



Overview

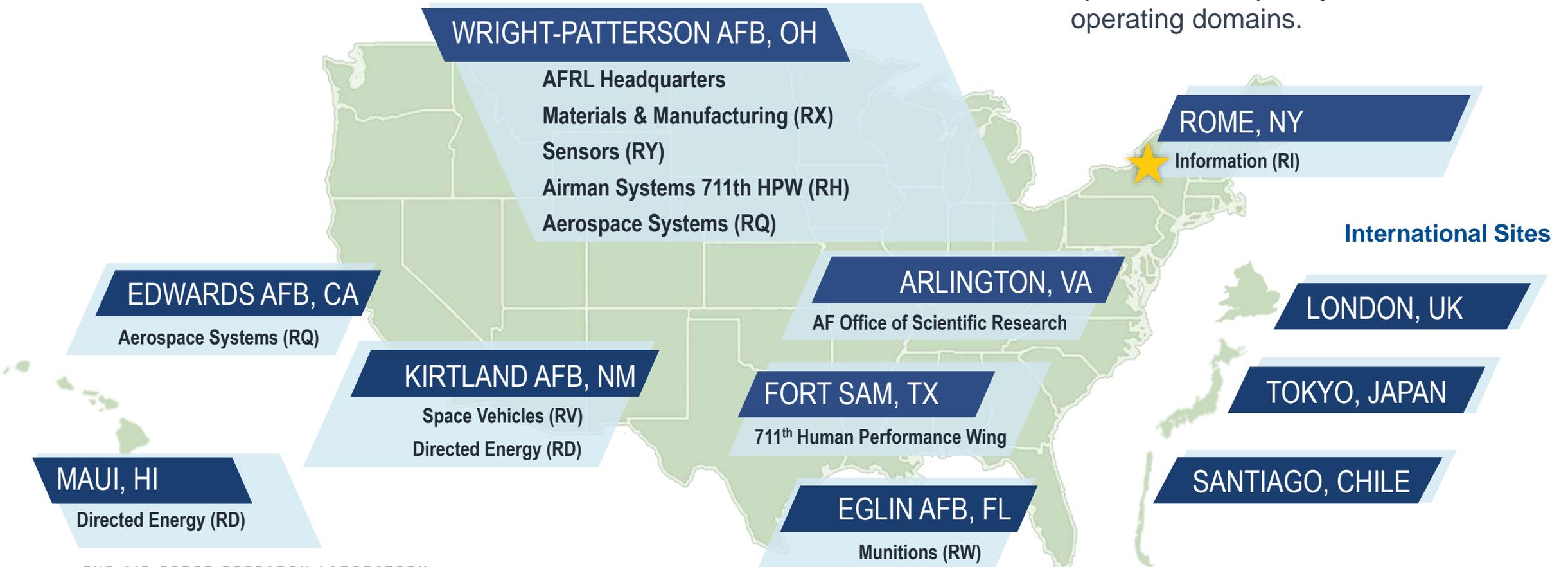
Information Directorate

September 2020

AFRL Mission & Vision

MISSION: We lead, discover, develop and deliver science, technology and innovation for Warfighters.

VISION: To arm Warfighters that dominate in time, space and complexity across all operating domains.



Information Directorate Mission & Vision



MISSION:

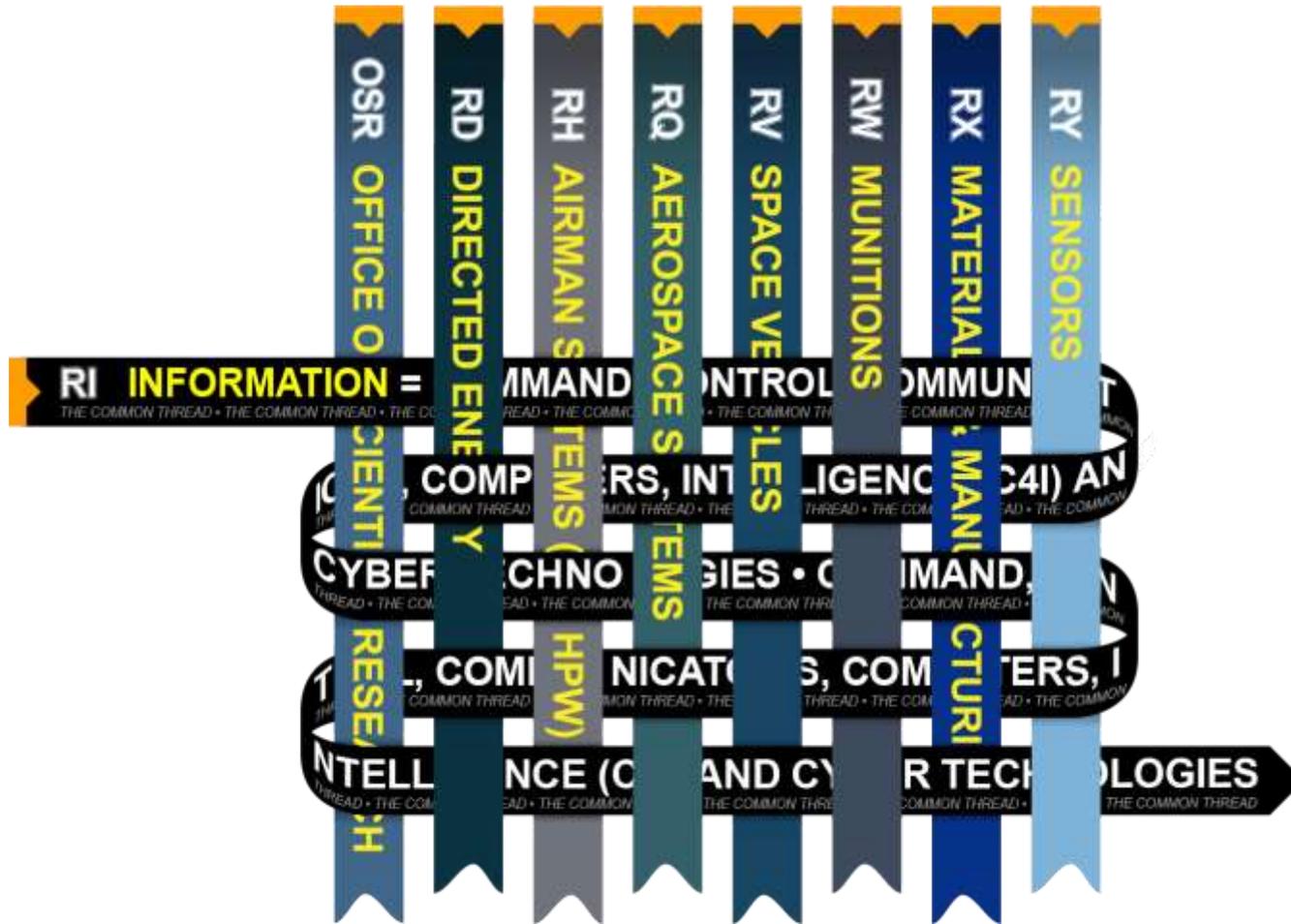
To explore, prototype, and demonstrate high-impact, game changing technologies that enable the Air Force and Nation to maintain its superior technical advantage.

VISION:

To lead the Air Force and Nation in command, control, communications, computers, and intelligence (C4I) and cyber science, technology, research and development.

ROME = C4I&Cyber

Information Technologies Touch Every AFRL Directorate



C4I&Cyber

Command, Control, Communications, Computers, Intelligence and Cyber

70% of RI programs are in collaboration with other AFRL TDs

- 18% Provide \$
- 46% SME Time
- 36% \$ + SME

Leadership

Director / Commander

Associate Director /
Tech. Advisor



Chief Scientist



Deputy Director



Deputy CC
(Section CC)



First Sergeant



Technical Divisions

Intelligence Systems



Computing &
Communications



Information
Systems



Information Exploitation
& Operations



Special Programs



Senior Scientific Leadership

Processing & Exploitation
Senior Scientist



Information Assurance
Senior Scientist



Command & Control
Senior Scientist



Chief Engineer



Core Technical Competency Leads

Processing &
Exploitation



Connectivity &
Dissemination



Autonomy, C2 &
Decision Support



Cyber Science &
Technology



Mission Support

Comptroller



Strategic Planning
& Integration



Contracting



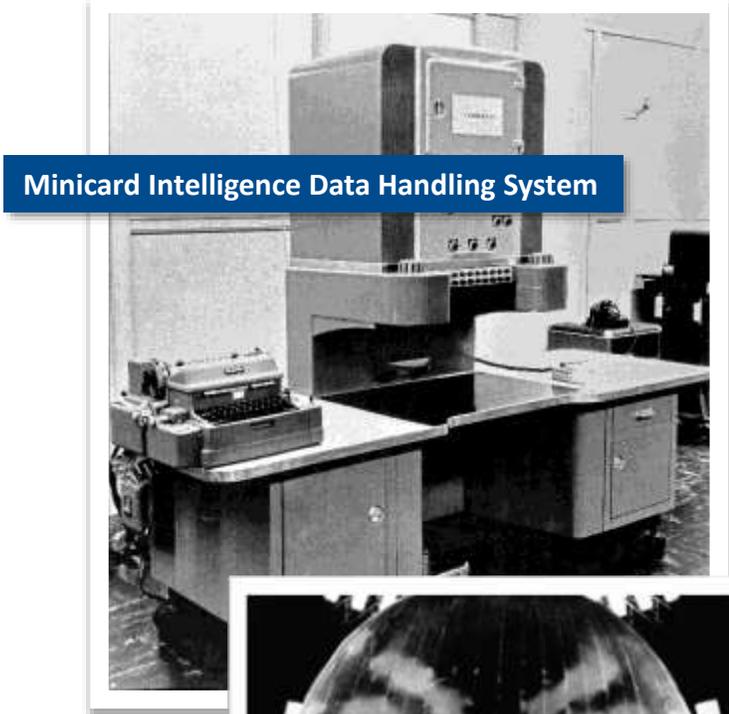
Integration &
Operations



Judge Advocate



Early Years of Research



Minicard Intelligence Data Handling System



ARPA Network RADC



Micro-Electro-Mechanical Systems (MEMS)



First Communication Satellite Echo 1



Cognitive Assistant That Learns and Organizes (CALO)



John F. Dove Laser Technology Creator

A Rich Heritage of Legendary Technology



Surveillance Radar



PAVE Mover



Airborne Digital Map System



IR Camera for B-52



Moving Target Indicators Experiment



Single Pass AirDrop



Selective Cyber Operations Technology Integration



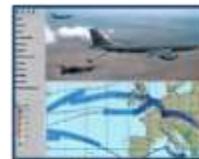
ECHO-I SATCOM (1st SAT Comm)



Russian to English machine translation



3D Memory



Advanced Planning System



Multi-Level Security



Cyber Situational Awareness



NSDC



Rome Air Development Center
Established 1951 – 1991



Rome Laboratory
Established 1991 – 1997



AF Research Lab Information Directorate
Established 1997 – Present



Intelligence Data Handling Systems



Skylab Tracking



SEM-E Modules For the F-22



Software Programmable Radio (forerunner of JTRS)



