



Presented to:

THE HUNTSVILLE AEROSPACE MARKETING ASSOCIATION

**U.S. ARMY AVIATION AND MISSILE RESEARCH,
DEVELOPMENT, AND ENGINEERING CENTER**

MISSILE SCIENCE & TECHNOLOGY OVERVIEW



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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Presented by:

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U.S. ARMY AVIATION AND MISSILE RESEARCH,
DEVELOPMENT, AND ENGINEERING CENTER

FOSTER INNOVATION AND ACCELERATE/MATURE TECHNOLOGY TO ENABLE FUTURE FORCE CAPABILITIES WHILE EXPLOITING OPPORTUNITIES TO RAPIDLY TRANSITION TECHNOLOGY TO THE CURRENT FORCE

CURRENT FORCE

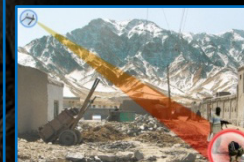


ENABLING THE FUTURE FORCE



ENHANCING THE CURRENT FORCE

FUTURE FORCE



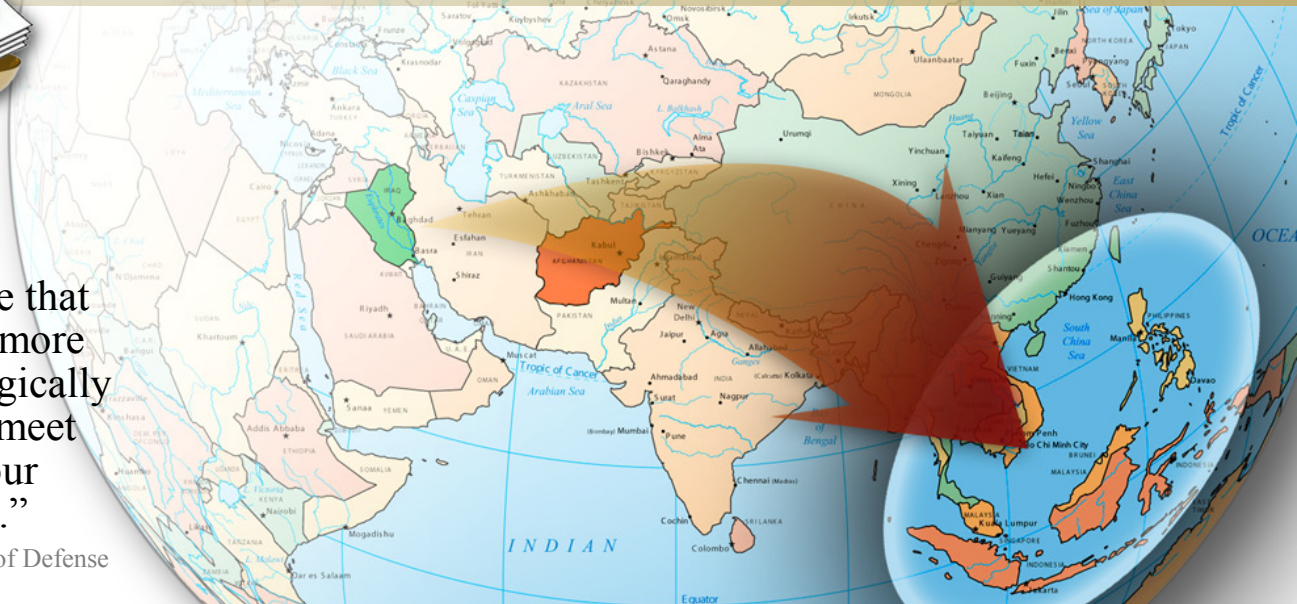


“... as we end today’s wars, we will focus on a broader range of challenges and opportunities, including the security and prosperity of the Asia Pacific.”

- Barak Obama, President of the United States

POWER PROJECTION / AREA DENIAL THREATS

- Electronic Warfare
- Ballistic Missile
- Advanced Air Defense
- Cyber Warfare
- Cruise Missile
- Others



“... we are shaping a Joint Force that will be smaller, leaner, but will be more agile, flexible, ready, and technologically advanced. ...ensuring that we can meet any future threats by investing in our people and a strong industrial base.”

