United States Air Force

Fuze Science & Technology

15 May 2012

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Oh, say can you see by the dawn's early light
What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars thru the perilous fight,
O'er the ramparts we watched were so gallantly streaming?
And the rocket's red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there.
Oh, say does that star-spangled banner yet wave
O'er the land of the free and the home of the brave?
United States National Anthem
Star Spangled Banner

Francis Scott Key
“And the rockets' red glare, the bombs bursting in air, Gave proof through the night that our flag was still there”
Vision:
Global leader in advancing weapons science and technology

Mission:
Lead the discovery, development, integration, and transition of affordable weapons technology, enabling the warfighter to win across all domains
A Requirement to Innovate

- Emerging Anti-Access Area Denial (A2AD) strategies & systems represent a disruptive innovation
  - “A2/AD environment that increasingly challenges U.S. military access to and freedom of action within potentially contested areas.”
  - New concepts and technologies are essential for maintaining military advantage in these challenging environments.

**example:** Conceptual 250lb Class Internal Carriage – a much more dynamic, sophisticated capability

**THEN...**

**NOW...**

All AFRL Technology Directorates INVOLVED
M&S and Systems Engineering Underpins the Enterprise
AFRL Weapons S&T Enterprise Approach – “OneAFRL” Initiative

• Integrated Strategic Planning and S&T Formulation

• AFRL Multiple Tech Directorate Investment via Strategic Weapons S&T Approach

• Integrated with AFRL XP(Plans) led Customer Engagement

• Cooperative Projects with DoD services, DTRA & DARPA

• Yields Deliberate Deliverables via AFRL Capability Concepts for Operational Capability Areas
Weapons S&T Enterprise
Integration Spectrum

Department of Defense
HAF/A5R & SAF/AQR / Other Svcs / COCOMs
ACC / AFSOC / AFGSC / AMC / AFMC
AFRL XP-Led Customer Engagement

Service Core Functions
AS GPA PR SO NDO GIISR

Core Function Master Plans
AFRL/XP-led Capability Working Groups

Needs
RQ RH RI RW / RD RX RY RV

Solutions

Capability Area Led Technology Teams
“Need Decomposition … Drive S&T Formulation”

AFRL Core Technical Competencies

Weapons S&T Enterprise
Integrate across the Enterprise to enable 5th/6th Gen Weapons

**Propulsion (RQ)**
- High-speed / Hyper-Sonic
- Solids
- Low Speed / Propeller

**Aeronautics (RQ)**
- Morphing Structures/Control Surfaces
- Aero Propulsion Integration
- Ultra-High Agility Airframes

**C2 / Cooperative Control / Target Updates (RI)**
- Secure Datalinks
- Network Integrity / Trust / Autonomy
- Cooperative Ctrl / Engagement Algorithms
- Remote Sensing

**Sensors (RY)**
- Target Characterization and Phenomenology
- Radome / Aperture Materials
- Integrated Multi-function devices

**Materials / Structures (RX)**
- High Temp resiliency
- Thermal protection / Coatings
- Energy Storage / Mgmt Devices MEMS

**Weapon Survivability (RQ,RX,RI)**
- Active / Passive techniques
- A/C → Weapon → Sub-munition Optimization
- Countermeasures

AFRL & Industry S&T Vectors to meet requirements of Weapons Capability Concepts
Putting the “Desirements” vs. S&T Pursuits in Perspective

There are no exact Customer “Needs”
We need to make informed decisions & Guide our customers to optimal solutions.
Strategic Way Ahead

• Investment Guide & Spring Review
  • Designed to organize ALL S&T activities into manageable categories derived from Service Core Functions and AF Direction

• Capability Pull - Concept-driven technology development and demonstration will be organized around “Capability Areas”

• Technology Push - Discovery/Tech Base-driven research (will be organized around “Major S&T Vectors”

Our challenge is to utilize all resources to solve both near and far-term capabilities challenges
Major S&T Goals
Customer Focused Vectors

• Enable Joint Force Operation in Anti-Access Area Denial (A2AD) Environment / Counter Air (Highly Contested Airspace) (Air Sea Battle)

• Realize / Weaponize potential of 5th & 6th Gen Fighter & Bomber Platforms

• Hold Spectrum of High Value Targets at Risk

• Precise Effects in Combat Operations (MCO & Irregular)

• Integrated Cross Domain Operations (Air/Sea/Gnd/Space/Cyber)

• Other Game Changing / Leap Ahead Technologies
Conceptualize the Next Generation of Weapons

AFRL Customer Engagement

Service Core Function
- Air Superiority
- NDO
- Global Precision Attack
- Special Operations

Operational Capability Area
- Air-to-Air Superiority
- Suppression of Enemy Air Defense
- Electronic Attack
- Global Strike
- Long-Range Strike
- Intra-Theater Strike
- Close-Controlled Strike
- Special Operations

Capability Area Technology Team
- Air Superiority
  - SEAD/DEAD
- Capability Area Technology Team
  - Long Range/High Speed Strike
- Capability Area Technology Team
  - Counter HDBT
- Capability Area Technology Team
  - Counter CBRNE/WMD
- Integrating Technology Team
  - Assured Operational Access (Counter A2AD)

High Interest Challenges

Cross Domain Integration

Integrating Technology Team

AFRL

Customer Engagement

DISTRIBUTION A. Approved for public release, distribution unlimited. (96ABW-2012-0152)
Joint Programmable Fuze FMU-152A/B

- Power Cable
- FZU-63/B Bomb Fuze Initiator
- Closure Ring
- Safety Pin Assy
- FMU-152A/B Bomb Fuze

Cleared for Public Release: 96ABW-2011-0250
# JPF Schedule/Milestones

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<th>EVENTS</th>
<th>FY11</th>
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<th>FY13</th>
<th>FY14</th>
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The Hard Target Void Sensing Fuze (HTVSF):

- Cockpit Programmable
- Void Sensing Function
- Multiple Arming Delay Times
- Multiple Function Delay Times

3:20 Wednesday Closed Session
Hard Target Void Sensing Fuze (HTVSF) Update
ATK Elkton Operations
Air Force Fuze Summary

• Munitions Directorate will lead a ‘new’ AFRL Weapons S&T Enterprise Approach

• Organizing S&T activities into manageable categories derived from Service Core Functions and AF Direction
  • Capability Pull - Concept-driven technology development and demonstration will be organized around “Capability Areas”
  • Technology Push - Discovery/Tech Base-driven research will be organized around “Major S&T Vectors”

• AF Fuze acquisition on track to deliver capabilities to warfighter
Questions?