CONDOR Supercomputer



DCGS



DARPA's agent for ARPANET



Research Facility Newport & Stockbridge



Track & ID Fusion Algorithms for AWACS



Off-Board Data On J-STARS



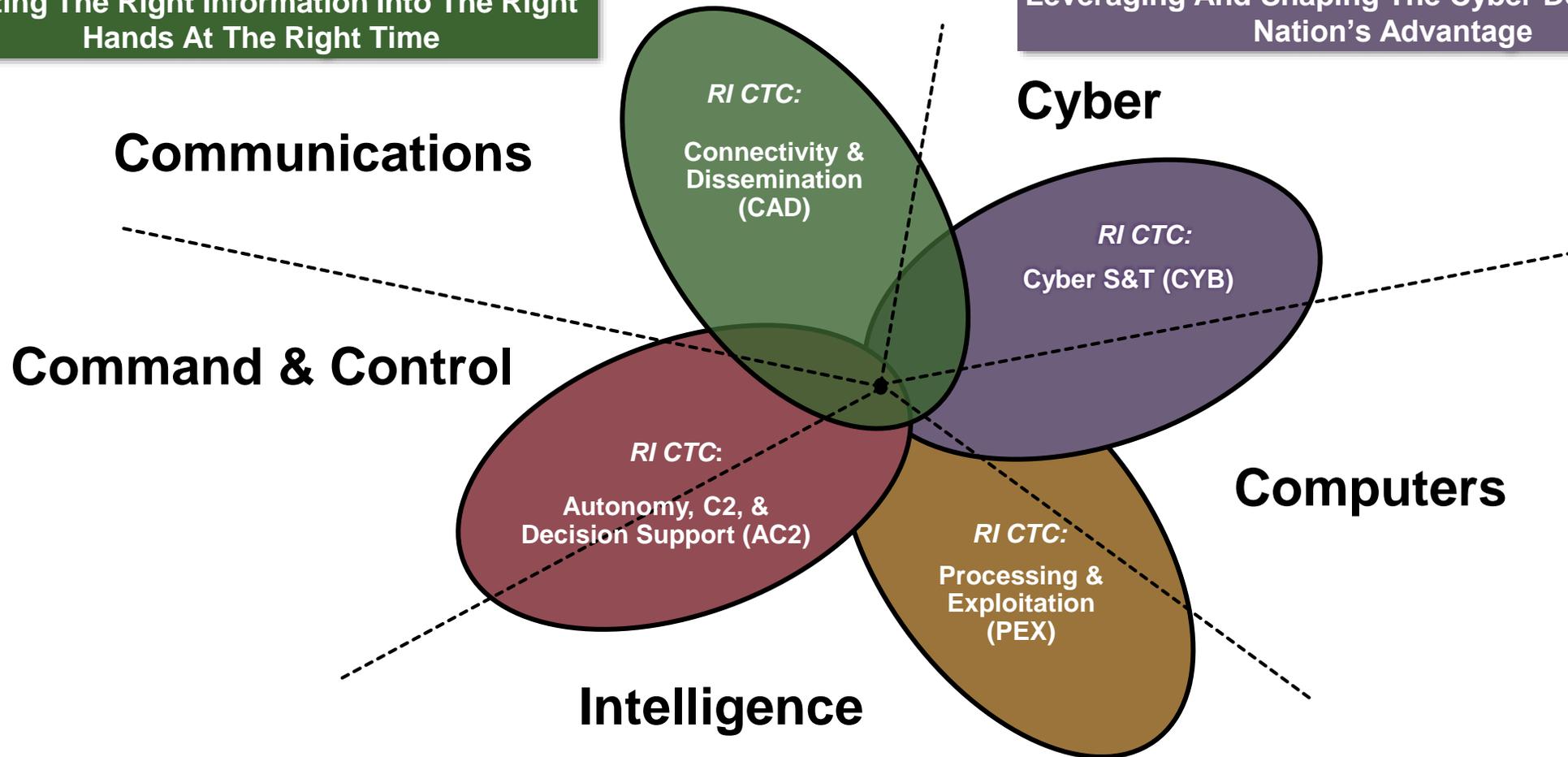
WebTAS

Core Technical Competencies (CTC)

Information Directorate Core Technical Competencies (CTC)

Putting The Right Information Into The Right Hands At The Right Time

Leveraging And Shaping The Cyber Domain To The Nation's Advantage



Mastering Complexity of Multi-domain Command & Control

Exploiting Computing and Algorithms to Transform Big Data Into Information

Connectivity and Dissemination (CAD)



CONNECTIVITY &
DISSEMINATION



Vision

Seamless, resilient networked communications fabric across the command and control intelligence surveillance and reconnaissance (C2ISR) enterprise, assuring delivery of timely, reliable, and actionable information to warfighters and systems.

Mission

Provide agile and secure mission-responsive communications and information sharing globally.

Goals

- Agile and secure communications and networks
- Agnostic connectivity
- Autonomous link discover, creation and utilization
- Dissemination of information at need, securely

Putting The Right Information Into The Right Hands At The Right Time

Cyber Science and Technology (CYB)



CYBER SCIENCE
AND TECHNOLOGY



Vision

An Air Force equipped with technologies that enable our freedom to operate in cyberspace while denying the adversary the same.

Mission

Deliver the science and technology necessary to ensure cyberspace superiority and support the conduct of full-spectrum, multi-domain, integrated cyber operations.

Goals:

- Secure, composable, risk-based compute options
- Cyber operations integrated and on par with air & space
- Ability to conduct cyber operations agnostic to medium and geography

Leveraging And Shaping The Cyber Domain To The Nation's Advantage

Processing and Exploitation (PEX)



PROCESSING AND
EXPLOITATION



Exploiting Computing And Algorithms To Transform Big Data Into Information

Vision

Innovator of technologies that process and exploit data in near real time, analyze massive collections over time and employ continuous learning to deliver asymmetric decision speed to the Air Force and Intelligence Community.

Mission

Deliver fast sense-making for situational awareness and adversarial insight for the AF, DoD, and Intelligence Community.

Goals

- Multi-INT correlation and fusion of massive amounts of intelligence, surveillance, and reconnaissance (ISR) and publicly available data.
- Exploit targets in denied areas.
- Adversarial and secure machine learning.
- Dynamic, hybrid computing advancing neuromorphic, nanotech, and quantum systems to efficiently process ISR information.

Autonomy, Command & Control and Decision Support (AC2)



AUTONOMY, COMMAND & CONTROL
(C2) AND DECISION SUPPORT



Vision

Mastering and imposing complexity to command & control future multi-domain operations in an evolving battlespace with speed and scale.

Mission

Deliver revolutionary, trusted, affordable information technologies for agile, resilient and distributed Air Force command & control and autonomous systems.

Goals

- Master complexity through development of adaptive command & control systems-of-systems and services
- Control, impose and synchronize complex multi-domain effects chains
- Harness machine intelligence to increase command & control speed and scale of operations
- Realize large-scale multi-agent systems for autonomous planning, tasking and execution

Mastering Complexity of Multi-domain Command & Control

Facilities

Information Directorate Facilities

65 Acre Campus, 30 Laboratories & Facilities, And 882,000 Sq Ft Floor Space



Information Directorate

The map shows three locations: Rome (top left), Stockbridge (bottom left), and Newport (right). Dashed blue lines connect the locations. A central text block describes the Stockbridge facility's use.

Rome
65 Acre Campus
30 Laboratories & Facilities
882,000 sq ft floor space

Stockbridge
Used for development of and real world experimentation with advanced radio frequency (RF)/optical communications, networking and information technologies, cyber techniques and effects, including small unmanned aircraft systems.

Newport
Primary mission: To evaluate antenna performance on full scale aircraft and make recommendations for improvement.

Information Directorate Facilities



Machine Intelligence for ISR Laboratory



Situation Awareness Laboratory



Cyber Experimentation Environment (CEE)



Audio Processing Lab



Operational Information Management Lab



Integrated Intelligence Innovation Facility (I3F)



Newport Remote Research Site



Secure Embedded High Performance Computing



Small Unmanned Aerial System Experimental Capability (SUAS-EC)



Command and Control Technology Center (C2TC)



High Performance Computing Facility



Advanced Computing Applications Laboratory



Quantum Information Science Facility



Quantum Communications Laboratory



Nanotechnology & Computational Intelligence Laboratory



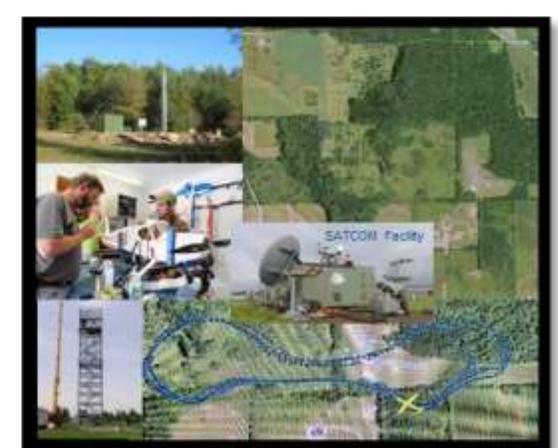
Corporate Collateral Facility (CCF)



Cyber Integration & Transition Environment



K5 Laboratory



Stockbridge Remote Research Site



Corporate Research and Development Server Facility (CRDSF)



Microwave and Optical Communication Range



RF Technology Center



Cyber Operations Technology Facility (COTF)



Network-Centric Integration & Interoperability Facility (NCIIF)

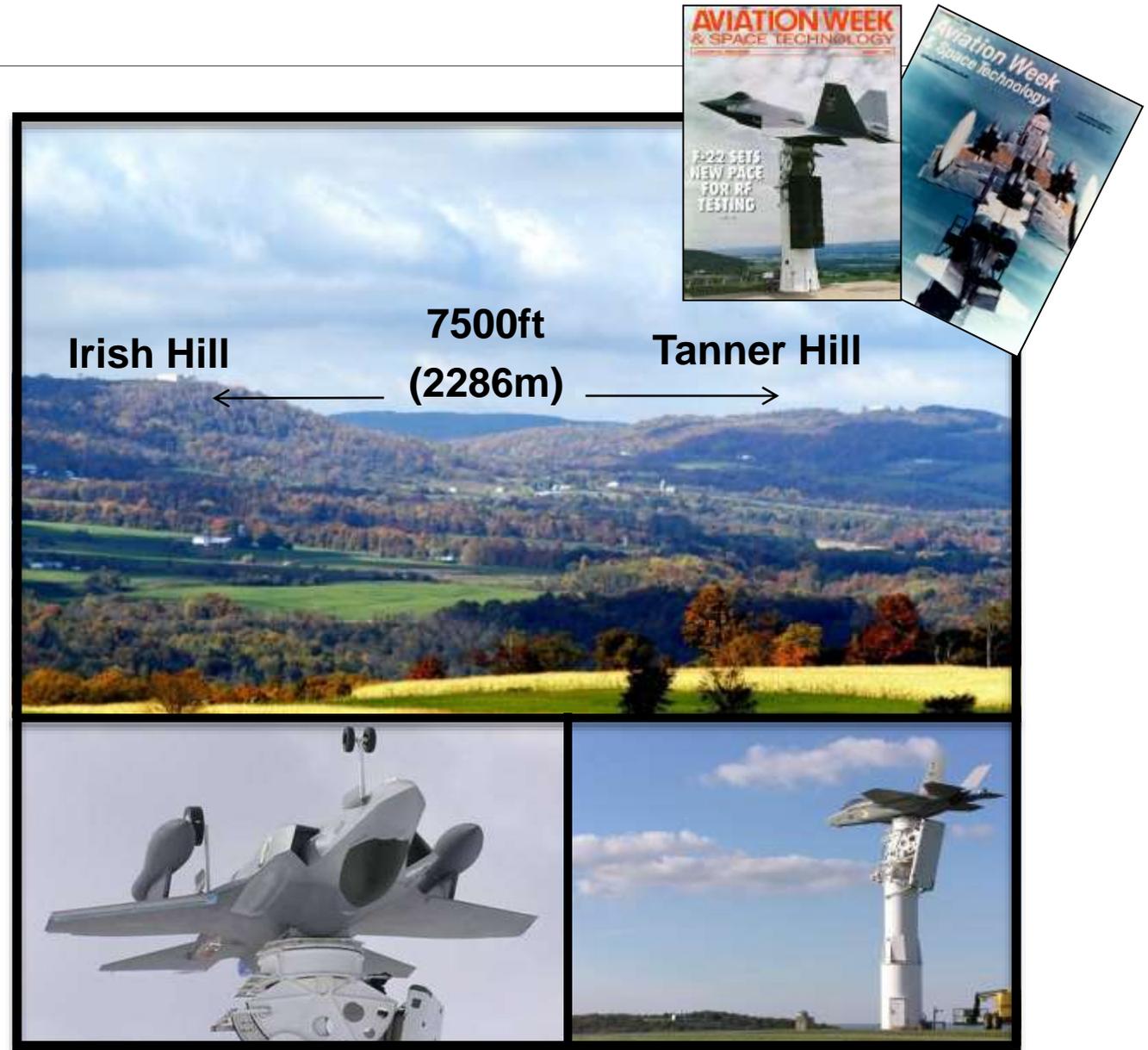


Command and Control Concept Center (C2CC)

