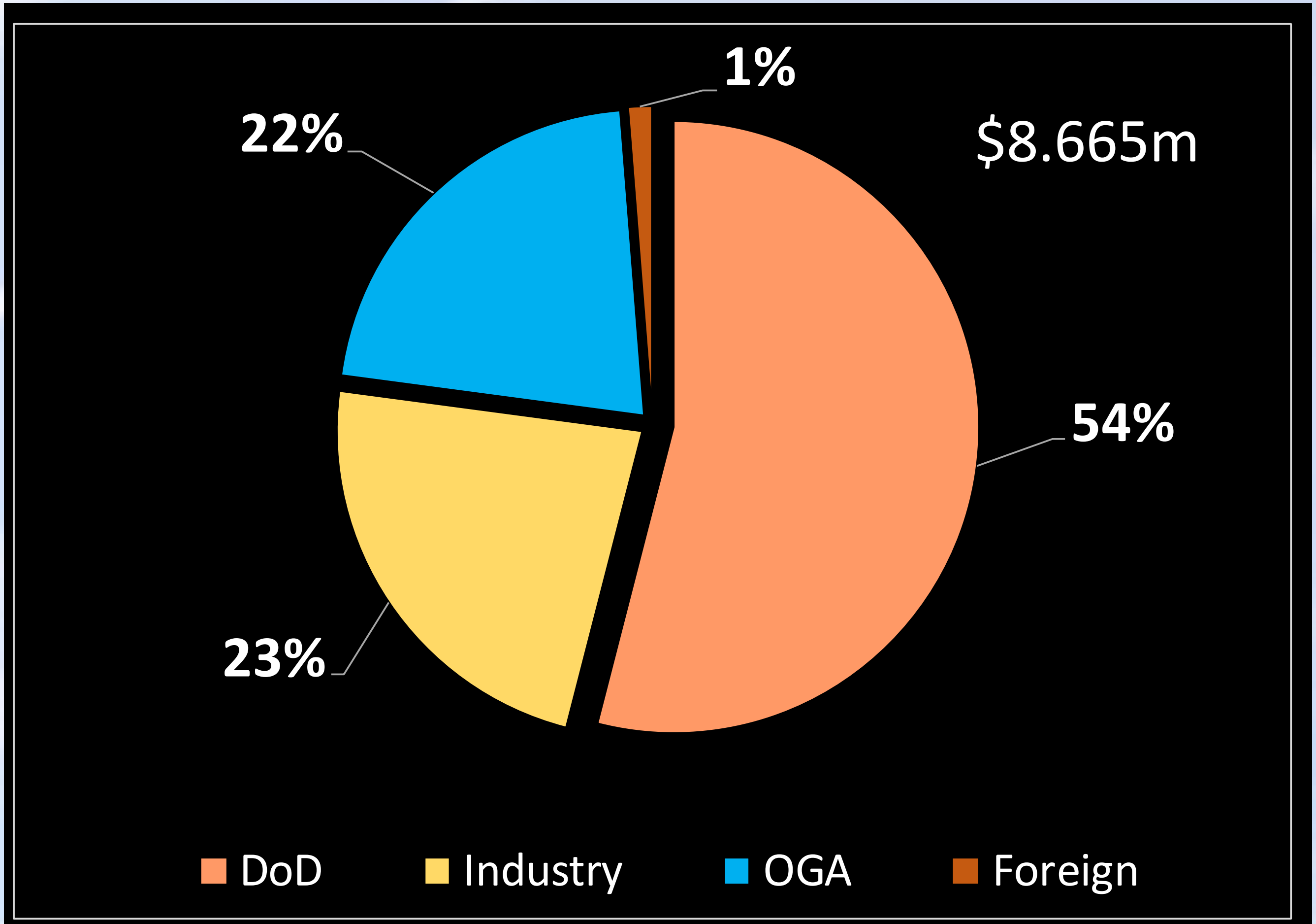
Home to

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

2016 Armstrong Budget Distribution



Sources of Non-NASA Funding



DoD	Industry	OGA	Foreign
$ 4,680,327	$ 2,000,922	$ 1,875,939	$ 108,182

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

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)

