



# Air Force Research Laboratory



## Addressing Air Force Capability Requirements with Emerging Technology Options

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Air Force Research Laboratory

*Integrity ★ Service ★ Excellence*



# United States Air Force Mission



The Mission of the United States Air Force  
is to Fly, Fight, and Win...

*In Air, Space, and Cyberspace*



# What We Do – Core Missions

- Air and space superiority, cyber assurance
  - Air superiority foundational to joint operations & American way of war
  - Domains likely to be most contested in future
- Intelligence, surveillance, reconnaissance (ISR)
  - Maximizing battlespace awareness
  - ~60 RPA patrols, ~1,200 hrs full-motion video per day
- Rapid global mobility
  - 1M+ airlift & tanker sorties in support of Mideast ops
  - One airlift sortie every two minutes, 24/7/365
  - 97% aeromedical evacuation survival rate
- Global strike
  - Hold any target on planet at risk
  - Two-thirds of America's nuclear triad
- Command & control
  - Integrates them all



*Global Vigilance, Global Reach, Global Power for the Joint Team*



## What We Bring to the Fight

- Nuclear Deterrence Operations
- Air Superiority
- Space Superiority
- Cyberspace Superiority
- Command and Control
- Global Integrated ISR
- Global Precision Attack
- Special Operations
- Rapid Global Mobility
- Personnel Recovery Operations
- Agile Combat Support
- Building Partnerships
- Education and Training



## Each Core Function led by AF 4-Star



# AFMC Mission Goals



Nuclear



Continue to Strengthen AFMC's  
Role in the Nuclear Enterprise

Technology



Advance Today's & Tomorrow's  
Combat Capabilities through  
Leading-Edge Technology

Life Cycle  
Management



Acquire and Support  
War-Winning Capabilities

Test & Evaluation



Perform World-Class Test and  
Evaluation

Sustainment



Sustain Air Force Capabilities  
through World-Class Depot  
Maintenance & Supply





# AFRL Mission



**Leading the discovery,  
development, and  
integration of affordable  
warfighting  
technologies for our air,  
space, and cyberspace  
force.**



# AFRL Headquarters



711th Human Performance Wing



Materials & Manufacturing



Aerospace Systems



Sensors



Information  
Rome Research Site, NY



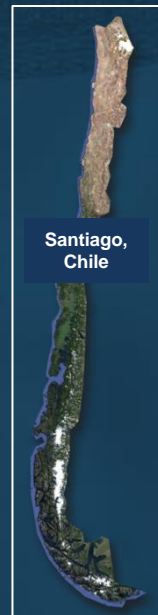
London, UK



Tokyo, Japan



AF Office of  
Scientific Research  
Arlington, VA



Santiago,  
Chile



Space Vehicles  
Directed Energy

Kirtland Air Force Base, NM



Munitions

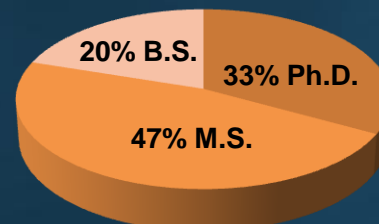
Eglin Air Force Base, FL



Maui Research Site, HI

	Employees	Civilian	Military
Total	5,746	4,603	1,143
S&Es	3,429	2,770	659

S&E Education





# Warfighter Focused Innovation

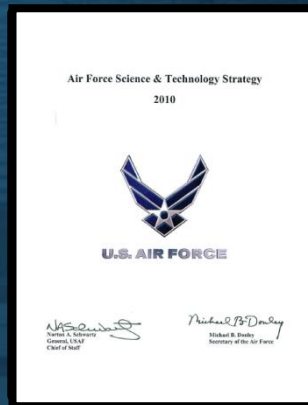
## Appropriated S&T Funds

CFLI and CFMP Demand Signals

Product and Sustainment Center  
Demand Signals

Congressional  
Interest

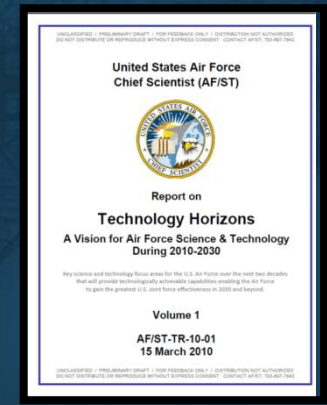
PROGRAM OF RECORD EVOLUTION



AF S&T  
Strategy



AF Core Function  
Master Plans



AF/ST  
Tech Horizons



DoD S&T Policy and  
Priorities

Collaboration with Government and Coalition Labs

Long Term S&T Technology Possibilities



# Air Force S&T Planning Process

## Identifying Highest Priority Capability Needs



- Core Function Master Plans: AF-level planning
  - COCOM needs are represented in CFMPs
- Capability Collaboration Teams: MAJCOMs, Centers, AFRL
- Applied Tech Councils: MAJCOM-level S&T Governance
- S&T Group/Board and AFROC: AF-level S&T Governance