Newport Research Site

Far Field, Elevated Outdoor Antenna Test Range

- 78 Acres
- 360 degree pattern measurement
- Established in 1972
- Ideal geography
- Essential measurements of the F-35 aircraft antenna patterns
- Inflatable reflector antennas for SOCOM
- 12 Commercial Test Agreements



Stockbridge Research Site

RF and Small UAS Experimental Facility

- 300 acre flexible test site, varying in relative distance, topology and foliage density
- Heavy-duty turntable with A 200' high arched measurement probe – large aircraft and vehicle capable
- 120' walkup tower for LOS and optical links



- SUAS airfield
- Fixed wing and VTOL platforms
- Trained flight personnel

- Controllable contested environment
- All weather, full season, configurable RF capability
- C4ISR, cyber, spectrum, networking
- Flexible frequency authorizations

- Experiment, management and control facility
- Flexible laboratory space
- Operations and control room



Extreme Computing Facility: A Computing Challenge Space

Current Von Neumann computing architectures are inefficient and do not scale

Foundational advances in computing architectures

- Quantum
- Neuromorphic
- Nanoelectronic
- Machine Learning
- Artificial Intelligence



Neuromorphic Computing

Brain-inspired, extremely low SWaP, intelligent computing at-the-edge in dynamic & contested mission environments

- Neurosynaptic processors
- Nanoelectronics

Agile Condor

- Real time situational awareness
- Neuromorphic architecture on-board
- Actionable intelligence with anomaly detection models, target recognition, and data fusion



Quantum Information Science

TIMING Fewer timing updates required, coherent EW, ISR, improved navigation

SENSING Enhanced inertial navigation, advanced low-SWaP sensors

COMM / NETWORKING Space object threat assessment, fieldable low-SWaP systems, fully-quantum transmission

COMPUTING Much faster data processing, asset optimization, image/object recognition

challenges increase

RI Goal: Demonstrate Quantum Network

- Nodes consist of arrays of trapped ions
- Entanglement mapping for long distance transmission over conventional channel
- Photon-based qubits provide interconnect and processing “on the fly”

DoD Lead for QEDC Consortium

Innovare Advancement Center | *Agility + Innovation + Partnerships*

An agile and transformative ecosystem at AFRL/RI, connecting global technology leaders to collaborate and solve complex Air Force computing challenges.

Linking researchers from government, industry, and academia, to share the best and brightest people, ideas, and facilities.

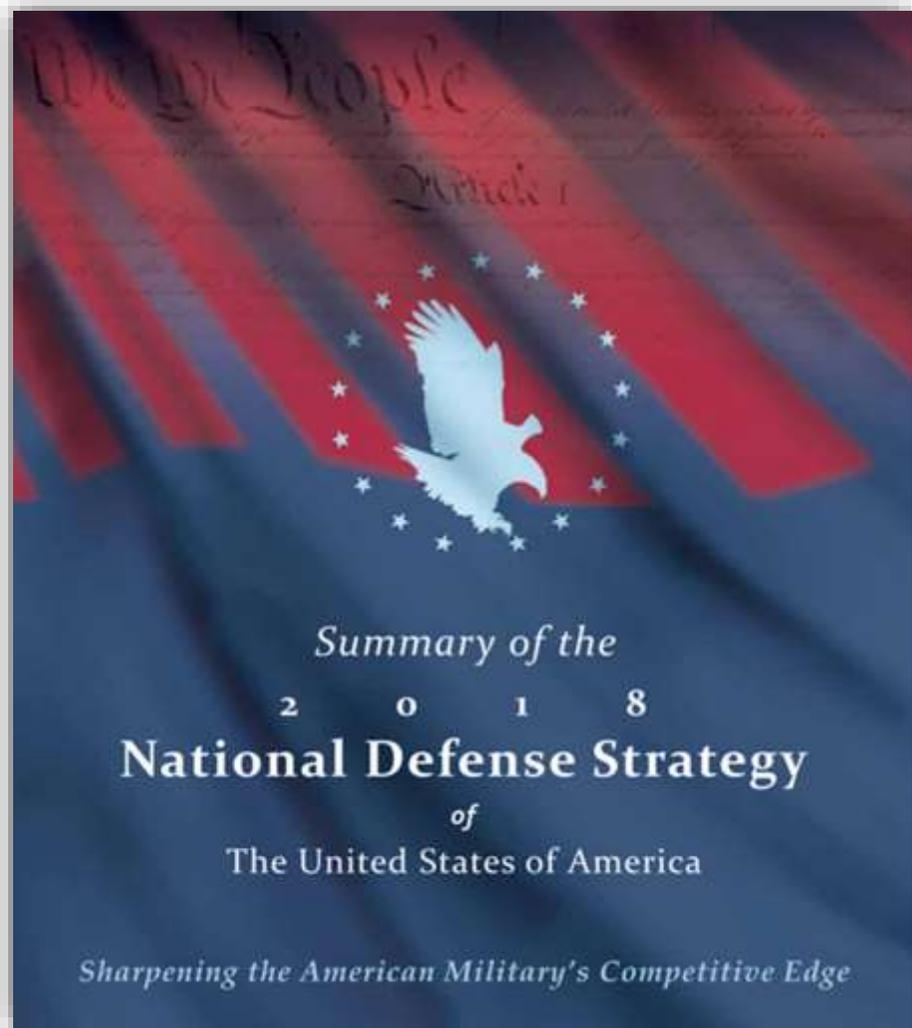
Discovery lab outside the fence for high risk, high impact problem solving

- Open campus facility within walking distance of AFRL campus
- Hard and soft lab space
- Collaboration space
- Event space
- One facility for outreach
- Co-located partners, offices, labs, event center
- Basic research hub for C4I and Cyber

S-UAS Testing | Quantum Facilities | Neuromorphic Computing Facilities

Strategic Alignment: National Defense Strategy

Strategic Drivers | Touching All of the Major Priorities for National Defense



Build a more lethal force - modernize key capabilities

- C4ISR
- Space And Cyberspace Warfighting Domains
- Advanced Autonomous Systems
- Nuclear Forces
- Resilient and Agile Logistics
- Joint Lethality In Contested Environments
- Missile Defense
- Forward Force Maneuver And Posture Resilience

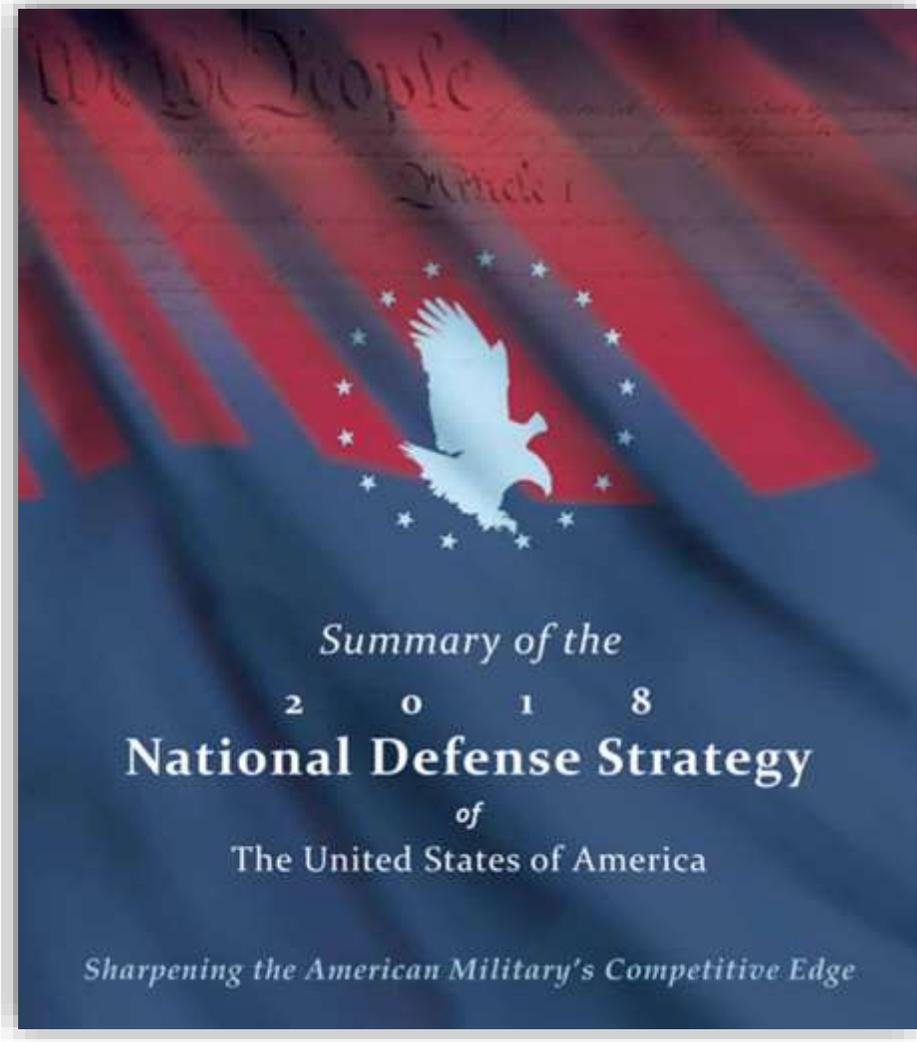
Strengthen alliances and attract new partners

- 462 Active Engagements
 - Gov't – 125
 - Industry – 223
 - Academia – 114

Reform the organization for greater performance and affordability

- Innovate At Speed
- Rapid, Iterative Approaches, Development → Fielding

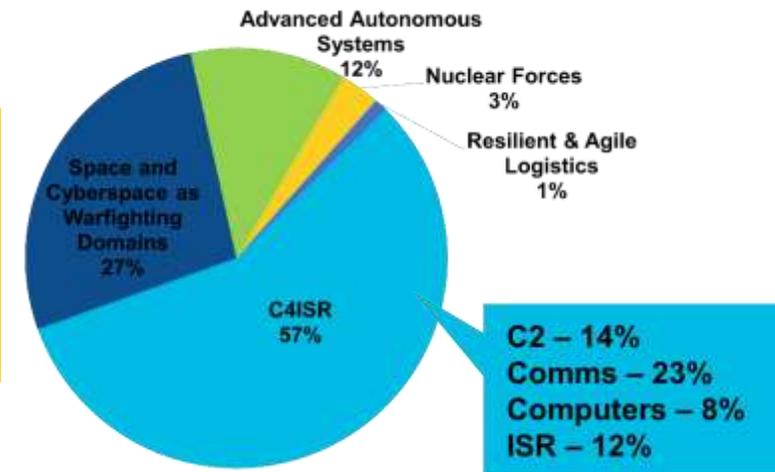
Build A More Lethal Force | Modernize Key Capabilities



