Air Platforms
Community of Interest Update

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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.

“...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.”
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
Air Platforms COI
Sub Areas

 Fixed Wing Vehicle

 Rotary Wing Vehicle

 Aircraft Propulsion, Power & Thermal

 High-Speed / Hypersonics
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
• 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
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

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.

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.

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)
  - Turbine Engine Technology Symposium (Sept. 10-13, 2018)
  - Air Vehicle Technology Symposium (Sept. 10-12, 2019)
  - Various Industry IR&D reviews

- **Data Sharing**

*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