Air Platforms
Community of Interest Update

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OASD(R&E)/RD/WS
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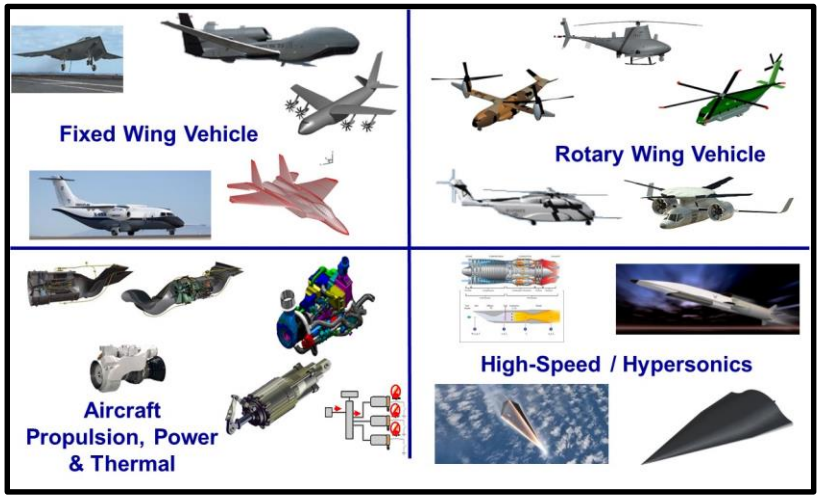
Air Platform COI

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



AP COI Subareas

AP Capability Oval

Air Platforms COI Vision

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

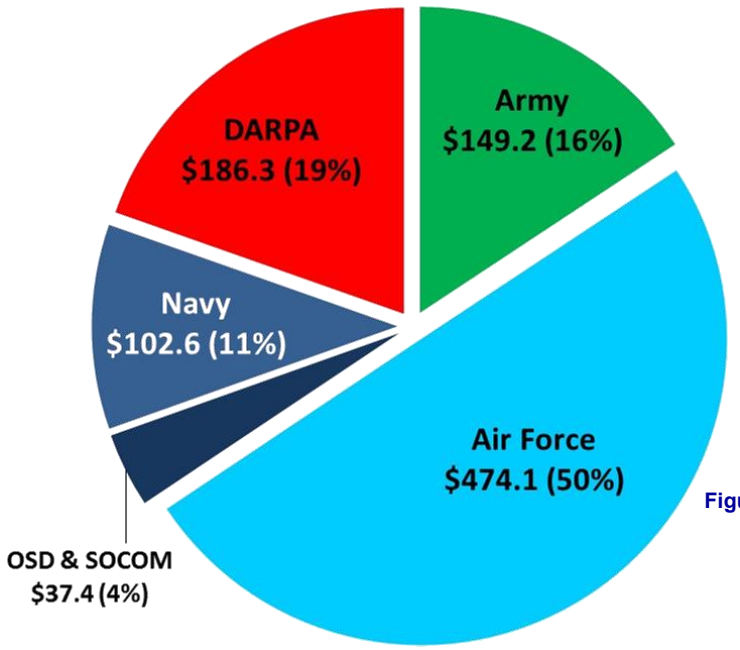
- **Perform mission at extended ranges**
- **Rapid response and 24/7 presence**
- **Counter advanced threats**
- **Autonomous and unmanned systems**
- **Continue to create technology surprise through science and technology**

"…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."

PB FY17 Air Platforms COI S&T Investment

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

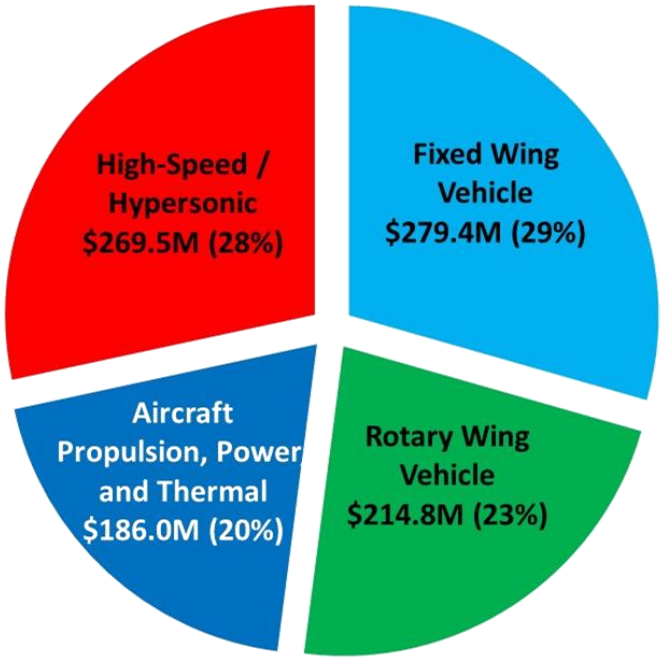
  Dr. Siva Banda (Air Force Principal – COI Lead)
  Dr. Bill Lewis (Army Principal)
  Dr. Tom Beutner and Dr. Knox Millsaps (Navy)
  Dr. Spiro Lekoudis and Dr. Joe Doychak (OSD)
  Dr. Brad Tousley (DARPA)
  Mr. Jay Dryer (NASA) – funding bookkept separately from DoD



Air Platforms total: $949.7M

(9.1% of DoD BA2 and BA3)