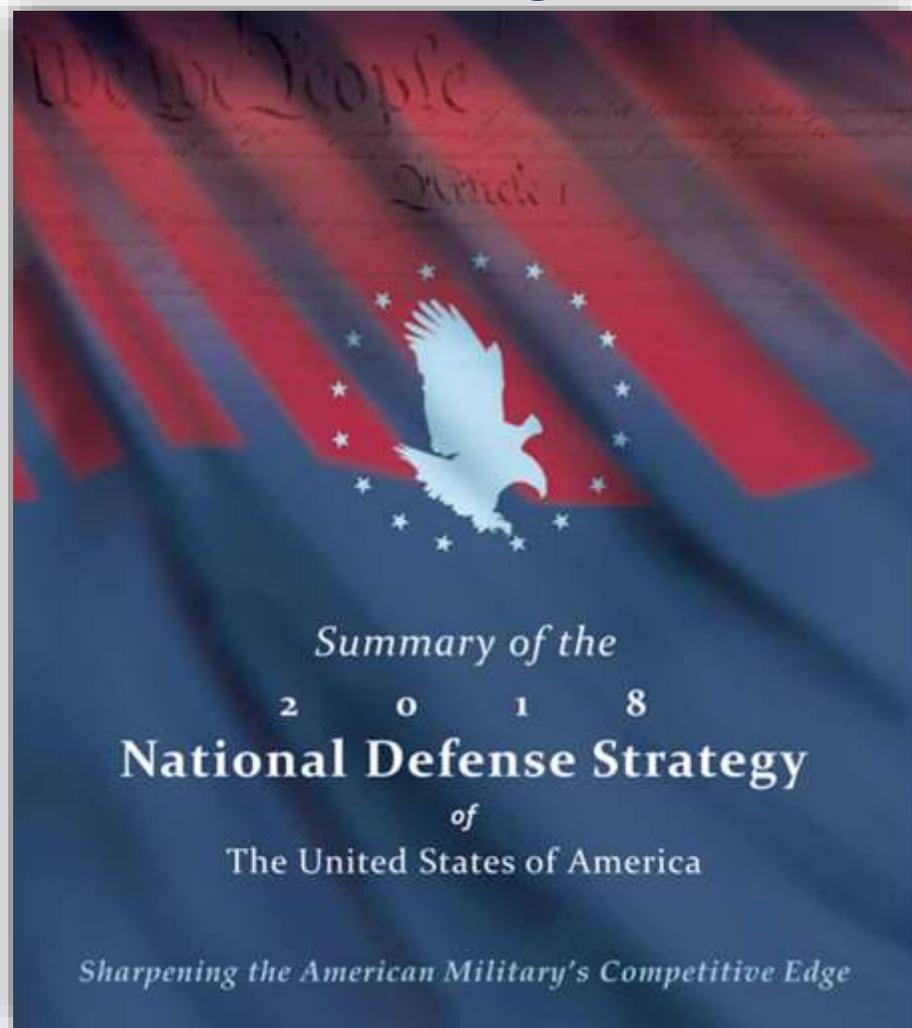
Addressing Critical Strategic Focus Areas

- **C4ISR**
- **Space And Cyberspace Warfighting Domains**
- **Advanced Autonomous Systems**
- **Nuclear Forces**
- **Resilient And Agile Logistics**
- **Joint Lethality In Contested Environments**
- **Missile Defense**
- **Forward Force Maneuver And Posture Resilience**

NDS Alignment by Percentage of RI Portfolio (AFRL FY20 \$)



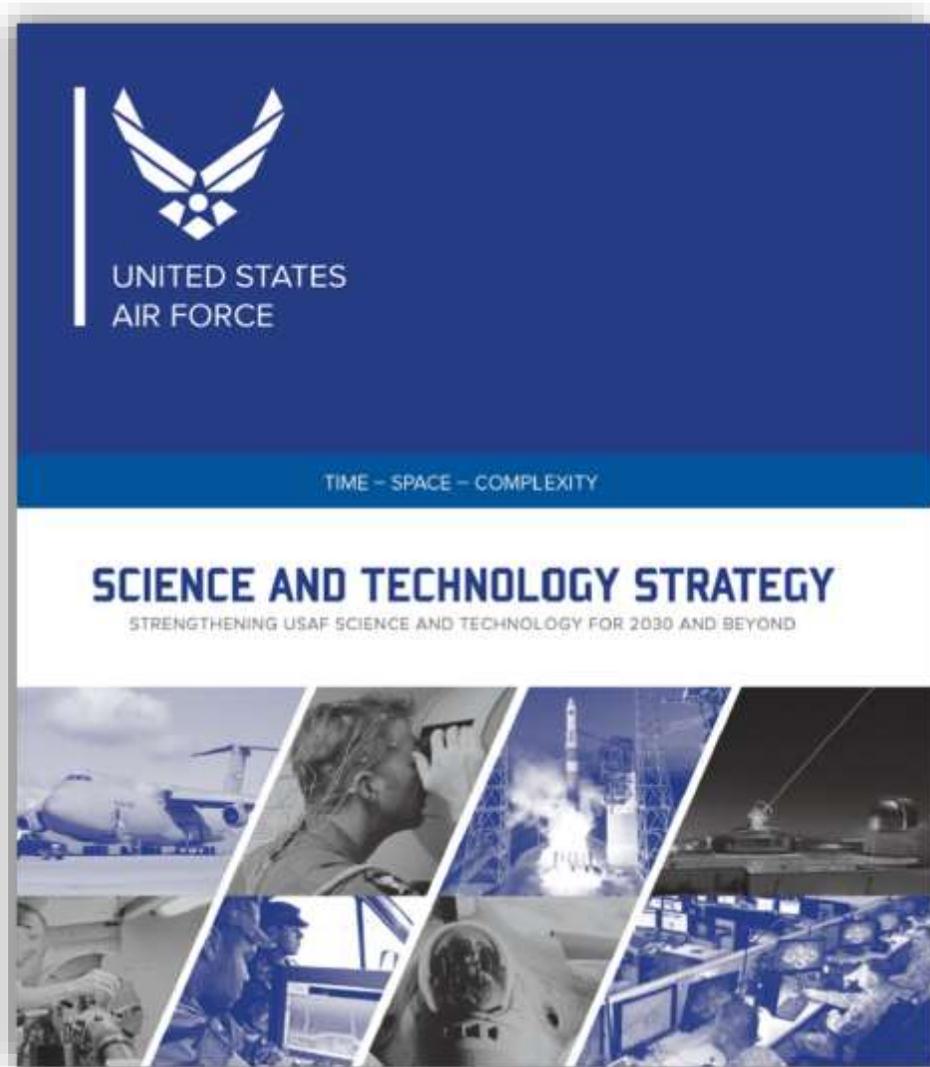
Reform the Organization for Greater Performance & Affordability



- **Harnessing a Culture of Agility in Acquisition & Capability Development**
- **Other Transaction for Prototype Authority (OTA)**
 - Non traditional vendors
- **Agile Cyber Technology 2**
 - \$950M multiple award IDIQ Contract
- **Small Business Innovation**
- **Collaborative Research & Development Agreements (CRADAs)**
 - 68 active CRADAs
- **Commercial Test Agreements**
- **Educational Partnership Agreements**
- **Open Solicitation BAA Process**
 - Agile acquisition of R&D via contracts, grants, cooperative agreements, and other transactions
- **AF and GWAC contracts:**
 - NETCENTS-2 One Acquisition Solution for Integrated Services (OASIS)
 - Alliant government-wide acquisition contract

Strategic Alignment: S&T 2030 Strategy

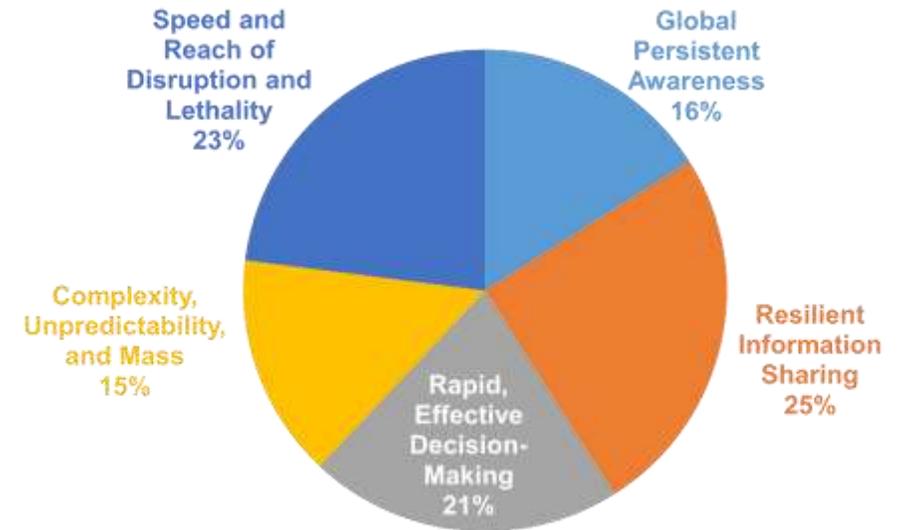
Strategic Drivers | Air Force S&T 2030 Strategy



Aligning with Strategic Capabilities Needed for our Future Air Force

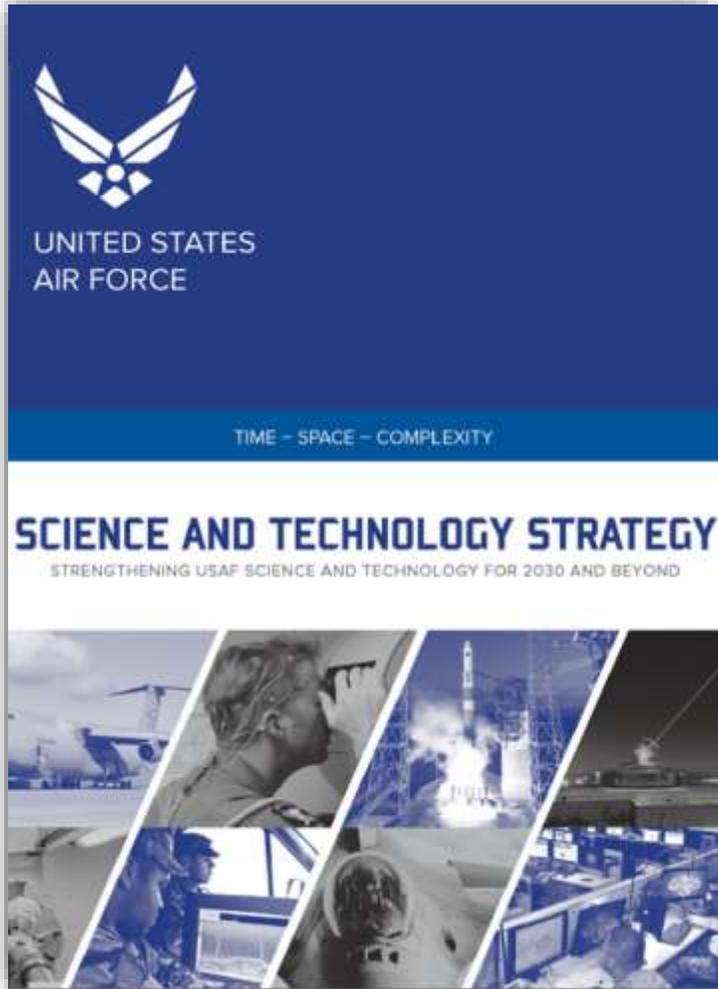
- Global Persistent Awareness
- **Resilient Information Sharing**
- Rapid, Effective Decision-Making
- **Complexity, Unpredictability, and Mass**
- Speed and Reach of Disruption and Lethality

S&T 2030 Strategy Alignment by Percentage of RI Portfolio (AFRL FY20 \$)



Strategic Drivers: Air Force S&T 2030 Strategy

Discovering New Technology of Air Force Relevance



Machine Learning Initiatives & Programs

- ML Boot Camp: Workforce Development
- MLCoE: Academia to DoD, a pipeline for accelerated ML R&D to AF applications
- Streamlined ML: Reducing the time & cost of delivering ML algorithms



Secure Stack: TCORE, ARES/HADES

- T-CORE: Government owned trusted processor that provides cyber guarantees beyond industry grade protected modes
- HADES: Embedded system reference architecture



Quantum

- Ultra-secure quantum communication and enable fundamentally new communication protocols using memory-based qubits and integrated-circuit-based interconnects