- Leon Panetta, United States Secretary of Defense

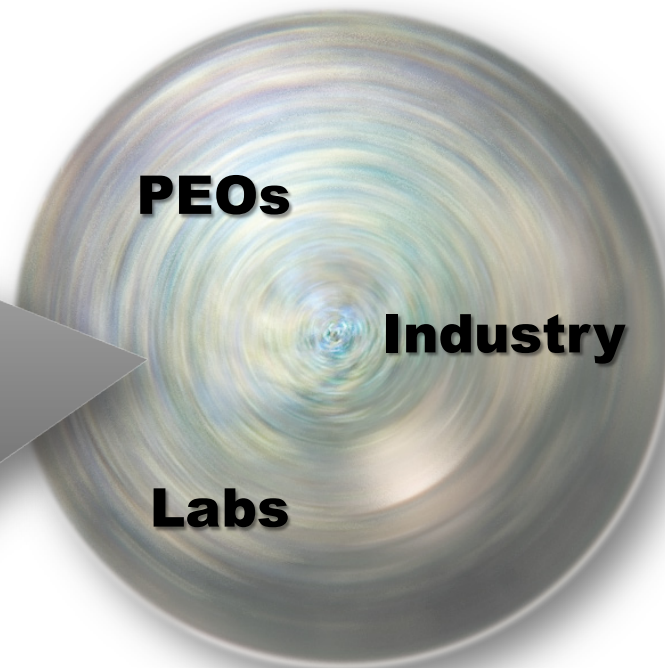
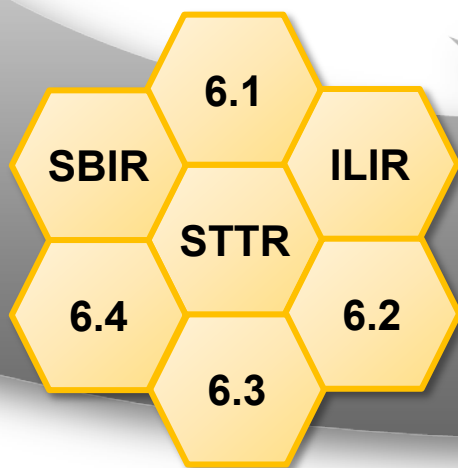
“The Department will make every effort to maintain an adequate industrial base and our investment in science and technology.”

- *Sustaining US Global Leadership*, p.8

LABS ARE THE INCUBATORS OF IDEAS

“Research is about people.”

– Zachary J. Lemnios,
Assistant Secretary of Defense for Research &
Engineering for the Department of Defense



“A lot of times people don’t know what they want until you show them.”

– Steve Jobs

GROUND DOMAIN

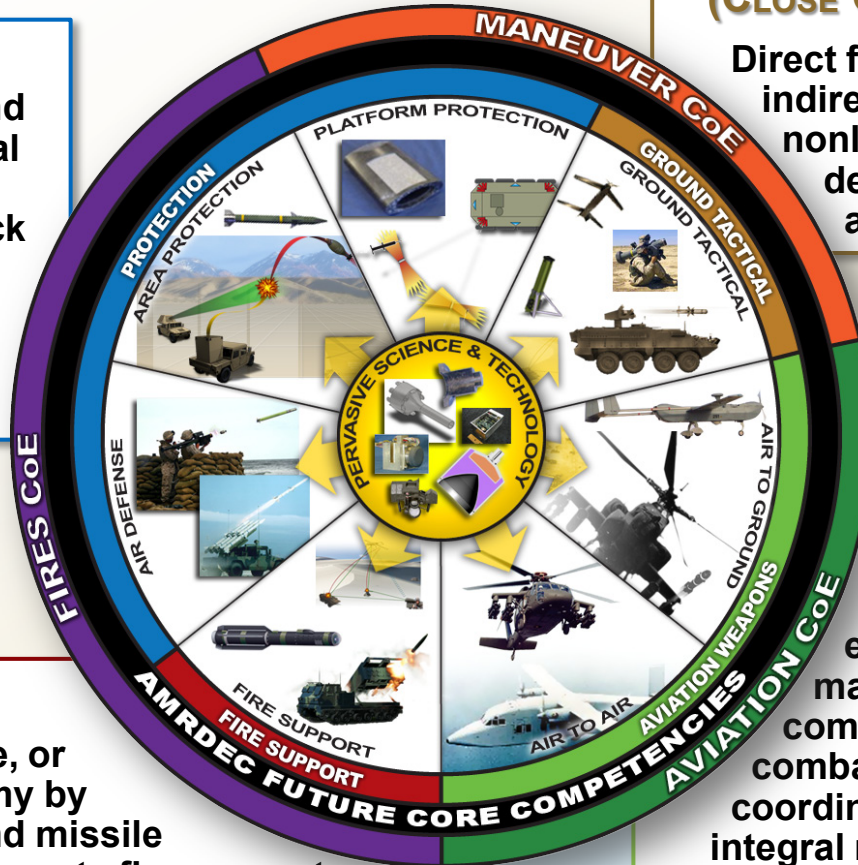
PROTECTION

Protect the force and selected geopolitical assets from aerial attack, missile attack and surveillance