Simulation Laboratory

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

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

NASA

National Aeronautics and Space Administration

TECHNOLOGY TRANSFER PROGRAM

BRINGING NASA TECHNOLOGY DOWN TO EARTH

Laura Fobel

Technology Transfer Officer

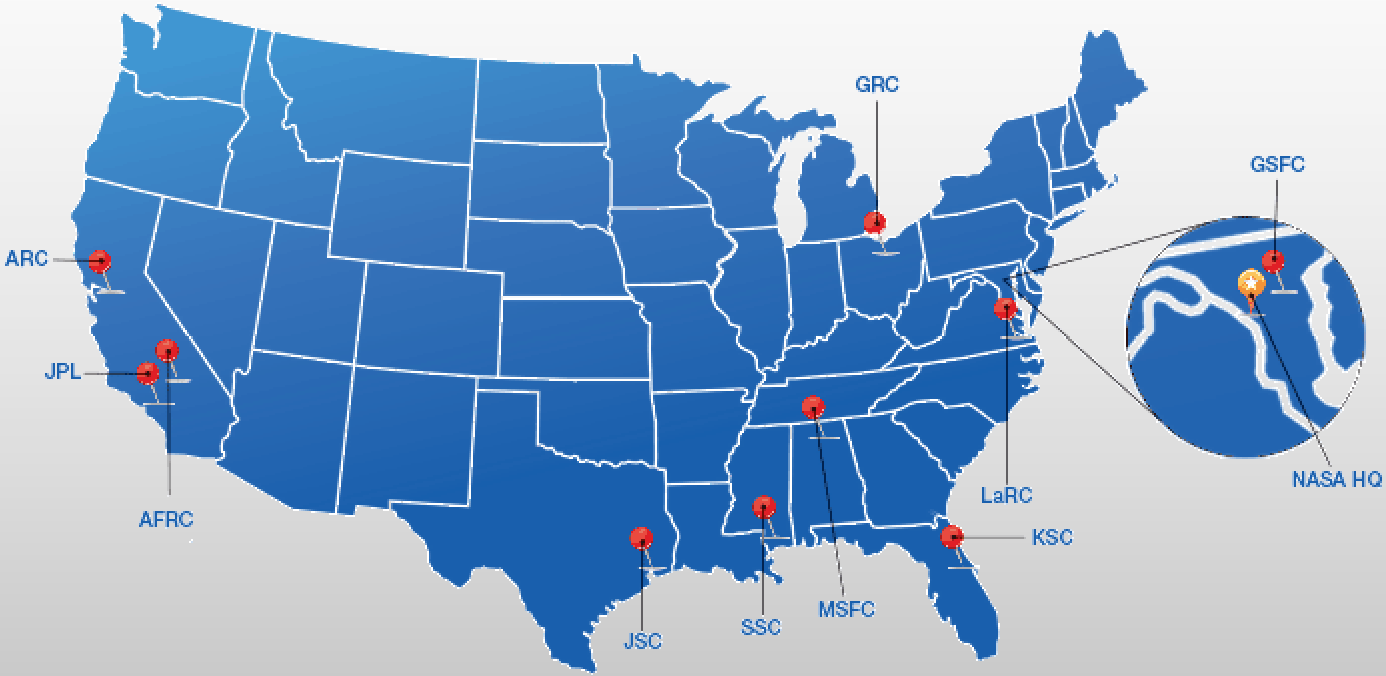
NASA Armstrong Flight Research Center

Laura.J.Fobel@nasa.gov

November 10, 2016

NASA Center Locations

TECHNOLOGY TRANSFER PROGRAM



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.