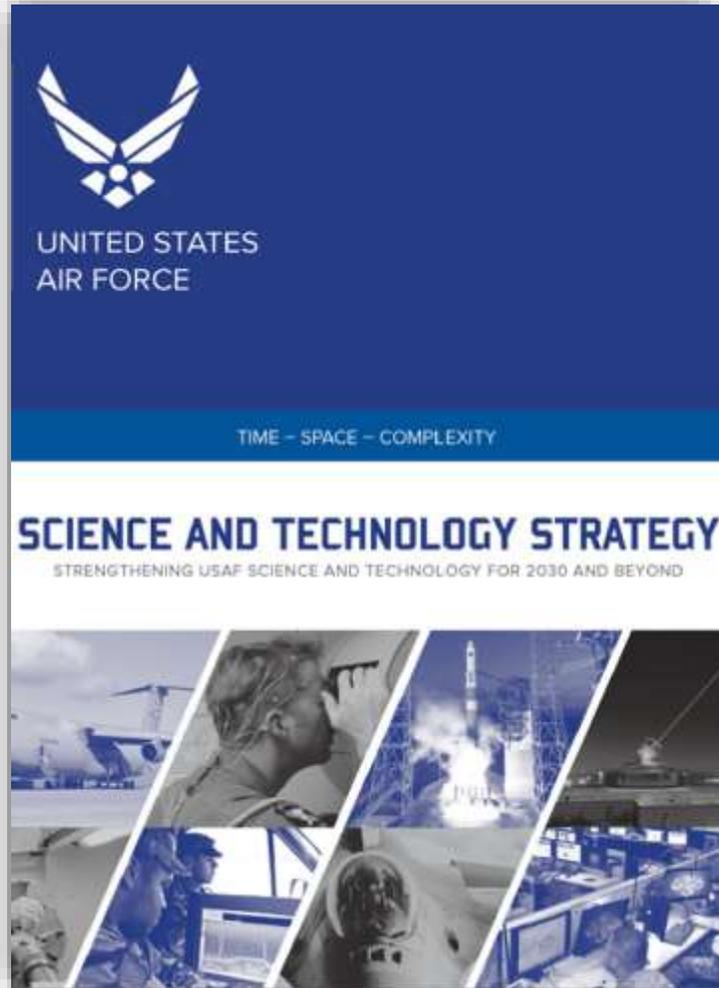
Agile Condor / Blue Raven - Neuromorphic Computing

- Deploying artificial intelligence and machine learning capabilities
- Low swap high performance ruggedized embedded computing
- Big data analytics at the edge



Strategic Drivers: Air Force S&T 2030 Strategy

Identifying Solutions to Established Air Force Mission Gaps



DistrO: Distributed C2

- Provide tactical C2 nodes with an agile distributed planning and assessment capability
- Enables a fail forward capability when an AOC is disconnected to carry on the air war



FuelAI

- “Labeling on the Line” web applications to label ISR data
- Integrating the labeling process into analyst workflows



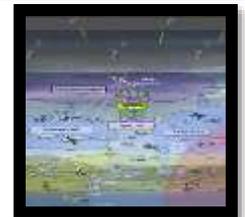
Cyber Quantification Framework

- Operational-level planning decision-support aid for rapidly evaluating cyberspace courses of action



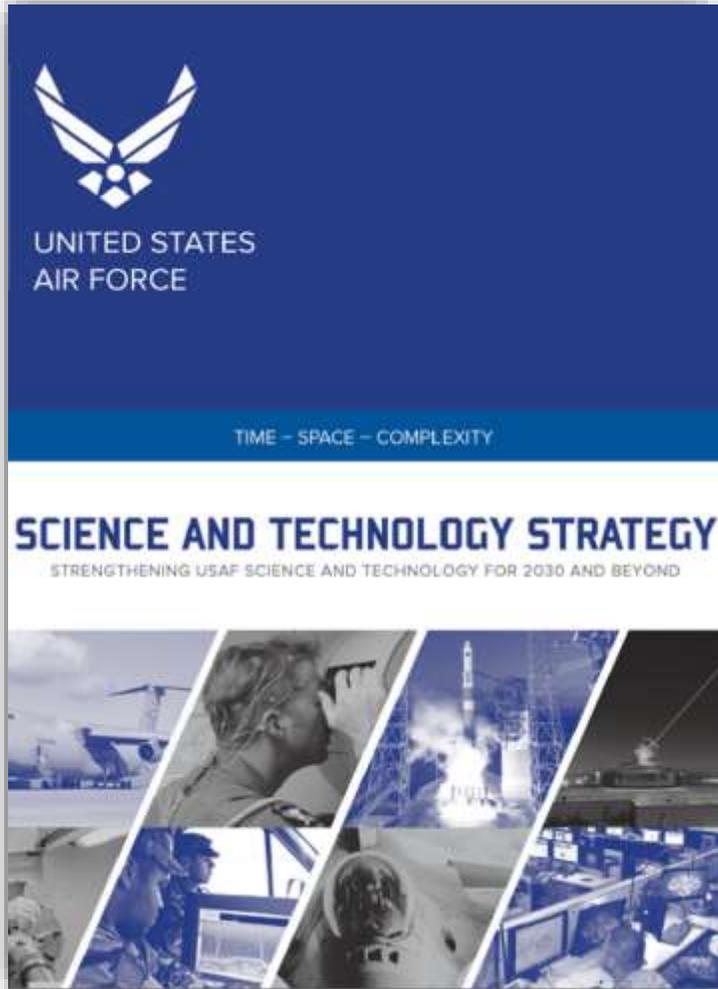
Assured Communications

- Elastic multi-domain networking
- Tactical apps & secure information exchange
- Spectrum maneuverability
- Wideband connectivity



Strategic Drivers: Air Force S&T 2030 Strategy

Maturing Emerging Technology into Air Force Systems



ELINT Signal Collection, Analysis, Processing and Exploitation

- Employs digital signal sampling, processing, and computing technology-increased analog-to-digital (ADC) sampling and field programmable gate array (FPGA) processing speeds



Open Architecture Distributed Common Ground System

- Agile ISR transformation owned and managed by the government



Software Defined Radio Frequency (SDRF++)

- Government-owned, dynamic, software-defined RF capabilities enable secure, on-demand multi-mission waveforms



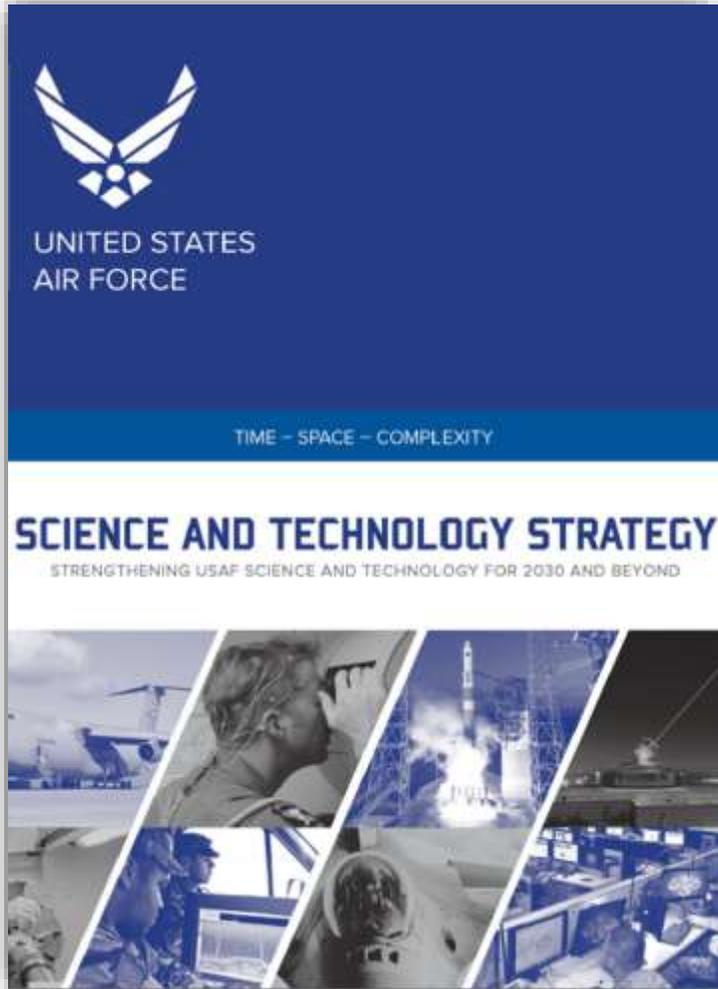
Flyleaf: DevOps Environment for C2

- Infrastructure and MD scenarios to drive Joint All-Domain workflows and CONOPS for the application of AI/ML



Strategic Drivers: Air Force S&T 2030 Strategy

Responding to Urgent Needs



Android Tactical Assault Kit (ATAK) & AERONET

- ATAK is an Android based application with advanced collaborative geo-spatial sharing, and communication capabilities
- AERONET: ATAK for exportable Light Attack Aircraft



Ninja

- Provides link specific cyber/EW detection and defeat of sUAS
- Fielding to all AF installations began in FY19



KRUGE

- Collaboration with Air Force Tactical Exploitation of National Capabilities (AFTENCAP) and various service partners.



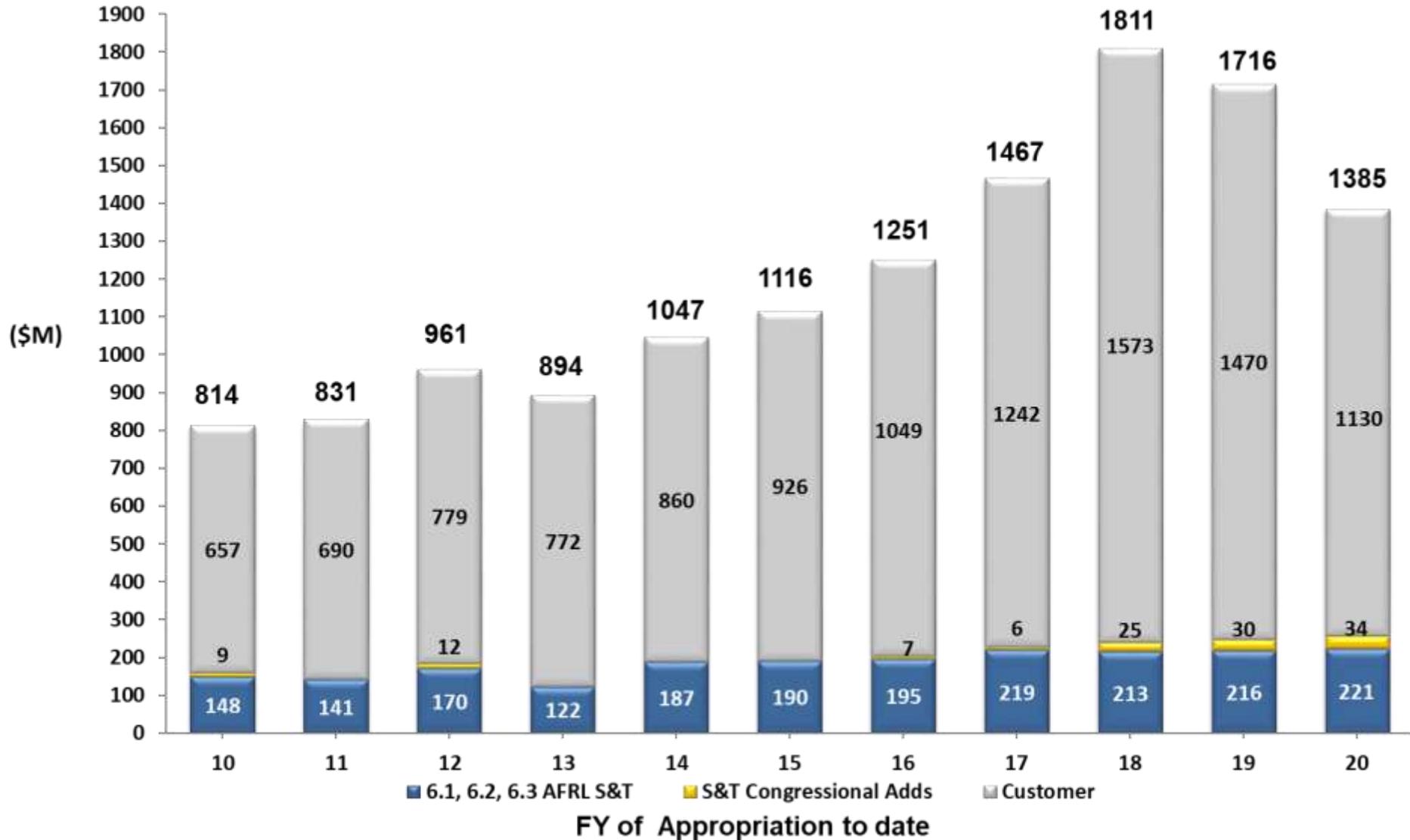
Checkmate

- Synchronized Multi-Domain Proactive Operations
- Reduced time to process and analyze Indications and Warnings (I&W) information and data