**Align Air Force S&T with Air Force Priorities**

# Technology Focus Areas

## Next Gen Aerospace Systems

\$624M



Advanced Turbine Materials



Turbine Sustainment



Adaptive Engines



Hypersonics

## Space and Nuclear Deterrence

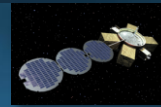
\$339M



Space Access



Payloads



Space Platforms



Advanced Experiments

## Weapons

\$318M



DE Counter-Electronics



High Speed Strike



High Velocity Penetrating Munitions



Flexible Weapons

## Command & Control, Cyber, Communications (C<sup>4</sup>)

\$274M



Processing, Exploitation, and Dissemination (PED)



Cyber



Space Communications

## Intelligence, Surveillance, & Reconnaissance (ISR)

\$262M



Human-Centered ISR



Synchronized Operations

## Affordability & Sustainment

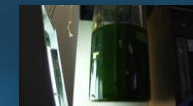
\$135M



Manufacturing Technology



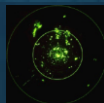
Sustainment



Energy/Fuels

## Electronic Warfare / Electronic Protection (EW/EP)

\$102M



EW Plus



Distributed EW



Infrared countermeasures

## Human Performance

\$61M



Autonomy



Aerospace Physiology & Toxicology



Training & Decision Making Tech

Total: ~\$2.5B, FY14 Appropriation

DISTRIBUTION STATEMENT A: Approved for public release; distribution unlimited (88ABW-2014-1413)



# Cutting-Edge Research Facilities



Compressor Research Facility



Fuels Research



Full Scale Antenna Evaluation



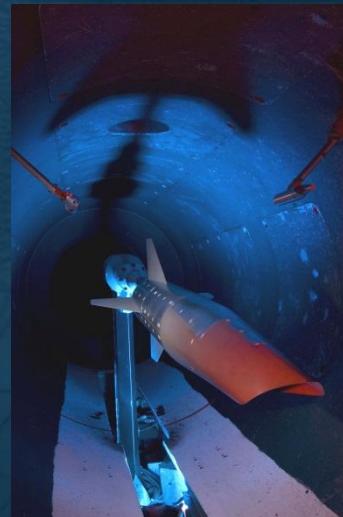
Optical Range



Human Centrifuge



Supercomputing



Advanced Wind  
Tunnels



Munitions Test Ranges



Clean Rooms



Rocket Test

# Contested Environments & Future Battlefields



## The U.S. is facing increasing global R&D competition

- Resource limitations becoming more apparent - Partnerships becoming even more important
- Budget contested, represents the “new normal”

## Cyberspace & EM Spectrum

- Information dominance is a must (battlespace awareness, assured C2, resilient & reliable communications, ability to synchronize ops)



## Less Freedom of Movement in Space

- Other nations, private industry, all pushing forward in space
- Space situational awareness is key

## Growing Sophistication in A2/AD Threats

- Access challenges require integrated technologies
- Longer distances require next gen rapid response capabilities







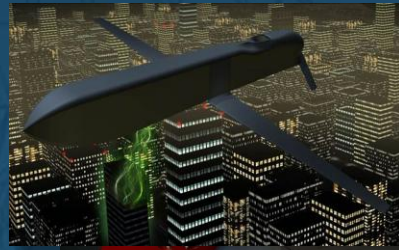
## Engagement & Partnership

- Focus our nation's economic engine on USAF S&T problems
- A healthy Tech Base provides big future payoff
- International Partnership



## Affordability

- "Baked in" to what we do across the entire S&T Enterprise



## More Advanced Technology Demos

- Higher TRL levels
- "Tech Push" - Not all Demos must come from a defined demand signal or requirement



## Push Innovation

- Leverage existing technologies ("tech push") to create new and better capabilities for tomorrow's warfighter
- Collaboration across the Air Force's S&T Enterprise

# Priorities



# Air Force SBIR/STTR Programs

The Air Force Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs are mission-oriented programs that integrate the needs and requirements of the Air Force through research and development topics that have military and commercial potential.

[www.Afsbirsttr.com](http://www.Afsbirsttr.com)

## Next Air Force Opportunities:

### SBIR 2014.1 solicitation

- Closed 1/22/2014, Proposals currently being evaluated

### STTR 2014.A solicitation

- Proposal submission currently open; closes 4/9/2014





# Air Force Independent Research and Development (IR&D) Program

The Air Force IR&D Program leads the use of the Defense Innovation Marketplace as primary communication tool to inform industry's IR&D portfolio planners.



<http://www.defenseinnovationmarketplace.mil/>

## Next Air Force IR&D Technical Interchanges:

Aero Enterprise: 14-18 April, WPAFB, OH

Nuclear Enterprise: 28 April – 2 May, Kirtland AFB, NM

C4ISR: 19-23 May, Hanscom AFB, MA

**Broad Agency Announcements Included on the Defense Innovation Marketplace**

# What We Want to Hear From Industry



- What are industries “Big Bets?” How is industry making decisions for IR&D?
- How can AFRL and industry achieve better alignment (road-mapping)?
- What are the current trends in S&T that AFRL may be missing?





# QUESTIONS?

## Legacy of War-Winning Technology Development



Early Flight

Space Age

Modern Flight

Cyber Domain

Future