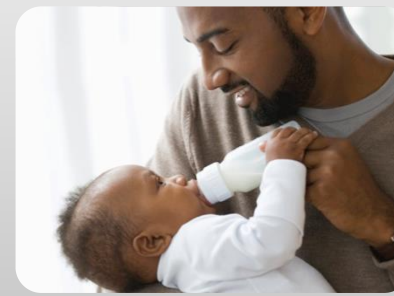
NASA Technology Transfer Spinoffs

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



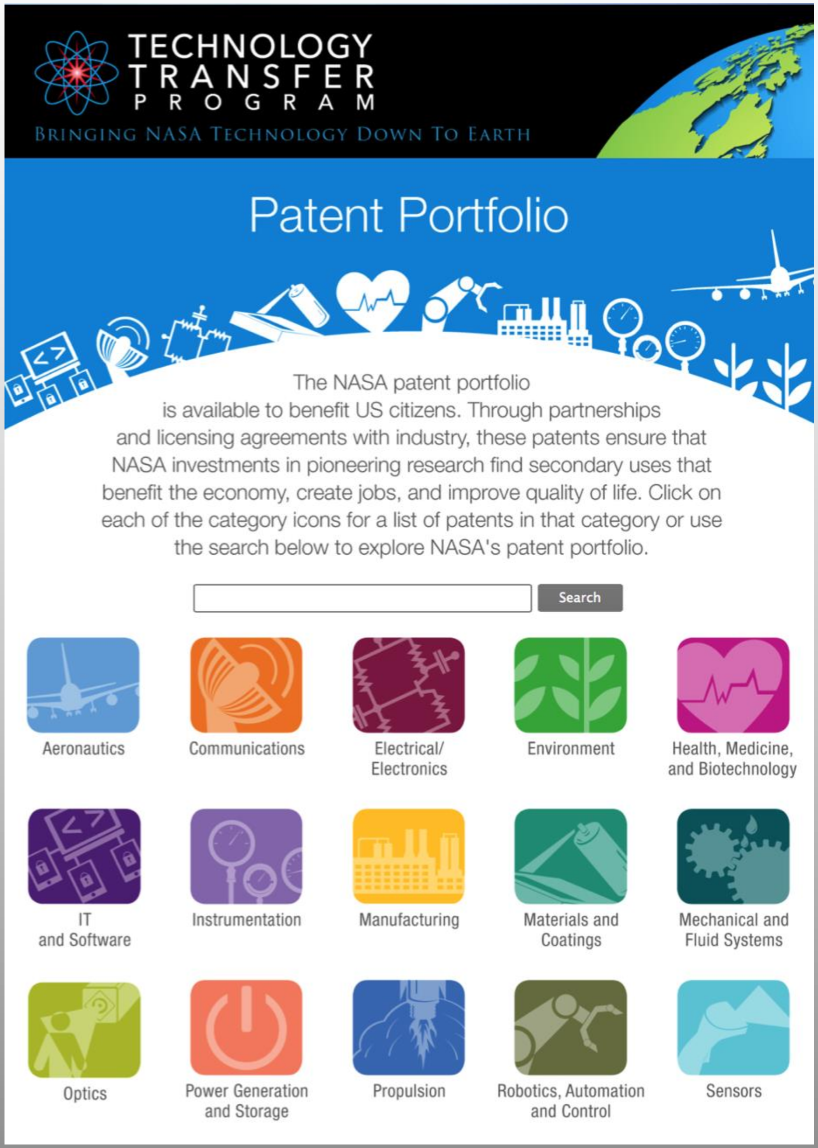
Nutritional supplement used in over 90% of infant formulas

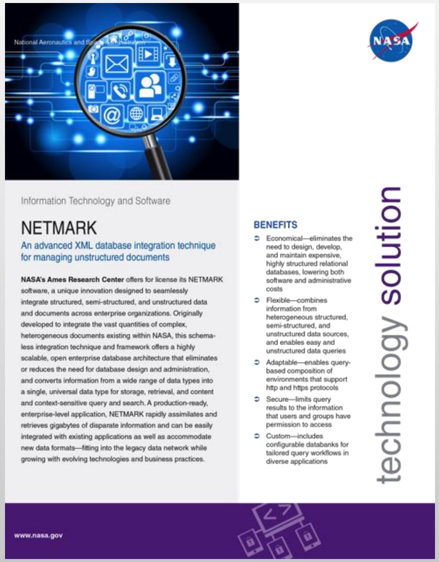
Ubiquitous aerodynamic innovations in airplanes and trucks