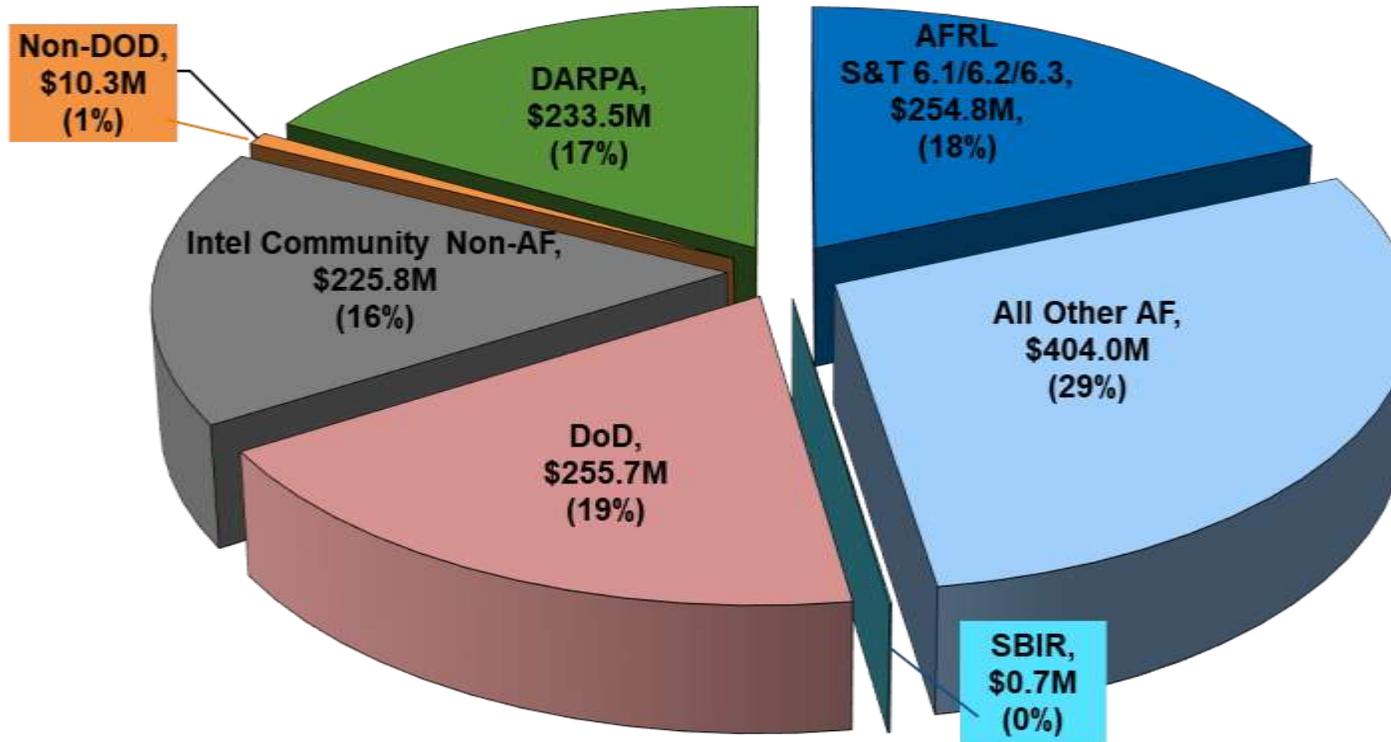
Revenue

Funding Trend (\$M)



Source: <webeis>
AFRL/RIB
as of 31July2020

Funding Profile – FY20 Funds as of 31 July 20

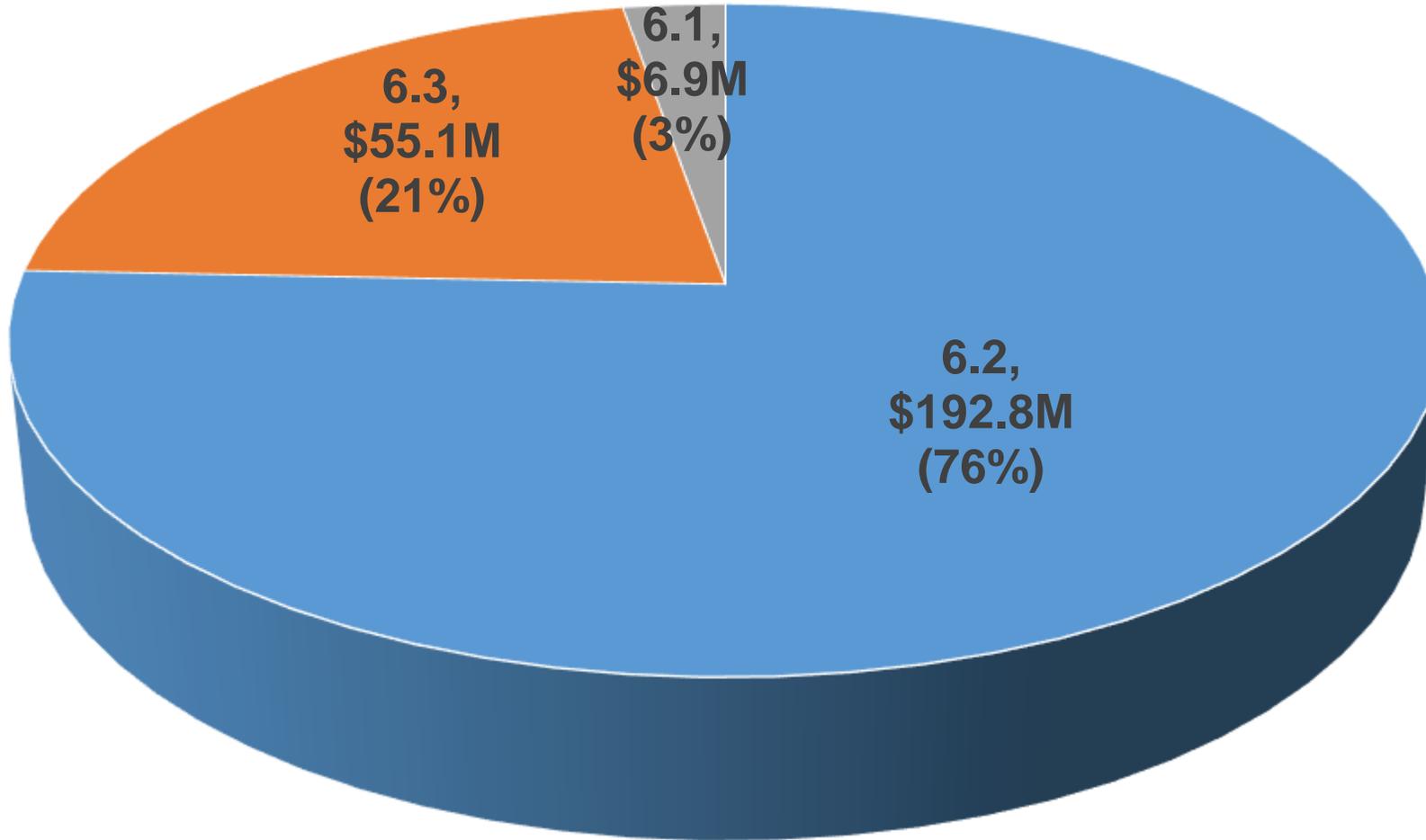


**Total FY20 Funding
as of 31 Jul 20
\$1.4B**

AFRL S&T	254.8	18%
Other AF	<u>404.7</u>	<u>29%</u>
Subtotal	659.5	47%
Other Customers	<u>725.3</u>	<u>53%</u>
TOTAL	1384.8	100%

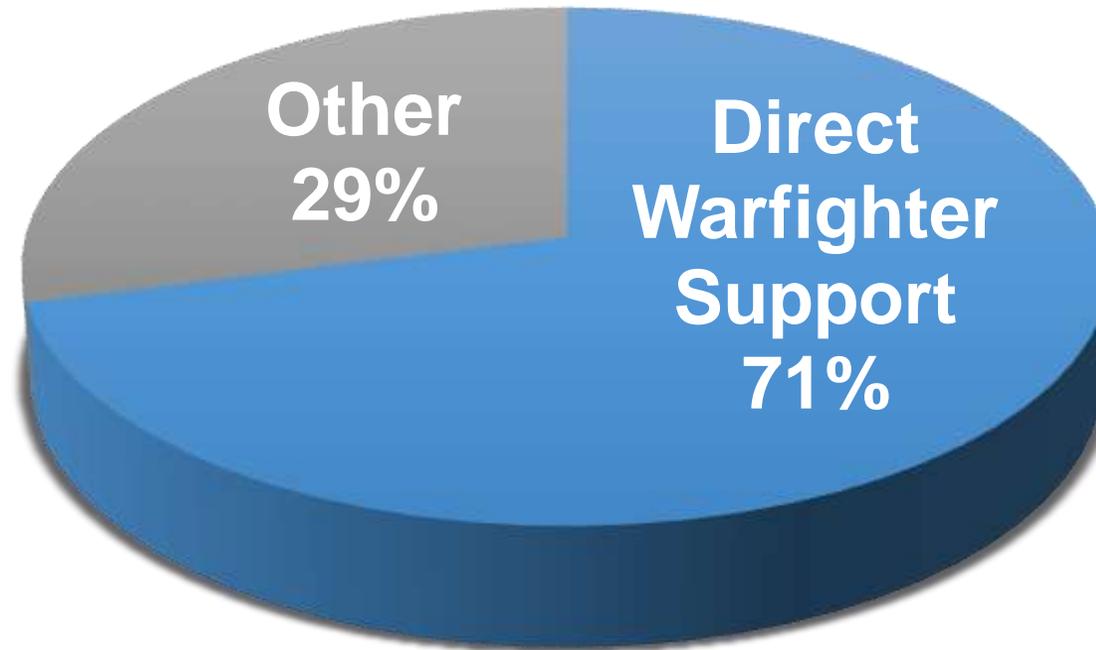
Source: <webeis>
AFRL/RIB
as of 31July2020

Funding Profile | AFRL S&T 6.1 / 6.2 / 6.3 FY20 Funds Received as of 31 July 20



Total FY20 AFRL S&T Funding – \$254.8M

Funding Profile | FY20 Funds as of 31 July **\$1.4B**



Partnerships

Partners

USAF

- AFMC
- AFSOC
- AFSPC
- ANG
- 16th

- AMC
- ACC
- AFLCMC
- SAF
- SMC
- ...



ACADEMIA

- 90+ grants
- Information Institute – 60+ members
- 130+ EPAs
- Visiting Faculty Research Program
- Research Fellowships
- STEM
- Centers of Excellence
- ...

JOINT COMMUNITY

- STRATCOM
- TRANSCOM
- NORTHCOM
- CYBERCOM
- CENTCOM
- Army
- Navy
- Marines
- ...



INTEL COMMUNITY

- DIA
- CIA
- IARPA
- NSA
- NRO
- NGA
- NASIC
- ...



INDUSTRY

- 200+ contractual partners
- IR&D
- 60+ CRADAs
- SBIR/STTR
- ...



INTERNATIONAL

- PAs
- TTCP
- NATO
- EOARD
- AOARD
- ...



OTHER DoD

- DARPA
- DTRA
- Cyber COI
- C4I COI
- ...



