ASD(R&E) Perspective on Future Rotorcraft S&T

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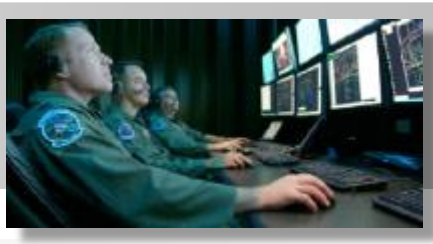
Strategic Context

"…But today that [U.S.] superiority is being challenged in unprecedented ways."


Secretary Carter

- Limited budgets
- Increasing global R&D competition

- Cyberspace threats
- Electromagnetic spectrum competition



- Less freedom of movement in space

- Growing sophistication in A2/AD threats

Defense R&E Strategy

www.defenseinnovationmarketplace.mil/resources/ASD(R&E)_Strategic_Guidance_May_2014.pdf

1. Mitigate current and anticipated threat capabilities

- Cyber
- Space Capability
- Missile Defense
- Electronic Warfare
- Counter-WMD

2. Affordably enable new or extended capabilities in existing military systems

- Systems Engineering
- Capability Prototyping
- Interoperability
- Modeling and Simulation
- Developmental Test & Evaluati
- Power & Energy

3. Create technology surprise through science and engineering

- Autonomy
- Human Systems
- Quantum Systems
- Data Analytics
- Hypersonics
- Basic Sciences

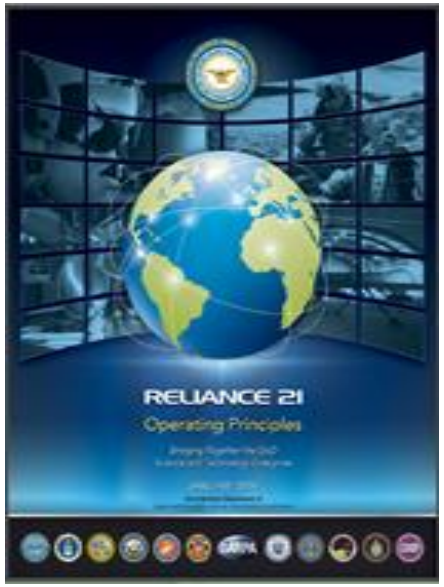
Technology to offset Manpower

Technology Needs

- Cyber / Electronic Warfare
- Engineering / M & S
- Capability Prototyping
- Protection & Sustainment
- Advanced Machine Intelligence
- Anti-Access/Area Denial

DoD Research & Engineering (R&E)
Reliance 21: Operating Principles

Operational framework of the DoD S&T Joint Planning and Coordination process



- Executes the DoD R&E Strategies
- Portfolio Management infrastructure to enable:
  - Information sharing
  - Alignment of effort against capability gaps
  - Coordination of priorities and investments
  - Exploit synergies and develop new opportunities
  - Support for scientists and engineers across the DoD R&E Enterprise
  - Released January 2014

Available at www.defenseinnovationmarketplace.mil/resources/2014-Reliance21OperatingPrinciples.pdf

Air Platforms Community of Interest (CoI)

Air Platforms Vision

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

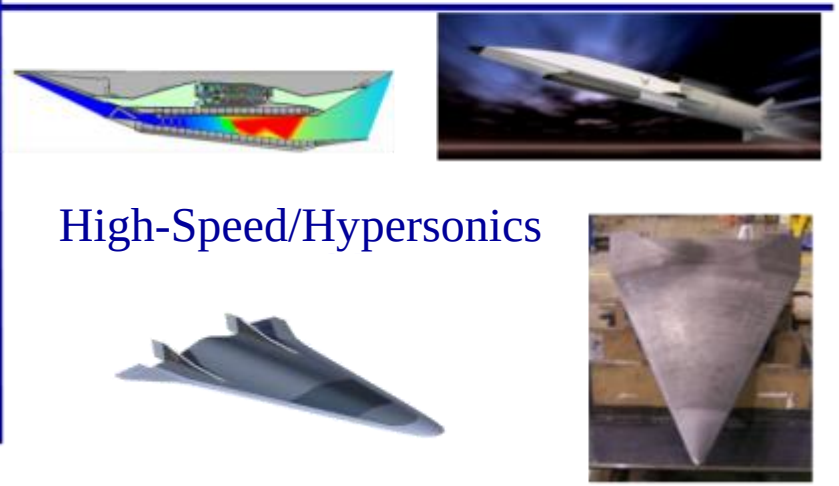
Effectiveness	Affordability
• Increased range and speed	• Shortening development timelines
• Increased time-on-station	• Applying advanced manufacturing
• Survivability against advanced threats	• Reducing sustainment demands
• Improved sensor / weapons integration	• Improving logistics
• Increased availability / msn capable rate	• Pursuing energy efficiencies

Air Platforms COI
Science & Technology Sub Areas

Fixed Wing Vehicle

Rotary Wing Vehicle

Aircraft
Propulsion, Power
& Thermal



High-Speed/Hypersonics

Rotary Wing Vehicles

Near Term (2020)	Mid Term (2025)	Far Term (2030)
• Reduced maintenance costs • Degraded Visual Environment • Joint Multi Role technologies • Multidisciplinary design optimization • Mission Systems Architecture	• Extension of TBO & improved failure prediction • Own the weather • Complex decision aiding • Lightweight structures	• Zero maintenance • Coordinated autonomous operations of multiple UAVs • Smart adaptive composite structures • Future Vertical Lift