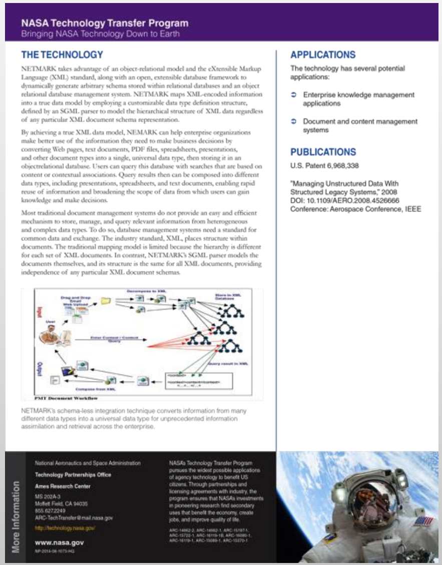
Voltage controller saves energy in nearly all load-bearing electrical machines

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

Patent Portfolio







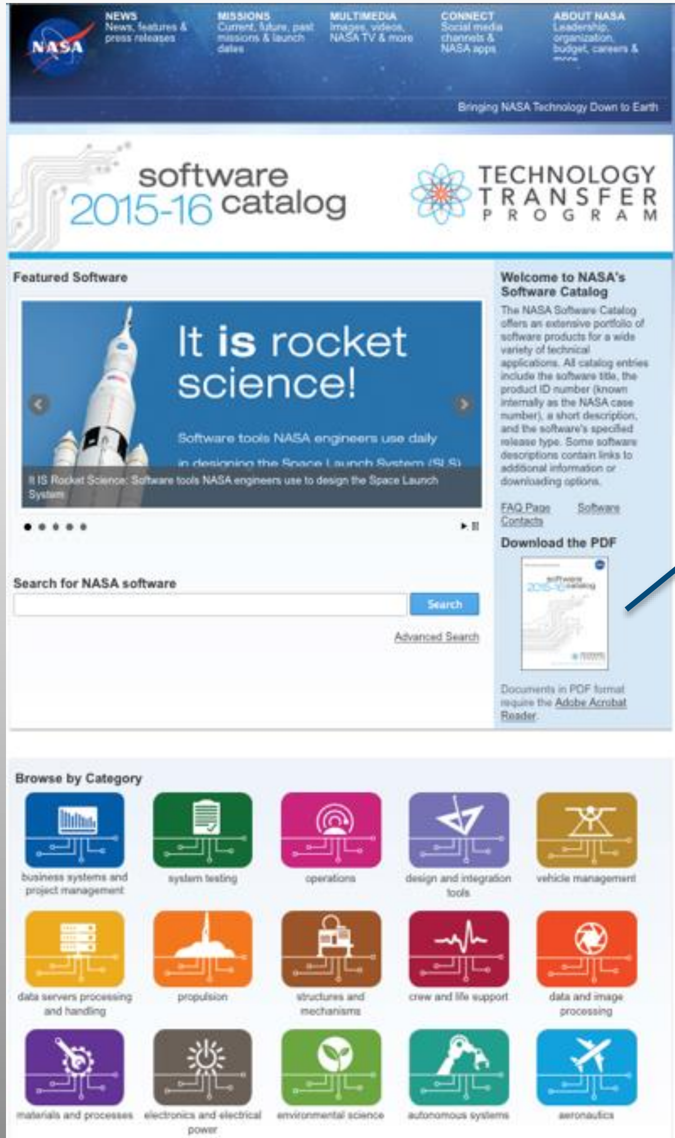
technology.nasa.gov/patents

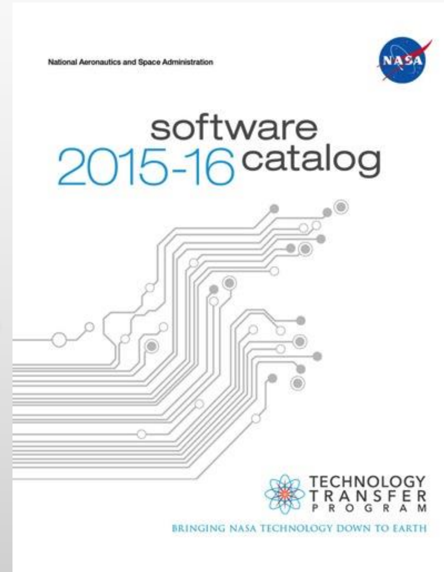
Startup NASA

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

Software Catalog





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.