- Air Defense
- Area Protection
- Platform Protection

GROUND TACTICAL (CLOSE COMBAT)

Direct fire weapons, supported by indirect fire, air-delivered fires, and nonlethal engagement means to decide the outcome of battles and engagements



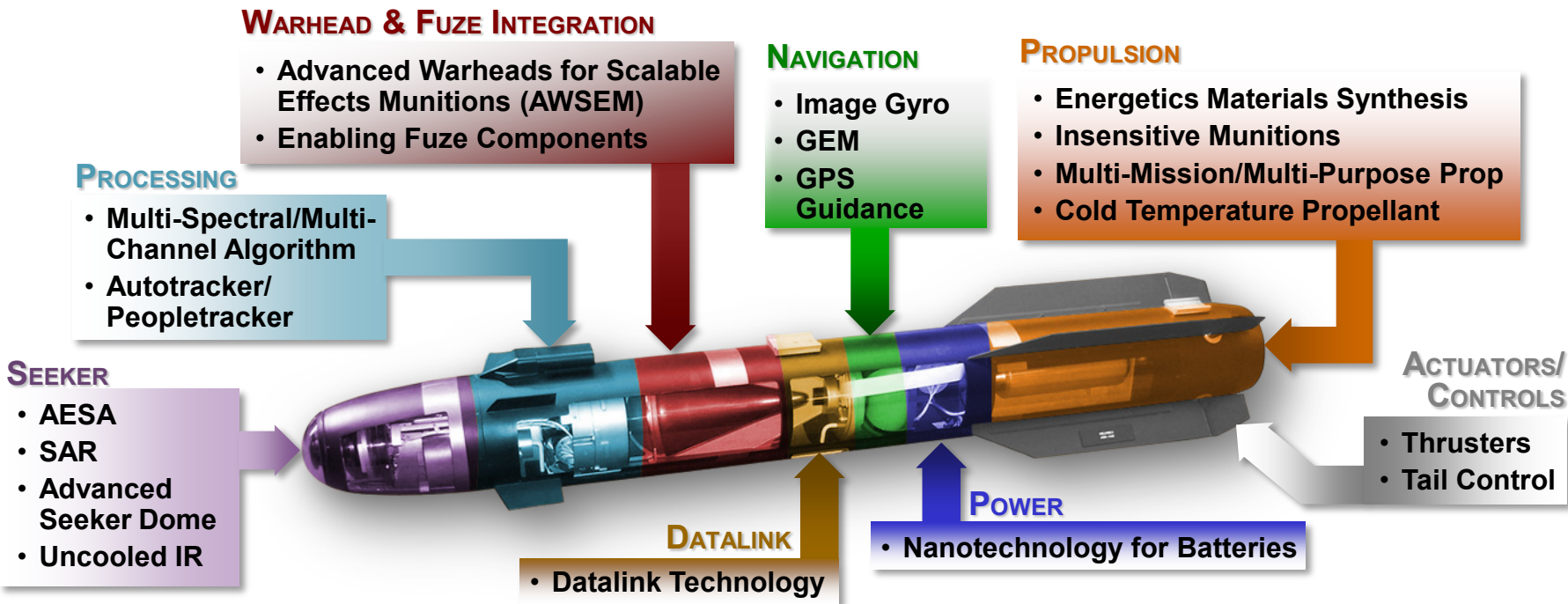
FIRE SUPPORT

Destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fire and to help integrate fire support assets into combined arms operations

AVIATION WEAPONS

Find, fix, and destroy the enemy through fire and maneuver; and to provide combat, combat service and combat service support in coordinated operations as an integral member of the combined arms team

AIR DOMAIN



EMERGING TECHNOLOGIES

SYSTEM CONCEPT DEMOS

LAUNCHER & STRUCTURES TECHNOLOGY

TECHNICAL FIRE CONTROL

MISSILE SYSTEMS TECHNOLOGIES

- Aerodynamics
- Affordability
- Simulation
- Missile Sustainment



**Close Combat Missile
Modernization to ensure range and
lethality overmatch against future
threat systems and precision lethality
needed for hybrid warfare
operations**

Attributes:

- Extended Range & Decreased TOF
- F&F & Extended Range
- Networking/Cooperative Engagement
- Lethality Against Multiple Target Sets
- Reduced Weight

Payoff:

- Achieve lethal effects at extended range
- Increased target identification range
- Increased survivability
- Increased stowed kills, reduced logistics burden
- Transition to PM CCWS for FY18 POR



Extended Area Protection & Survivability (EAPS)

FY09-FY15: Critical Technologies & Key Elements Integrated and Flight Demonstrated

Technical Fire Control
Demonstrate fire control sensors, missile and bullet projectiles, and guns/launchers can be integrated into a weapons system capable of meeting mission requirements.