- Increased Speed, Range, & Payload
- Reduced Maintenance
- Autonomy
- Flight Control Improvements

- Transformational Vertical Lift Capabilities
- Zero Maintenance
- NextGen UAS Engine and Platform Demonstrations

Army S&T Priorities

Extension of Range and Endurance

- Fly faster and farther
- Support all FVL initiative capabilities
- Carry more payload
- Demonstrate transformational vertical lift capabilities

Operations in Degraded Visual Environments (DVE)

- Operate in complex environments
- Pilotage in all DVE's
- 360º situational awareness (SA)
- Multi-functionality
- Multi-spectral

Sustainability, Maintainability, Reduced Logistics Footprint

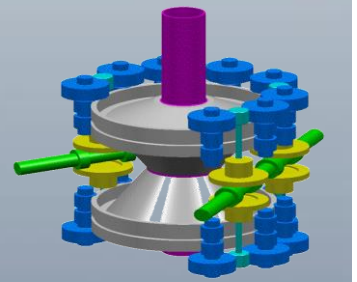
- Ultra-reliable designs
- Zero maintenance concept
- Reduced Maintenance burden

Future Family of UAS Demo

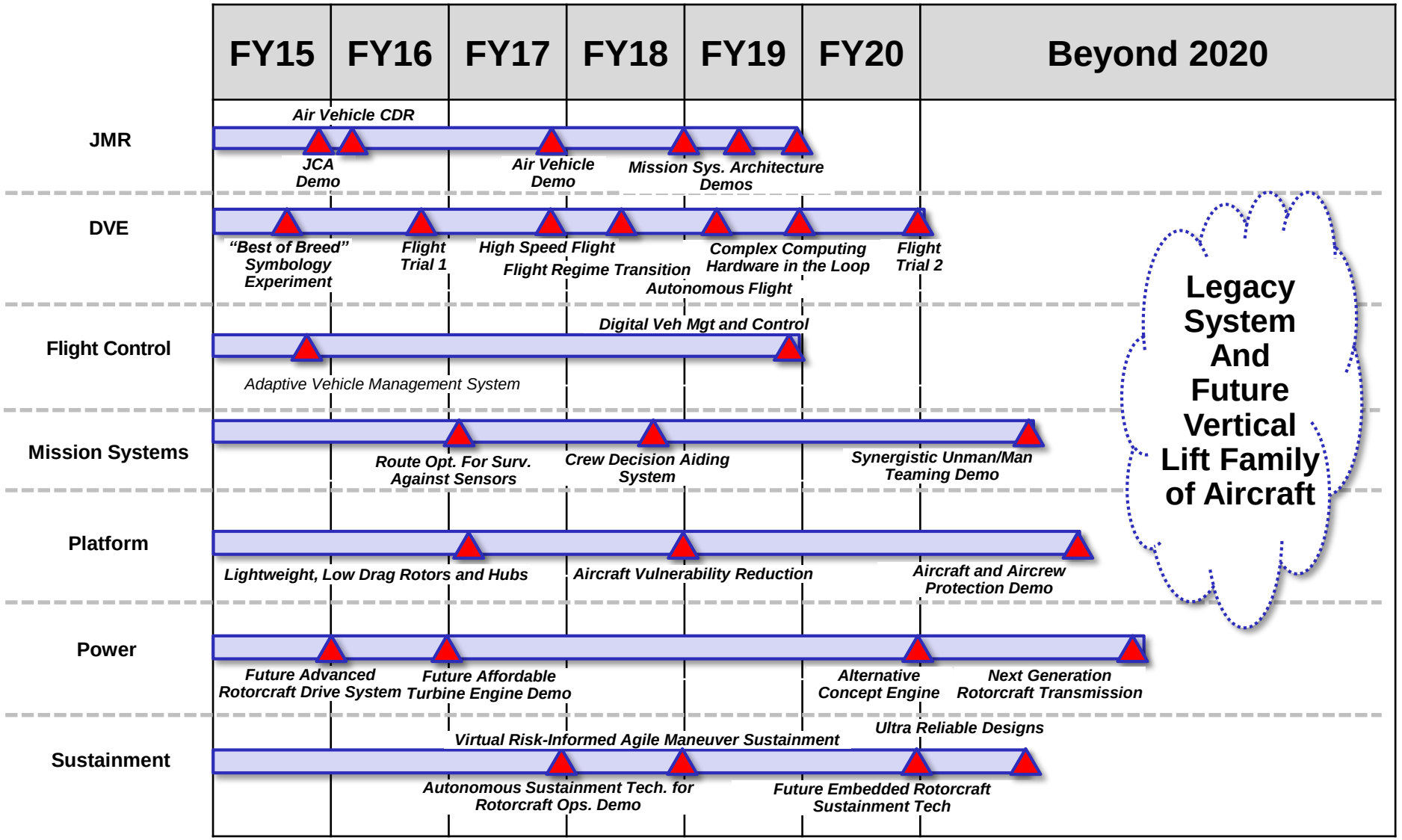
- Mature autonomous capabilities
- Refine the interface between pilot and aircraft
- Advanced UAS engine concepts

Advance Engine & Drive Technologies

- Multi-speed transmission
- Move beyond traditional turbo-shaft engine architecture



Rotary Wing Vehicle



Summary

- Maintaining S&T alignment to strategy essential in this budget environment
- Community of Interests used to coordinate and plan S&T
- Affordability is a key element of Defense R&E Strategy
- Development of technologies for Rotary Wing Vehicles is critical to enabling future capabilities – both for legacy and FVL