



# **Air Platforms Community of Interest Update**

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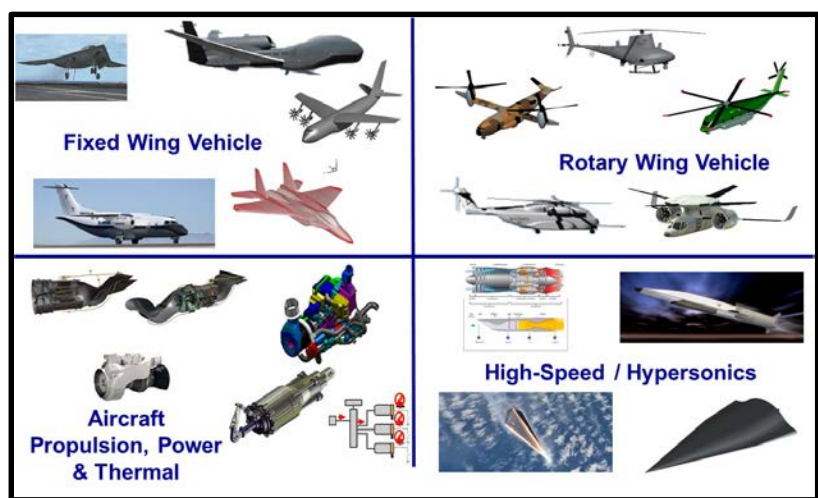
# Air Platform COI

The Air Platforms Community of Interest (COI) serves as a standing forum within the DoD S&T Reliance 21 framework for developing and coordinating initiatives related to air platforms, including fixed and rotary wing vehicles, high-speed / hypersonic systems, and aircraft propulsion, power and thermal management systems.



Sec. Mattis

"...we have to make certain we are not dominant and irrelevant at the same time, dominant in a past form of warfare that is no longer relevant."



AP COI Sub Areas



AP Capability Oval



# PBR FY18 Air Platforms COI S&T Investment



- **Air Platforms Community of Interest (COI) has participants from all Services, OSD, NASA**

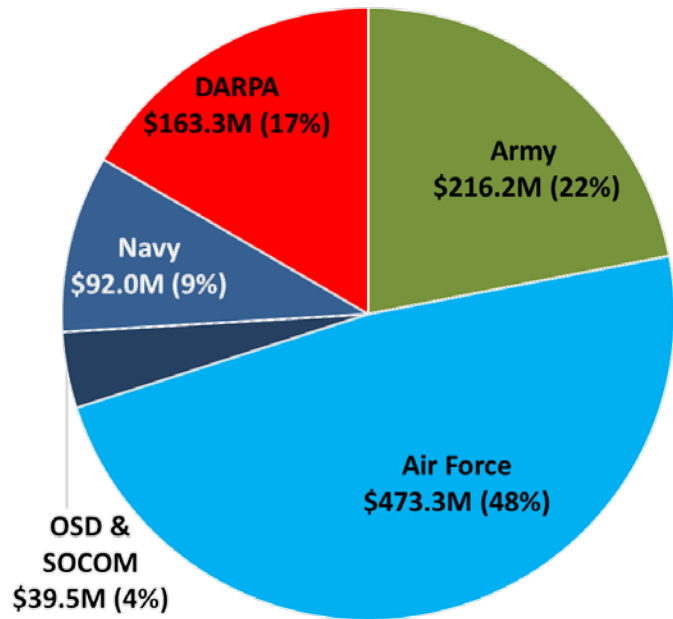
Dr. Siva Banda (Air Force Principal – COI Lead)

Dr. Bill Lewis (Army Principal)

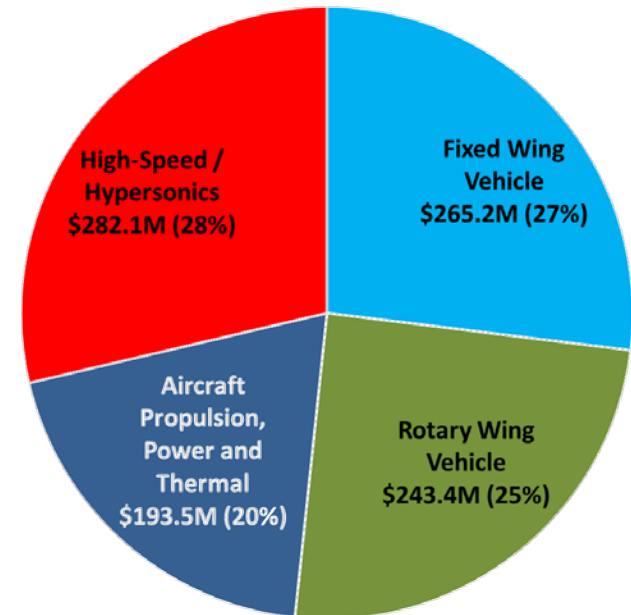
Dr. Knox Millsaps (Navy)