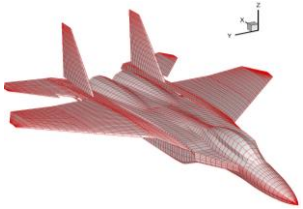
Figures based on FY17 President's Budget request



Air Platforms COI Sub Areas



Fixed Wing Vehicle

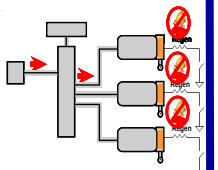





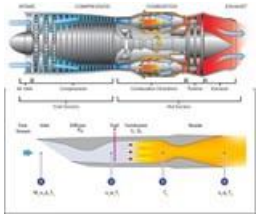
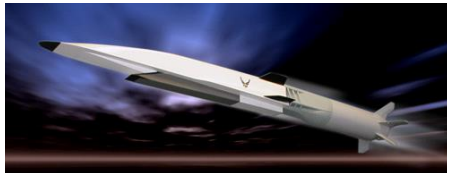
Rotary Wing Vehicle







Aircraft Propulsion, Power & Thermal

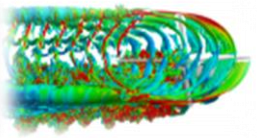
High-Speed / Hypersonics


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

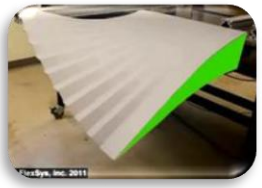
- **Specific Objectives**
  - Demonstrate advanced vertical lift platforms and integrated mission architectures by 2020.
  - Conduct multi-ship degraded visual environment flight using integrated sensor fusion, pilot cueing and flight controls.
  - Develop next generation UAS technology demonstrator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

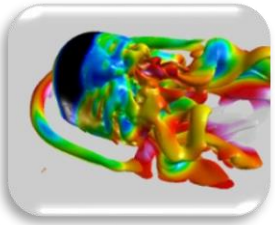
- **Technology Challenge Areas**
  - Durable, high performing, and damage tolerant structures
  - Increased power generation with adaptive components
  - Defined standards and protocols for open systems
  - Optimized and integrated multi-spectral survivability
  - Holistic situational awareness and synergistic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



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 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
  - UAS integration and autonomy
  - Advanced structures and sustainment
  - Design & analysis (faster, more robust analyses, trades, and flight simulations)





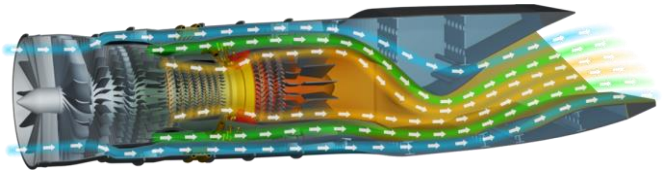
Aircraft Propulsion, Power & Thermal

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

Heat Exchanger

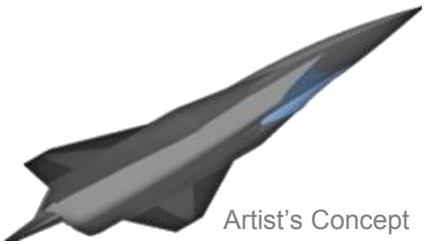
Thermal Management Systems

Starter/Generator Systems



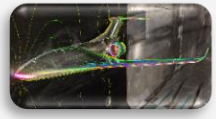
High-Speed / Hypersonics

- **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 FY16 Accomplishments

Defining Requirements for a large scale Efficient Experimental Transport Aircraft Demonstrator



- *Double the effective productivity of mobility aircraft*
- *Impact three major acquisitions*

Low Cost Attritable Aircraft Technology (LCAAT)

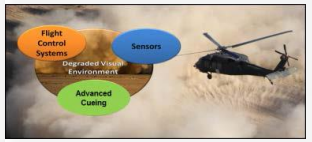
- *Design complete*
- *First flight late FY18*

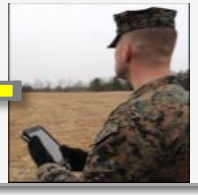
Degraded Visual Environment (DVE)

- *Flight test data acquired for snow/whiteout, fog, & rain*

Autonomous Aerial Cargo / Utility System (AACUS)

- *UH-1H testbed aircraft portability demo commenced*





Advanced Turbine Technologies for Affordable Mission-Capability (ATTAM)

- *Planning of national effort complete*

Adaptive Engine Technology Development (AETD)

- *Core engines & components in test*
- *Technology transitioned to AFLCMC!*

MegaWatt Fighter Engine Demo (NASA/AF Team)

- *MW electrical & thermal offtake while providing thrust at altitude*

High Speed Strike Weapon (HSSW) Tech Mat

- *Completed several tech development milestones enabling increased performance and reduced cost*

Aircraft Technology Development

- *Completed preparations for direct-connect testing of powerhead concepts through the Medium Scale Critical Components (MSCC) program*

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 9-11, 2017)
  - Tri-Service Energy Optimized Aircraft Steering Committee Meeting (May 16-17, 2017)
  - Air Vehicle Technology Symposium (Oct. 24-26, 2017) – first bi-annual meeting
  - Turbine Engine Technology Symposium (Sept. 10-13, 2018)
  - Various industry IR&D reviews
- **Data Sharing**
  - Defense Innovation Marketplace (http://www.defenseinnovationmarketplace.mil/coi.html)

Air Platforms COI plans to continue outreach

Air Platforms COI
Concluding Remarks

- **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**

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