OTHERS

- FBI
- FFRDCs
- NASA
- DHS
- DoE Labs
- ...

Embedded Team



Embedded Here

- 222d CACS augmenting NROC (80 - NY Air National Guardsmen)
- Joint Reserve Intelligence Connectivity Program (JRICP) (74 Reserve and Guardsmen)
- Organic 3 Air Force 14N Intel Officers (1Lt, 2Capt)
- Organic 6 Air Force Enlisted Intel Specialists

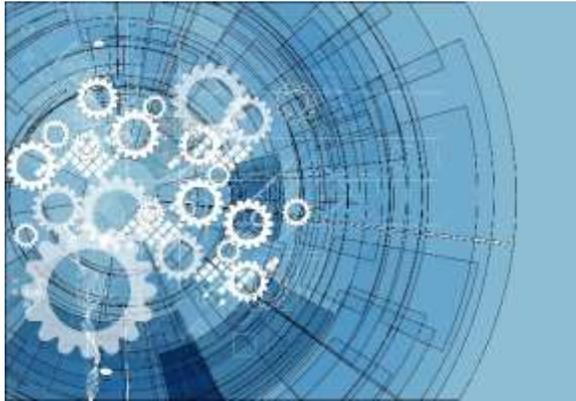


Embedded There

- Air Combat Command
- Air Force Space Command
- SAF/AQR
- SUNY Polytechnic Institute
- Air Force Academy
- SOCOM
- OSD
- AFLCMC (Kessel Run, OA DCGS)
- 16th AF
- AFRL Space Vehicles Directorate

Small Business Innovation Research (SBIR) Successes

Repository, Integration, & Verification Toolset For Systems-of-systems (RIVETSS)

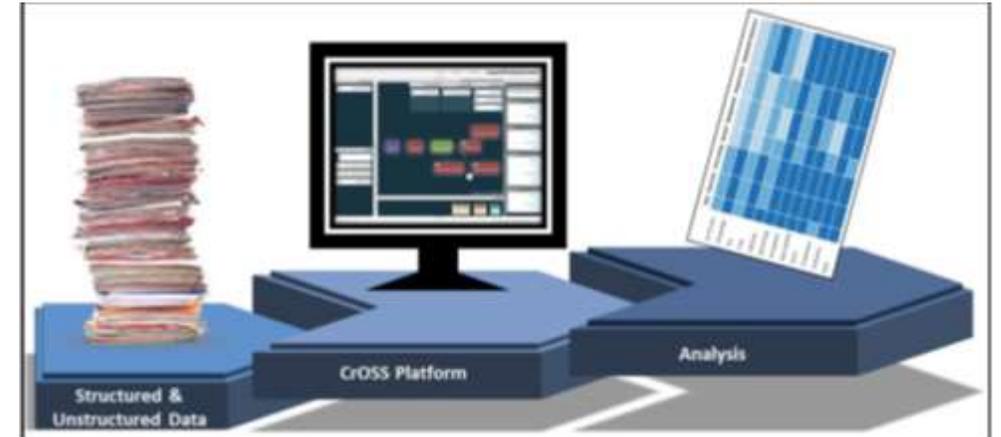


Automating IT integration

Enables ability to test, document, and update components as they are delivered independently by vendors. Generates feedback and instruction to aid automating the integration process

Transition Partner: OSD

Cross Organizational Semantic Services (Cross)



Time-saving software tool

The application of new text mining and analysis technologies to automate the process of reviewing large collections of documents

Transition Partner: DTIC, DoD UASCDP

Small Business Innovation Research Pitch Events

F-35 PITCH DAY

November 2019



Providing the warfighter with innovative software tools to increase the efficiency of software development by partnering with pioneering small businesses that may have solutions to AF challenges, including:

- Multisource data fusion and management
- Conditional optimization in building data files
- Synthetic radio frequency environment generation and scenario development
- High fidelity modeling and simulation for test
- Automated data file deployment and delivery
- Analytical mapping software
- Integration of disparate data sources
- Data encryption

Awarded 17 Phase I SBIR Contracts

QUANTUM COLLIDER EVENT

June 2020



Seeking innovative technologies and/or processes which will advance the development of Quantum Enabling Technologies and applications in the areas of:

- Timing
- Sensing
- Information Processing and Computing
- Communication and Networking

Awarded 35 Phase I STTR Contracts
Total funding for Phase I & II: \$56M



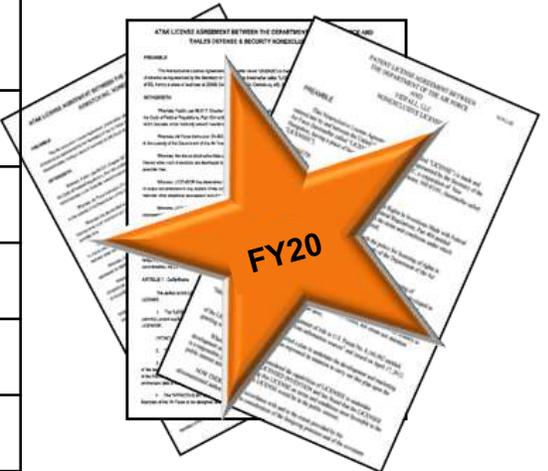


Technology Transfer

Created to ensure Air Force S&E activities are transferred or shared with state and local governments, academia and industry

The exchange of knowledge, expertise, equipment, and testing facilities leverages DoD research and development investment

FY20 OPEN Agreements per AF Org per Transfer Mechanism			
AF Org	CRADA	EPA	CTA
711 HPW	3	2	
711 HPW/RH	99	25	6
AFRL/SB	42	12	
RD	10	41	
RI	68	130	21
RQ	40	58	3
RV	15	39	1
RW	26	10	2
RX	38	22	
RY	26	3	



183 Active Licenses

Leading the way for the Enterprise!

Partnership Intermediaries



Information Institute

Facilitate Tech Transfer

Business Incubator & Accelerator

AF STEM

Local STEM

63 Visiting Professors, 17 Students from 39 Universities

Connecting S&Es to Industry, CRADAs

Commercialization Academy

Executing \$99M AF STEM initiatives, with AFRL/RI as Lead AF Agent

5 Virtual STEM Camps, 62 Students from 11 States



Curriculum Development

Quantum Information Science

Influence Over Industry via CRADAs

- Dr. Roper's perspective is for the RDT&E community to leverage/influence Industry's approximately \$400B research and development investment
 - Proposed Industry Leverage Goals – Percentage of AFRL S&T budget
 - AFRL should seek to influence 0.75% of industry's budget with a stretch goal of 1.5%
 - Threshold: \$2.8B (1:1 of AFRL's \$2.8B FY19 S&T budget)
 - Objective: \$5.6B (2:1)
- RI's Current Stats
 - 68 CRADAs with over \$500M shared investment in Collaborative R&D
 - RI's FY19 S&T budget was \$245M yielding ~2:1 leverage

Leveraging Industry via CRADAs - Examples



Spectrum Independence through Directional Networking

- Airborne Networking Technology Evaluation
- Cubic Defense Applications - \$6.15M



Counter Autonomous Air

- Machine Learning in the 5th Domain
- Andural Industries - \$100M



Connecting Quantum Capabilities

- Integrated Photonics
- Precision Optical Transceivers - \$100K



Multi-Domain Dynamic Targeting

- Modernization of Full Spectrum Targeting
- Northrup Grumman Systems Corporation - \$4.8M



Cyber Operations Platforms Transition & Research

- Cyber Mission Planning and Operations Tech
- Two Six Labs - \$190.3M



Enhanced T-CORE

- Trusted Cyber Nano Research
- Lockheed Martin Corporation - \$82M

Highly Assured and Defended Embedded Systems

- Autonomous Resilient Systems in Support of Multi-Domain Operations
- GE Aviation Systems - \$110M



Advanced Computing at the Edge

- Agile ISR Data Processing and Exploitation
- Black Owl Consulting - \$16.4M

114 Academic Partnerships | Contracts, Grants, Cooperative Agreements, Educational Partnership Agreements, Cooperative R&D Agreements, Information Institute & Visiting Researchers

Air Force Academy
 Air Force Institute of Technology
 Arizona State University
 Auburn University
 Brescia University
 Brigham Young University
 Brown University
 California State University, Northridge
 California University, Riverside
 Carnegie Mellon University
 Central State University
 City College of New York
 Clarkson University
 Clayton State University
 Colorado State University
 Columbia University
 Cornell University
 Dartmouth College
 Dillard University
 Duke University
 Embry-Riddle Aeronautical University
 Fairleigh Dickinson University
 Florida Atlantic University
 Florida Institute of Technology
 Florida International University
 Georgia Institute of Technology
 George Mason University
 Harvard University
 Howard University

Indiana University of Pennsylvania
 Iowa State University
 Johns Hopkins University
 LaSalle University
 Leland Stanford Junior University
 Louisiana Tech University
 Massachusetts Institute of Technology
 Michigan Technological University
 Minnesota State University
 Missouri University of Science & Technology
 Montana State University
 Navajo Technical University
 New Jersey Institute of Technology
 New York University
 Norfolk State University
 North Carolina Agricultural & Tech State U.
 Northeastern University
 Northern Arizona University
 Northwestern University
 Norwich University
 Oklahoma State University
 Pennsylvania State University
 Prairie View A&M University
 Purdue University
 Rensselaer Polytechnic Institute
 Research Foundation Of The City University Of NY
 Rochester Institute of Technology
 Rose-Hulman Institute of Technology
 Rutgers – Newark College of Arts & Sciences

San Diego State University
 San Francisco State University
 SUNY Binghamton University
 SUNY Buffalo
 SUNY Polytechnic Institute
 SUNY Stony Brook
 Syracuse University
 Tennessee State University
 Texas A&M Engineering Experiment Station
 Texas A&M University, Central Texas
 Texas Southern University
 Tufts College
 University of California
 University of California, Berkeley
 University of California, Davis
 University of California, Los Angeles
 University of California, San Diego
 University of California, Santa Barbara
 University of Central Florida
 University of Chicago
 University of Cincinnati
 University of Colorado, Denver
 University of Connecticut
 University of Dayton
 University of Florence
 University of Hawaii
 University of Illinois
 University of Kansas
 University of Maryland