Dr. Joe Doychak (OSD)

Mr. Jay Dryer (NASA) – funding bookkept separately from DoD



**Air Platforms  
FY18 total:  
\$984.2M**  
(8.9% of DoD BA2 and BA3)  
Figures based on FY18 President's Budget Request





# Air Platforms COI Status



- High-level, enduring coordination within the AP COI
  - Cross-Service/Agency leadership and working-level coordination
  - Well-established Industry constituency
  - National-level forums
- AP COI expanding interactions with other COIs
  - Address integration holistically
  - Communicate better with stakeholders, industry, etc.
- Long-standing collaborative relationships with industry
- International activities aligned with Service strategies







# Fixed Wing Vehicle

## • Vision

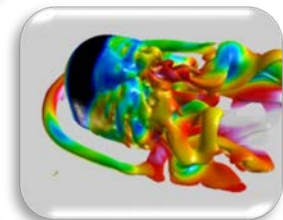
- Enable air superiority platforms with longer range, supercruise, greater payload and more survivability
- Enable future mobility aircraft
- Clearing house for sea-based aircraft launch and recovery technology
- Enable affordable and autonomous unmanned vehicles, and enable manned and unmanned teaming operations
- Keep legacy fleet safe, affordable, available and capable

## • Objectives

- Air vehicle range, payload, control, speed and low cost
- Access, interoperability and expanded operating envelopes
- Operational safety, efficiency and reduced pilot training

## • Technology Challenge Areas

- Aerodynamics, control and propulsion integration
- Advanced kinetic and DE weapons integration
- Unmanned aircraft systems integration and autonomy
- Advanced structures and sustainment
- Design and analysis (faster, more robust analyses, trades and flight simulations)





# Rotary Wing Vehicle



- **Vision**

- Fly faster and farther while carrying more
- Enable operations in complex, contested environments
- Integrate autonomy and reduce cognitive workload
- Develop ultra-reliable designs towards zero-maintenance
- Enhance legacy fleet capability, availability, and affordability



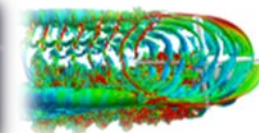
- **Specific Objectives**

- Demonstrate advanced vertical lift platforms and integrated mission architectures by 2020
- Conduct multi-ship degraded visual environment flight using integrated sensor fusion, pilot cueing and flight controls
- Develop next generation UAS technology demonstrator by 2023



- **Technology Challenge Areas**

- Durable, high performing and damage tolerant structures
- Increased power generation with adaptive components
- Defined standards and protocols for open systems
- Optimized and integrated multi-spectral survivability
- Holistic situational awareness and synergistic unmanned teaming
- Multi-disciplinary, model-based design analysis and optimization





# Aircraft Propulsion, Power & Thermal



- **Vision**

- Enhanced air platform capabilities and sustainment challenges are enabled by the Aircraft Propulsion, Power & Thermal (APPT) Sub Area's technology products
- Coordination within APPT energizes a strong technology and Industry base



Heat Exchanger

- **Objectives**

- Develop efficient, high-performing, light-weight, reliable, maintainable and affordable aircraft propulsion systems and power and thermal management subsystems
- Deliver energy-optimized integrated propulsion, power and thermal management technology



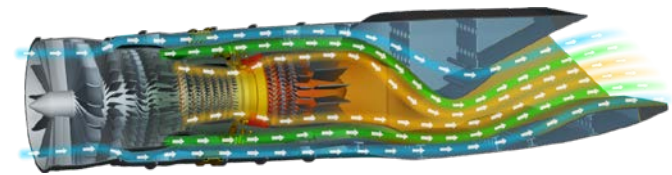
Thermal Management Systems

- **Technology Challenges**

- High power density subsystems
- Ultra high pressure ratio compressors
- Robust integrated propulsion, power and thermal architectures
- Model-based design