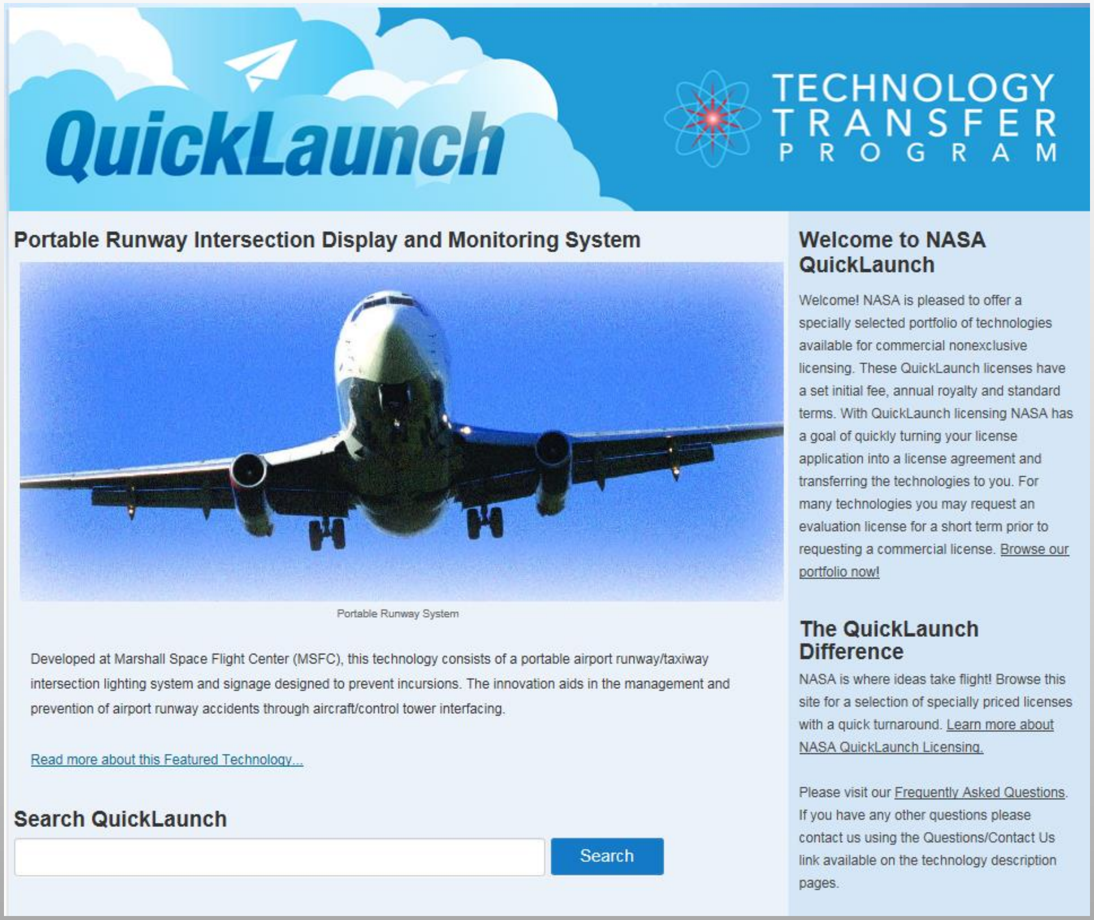
software.nasa.gov

Public Domain

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

technology.nasa.gov/publicdomain

QuickLaunch



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

NASA technologies save lives, create jobs, and increase revenue

National Aeronautics and Space Administration

TECHNOLOGY TRANSFER PROGRAM

BRINGING NASA TECHNOLOGY DOWN TO EARTH

NASA Armstrong Flight Research Center

How to License NASA Technologies
Thursday, November 10th, 2016

www.nasa.gov

Background

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

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How to license NASA Technology

Licensing Process

Types of Licenses

TECHNOLOGY TRANSFER PROGRAM

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

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

Non-Reimburseable:
Achieve a common goal with industry with no exchange of funds

NASA Policy and U.S. Law

- 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

National Aeronautics and
Space Administration

Small Business Innovation Research
Small Business Technology TRansfer

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