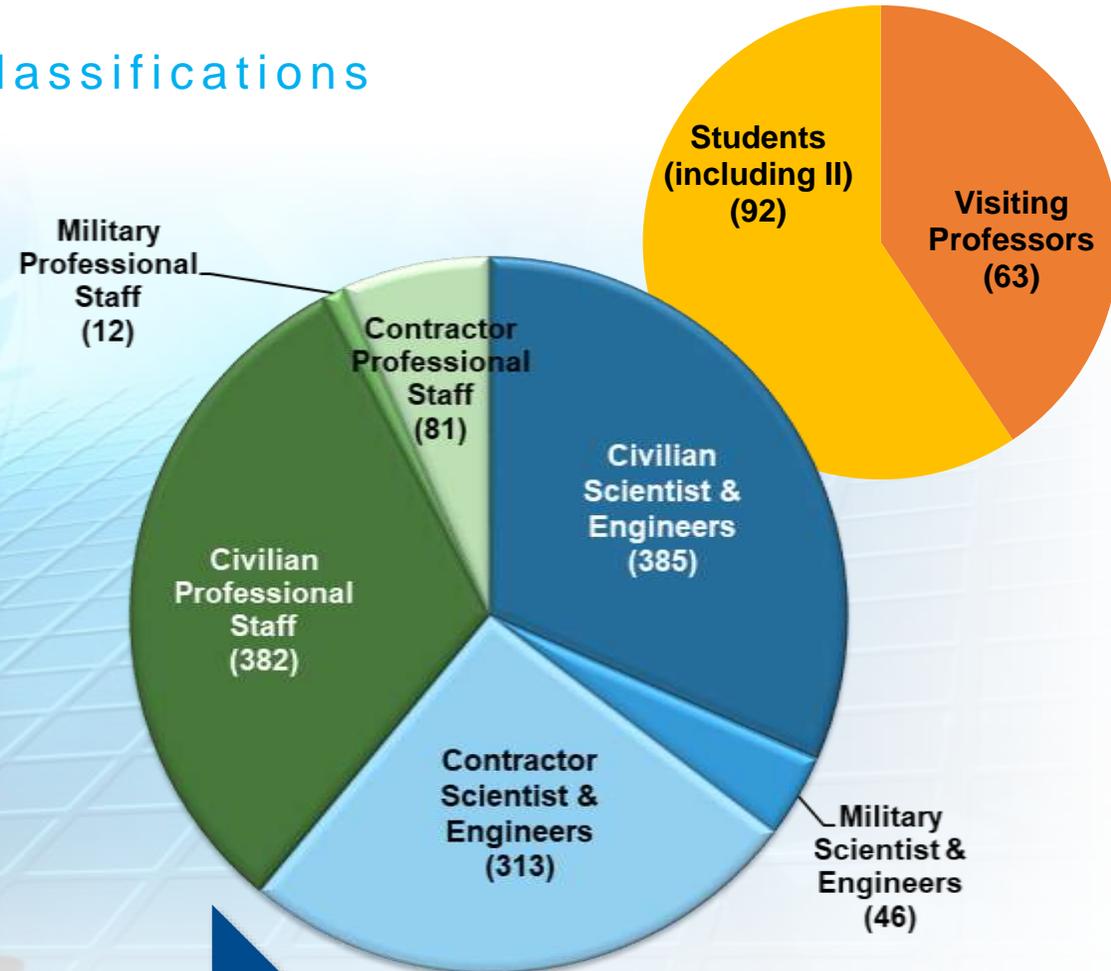
University of Massachusetts, Amherst
 University of Massachusetts, Dartmouth
 University of Massachusetts, Lowell
 University of Michigan
 University of Minnesota, Twin Cities
 University of Missouri, Kansas City
 University of North Texas
 University of Oxford
 University of Pennsylvania
 University of Rochester
 University of Southern Alabama
 University of South Carolina
 University of Southern California
 University of Southern Alabama
 University of South Carolina
 University of Southern California
 University of South Florida, Tampa
 University of Tennessee
 University of Texas at Dallas
 University of Tulsa
 University of Washington
 University of Wisconsin
 Utah State University
 Utica College
 Vanderbilt University
 Virginia Polytechnic Institute and State U.
 Wichita State University

Workforce

World Class Talent

Future Starts Here | Government Career Classifications

- Electronics Engineering
- Computer Science
- Computer Engineering
- Physics
- Mathematics
- Operations Research
- General Engineering
- Mechanical Engineering
- Materials Engineering
- Civil Engineering
- Environmental Engineering
- Industrial Engineering
- Maintenance Mechanic & Fabrication
- Telecommunications
- Safety & Occupational Health Management
- Human Resources Management
- Logistics Management
- Architecture
- Business Administration
- Financial Management
- Patent Attorney & Legal Services
- Cartography
- Contracting
- Police

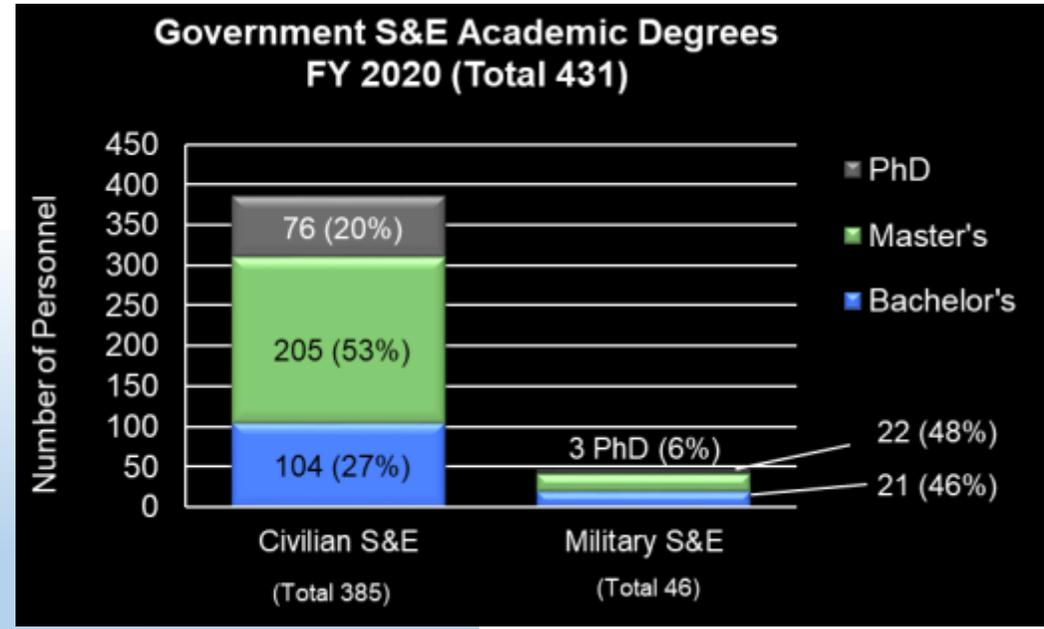
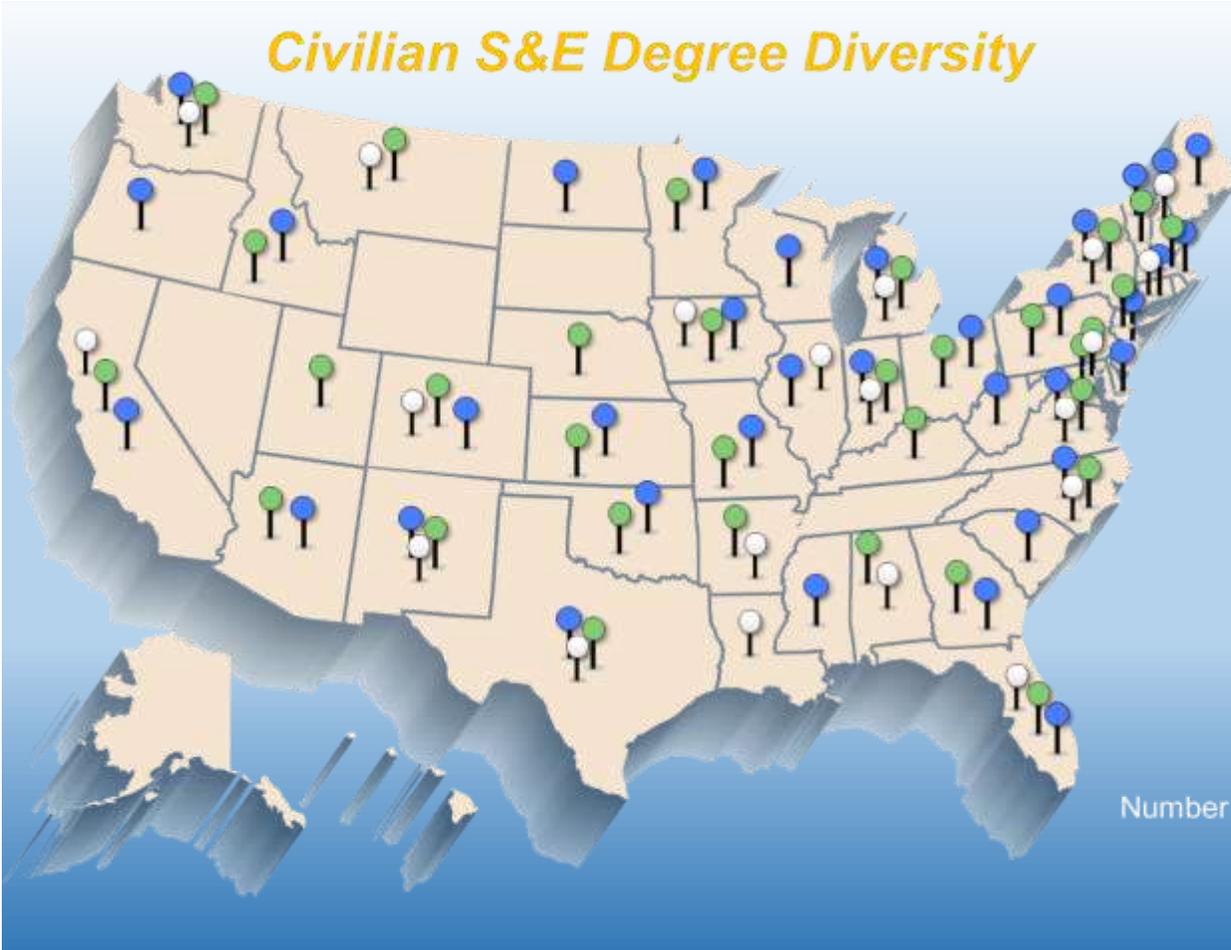


Total Government Staffing – 825
Total Directorate Staffing – 1,219

Source: <webeis>
 AFRL/RIB
 as of 31 July 20

Academic Diversity

Civilian S&E Degree Diversity



Number of *Different* Schools Attended: **167**

Number of Academic Disciplines: **79**

As of 21 Sept 19

Source: <webeis>
AFRL/RIB
as of 31 July 2020

Workforce Development | Develop Cyber Leaders of Consequence



ADVANCED COURSE IN ENGINEERING

Competence | Commitment | Courage | Compassion

“ACE was the most impactful summer of my life”

- The ACE program forges a cadre of cyber warriors and leaders of consequence
 - Develops highly competent and credible problem solvers and change agents
 - Inculcates a warrior ethos by developing “a hardiness of spirit and moral and physical courage”
 - Shapes cyber leaders that exercise competence, commitment, courage and compassion
 - Hones clear, concise, and compelling communications skills to exercise mission command
- Immersion in mission centric education, training and research at the tactical and operational level provides the leaders and change agents the nation needs in cyberspace
- Program data
 - Current Alumni: 354, 2020 Class: 29 future leaders
 - 2018 Retention Numbers: 60% of commissioned graduates are Active Duty
 - ACE alumni selection rate: 5 year rolling average, 25% of AF CNODP participants are ACE graduates



Machine Learning Boot Camp

- Developing and executing intensive “boot camps” on machine learning for AF civilian and military S&Es and acquisition leaders to build the workforce we need
- 22 S&Es attended 10 week curriculum in Fall 2019

Teaching Future Scientist and Engineers
2019 highlights

Students Impacted: 1,200+
 RI Volunteer Hours: 1,450+
 Teachers Impacted: 34+
 Schools Involved: 38+



ENGINEERING CAMP



ANNUAL CHALLENGE COMPETITION



DRONE CAMP



QUANTUM CAMP



LEGO CAMP



ARDUINO CAMP



CYBER CAMP

New \$99M Partnership Intermediary Agreement with the Griffiss Institute awarded to support entire Air Force STEM program.

SPROUT Program (new) 'Wish List' for teachers

- Over \$82,000 of STEM Materials were awarded to 28 teachers from the Mohawk Valley
- Impacted over 8500 students locally

Mid York Library Educational Partnership Agreement signed.

- \$1,083 worth of STEM materials/equipment donated

Successes During COVID-19

Events and Tech Successes During COVID-19

Events

- Virtual Quantum Collider Event
 - 2K virtual attendees, 23 companies awarded 35 contracts
- Hack-A-Sat goes virtual
 - Over 6K individuals competed in online qualification event
- \$1M International Quantum-U Tech Accelerator
- STEM Virtual Summer Camp by AFRL & Griffiss Institute



Technology

- Partnership with AFOSR and AFRL/RI in Chili using AI
- SecureView is supporting the AF CAO's COVID-19 related need for immediate, mobile, SIPR access for senior Air Force leaders

INFORMATION DIRECTORATE: C⁴I&Cyber

Global Persistent Awareness

Resilient Information Sharing

Rapid, Effective Decision-Making

Complexity, Unpredictability, and Mass

Speed and Reach of Disruption and Lethality

Questions



LEAD · DISCOVER · DEVELOP · DELIVER