Starter/Generator Systems







# High-Speed / Hypersonics



- **Vision**

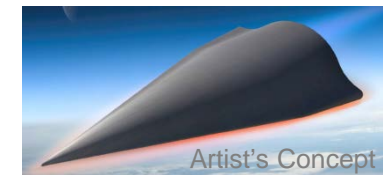
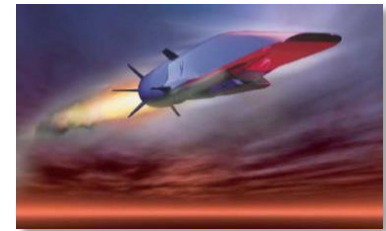
- Advance military systems into the hypersonic regime to enable transformational Strike and ISR capabilities

- **Objectives**

- By 2020, develop robust, comprehensive technology options for survivable, time-critical strike
- By 2030, develop robust, comprehensive technology options for penetrating regional platform

- **Major Research Areas**

- Scramjet propulsion and integration
- Rocket booster propulsion
- Advanced materials, structures and manufacturing
- Vehicle aeromechanics
- Adaptive flight control
- Military utility analysis
- *High speed turbine engines (leveraging power and control)*





# Air Platforms COI Some FY17 Accomplishments



## Conformal Loadbearing Antenna Structure (CLAS)

- *Flight demonstrations were accomplished using TigerShark UAV. Incorporated CLAS technology enabled 70+ installed antennas to demonstrate the ability beam steer the airborne antenna array to a single ground location.*

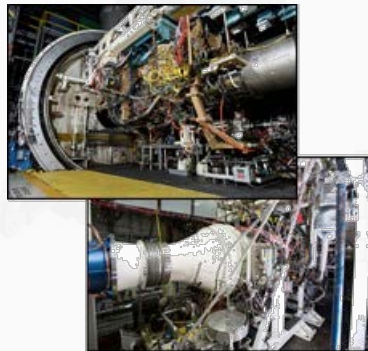


## Low Cost Attritable Strike Demo (LCASD) JCTD

- *Passed CDR; on schedule for First Flight Summer 2018*

## Adaptive Engine Technology Development (AETD)

- *AFRL partnered with General Electric and Pratt & Whitney to successfully test a new high efficiency core and adaptive fan demonstrator in 2017. These tests validated adaptability, aerodynamic performance, operability and structural designs.*



## Joint Multi Role Technology Demonstrator

- **Bell demonstrator, V-280, first flight on 18 Dec 2017**
- *Bell's Air Vehicle Technology Demonstrator aircraft successfully achieved first flight Dec. 18 in Amarillo, Texas. The second demonstrator from Lockheed Martin – Sikorsky is scheduled to fly in 2018.*



## High Speed System Test (HSST)

- ***Developed multiple test support equipment to enable rapid and accurate hypersonic design***
- *NASA Armstrong flew an inert test article of AFRL funder GOLauncher1 in Dec. 2017. This test gathered aerodynamic, flight dynamics, and structural data for carrying GO1 under a Gulfstream-III. This testing including the launch maneuver up 30deg flight path angle at Mach 0.7*





# Air Platforms COI Challenges



- **Technologies supporting, e.g. Open architectures**
  - Manned-Unmanned teaming
  - Future sustainment processes
  - Increased power/thermal management demands
  - New concepts supporting mobility, high-speed/hypersonics, etc.
  - Counter-UAS
- **Leadership and culture**
  - Proactively defining/articulating and leading the Nation's military aerospace sector
  - Collectively advocating for the Warfighter cause
  - Owning the Air Domain's future viability

***Continued Industry engagement and leadership required***



# Air Platforms Outreach Coordination



- **Air Platforms COI reaches out to other COIs and DoD organizations to coordinate and perform S&T**
- **Representatives from AP sub areas participate in various conferences and meetings**
  - American Helicopter Society (AHS) Annual Forum (May 14-17, 2018)
  - AIAA Science and Technology Forum and Exposition (AIAA SciTech) (January 7-11, 2019)
  - Turbine Engine Technology Symposium (Sept. 10-13, 2018)
  - Air Vehicle Technology Symposium (Sept. 10-12, 2019)
  - Various Industry IR&D reviews
- **Data Sharing**
  - Defense Innovation Marketplace (<http://www.defenseinnovationmarketplace.mil/coi.html>)

***Air Platforms COI to continue outreach***





# Air Platforms COI

## Concluding Remarks



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***Providing innovative air platform technology and technology integration for survivable, affordable, effective and agile capability for legacy and future aircraft***