Fire Control Sensor

Demonstrate fire control sensor technology and prototype hardware that supports projectile concepts and flight demonstration.

- Track
- Illuminate

- Intercept Target

Projectile

Demonstrate missile and bullet technology and prototype hardware through flight demonstration and intercept/defeat of RAM targets.

- Guide to Target

Launcher Integration

Demonstrate missile integration into the vertical launcher and course corrected bullet and gun integration

- Launch

Threat

- Mortars
- Artillery
- Rockets
- Unmanned Aerial Vehicles
- Cruise Missiles
- Rotary Wing Aircraft

Notional Battle Element and Concept of Operation

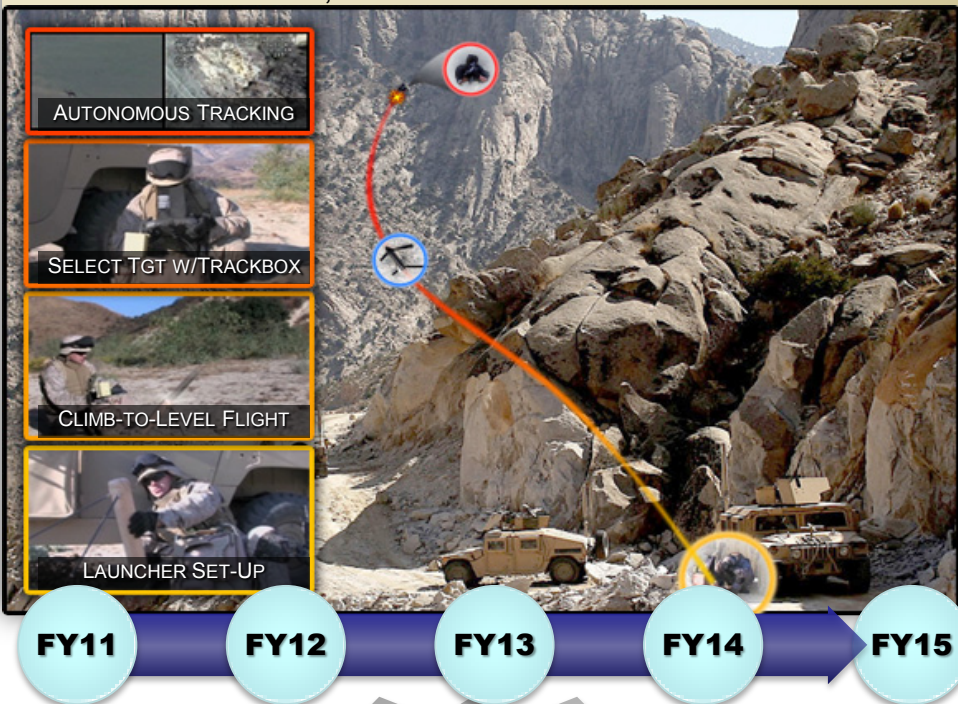
Program Objective

Develop & flight-demonstrate prototype hardware in support of system concepts, bridging the gap between initial C-RAM and the objective EAADS capabilities and providing mobile, 360 degree hemispherical extended area protection against RAM threats.



LETHAL MINIATURE AERIAL MUNITION SYSTEM (LMAMS)

A SMALL PRECISION, SOLDIER-CARRIED, SOLDIER-LAUNCHED, LOITERING, PRECISION MUNITION SYSTEM



LMAMS

critical component technology to enable small units to defeat enemy personnel/soft targets in urban/complex terrain without exposure to direct enemy fires and with low collateral damage

Mature, Integrate, & Flight Demonstrate:

- **IMAGE STABILIZATION/AUTOTRACKER** for increased day/night target acquisition and reduced operator workload
- **INTEGRATED WARHEAD, FUZE, & PROXIMITY SENSOR** for increased lethality in obscured battlefields and increased IM compliance
- **DIGITAL DATA LINK** for secure, reliable communication over flight trajectories
- **ROBUST POWER SYSTEMS** for reliable, low-maintenance system operation in all temperature environments

Payoff:

- Improved situational awareness, lethality, and survivability against
 - Combatants on ridgelines or overhangs
 - Snipers in close urban terrain
 - Insurgents placing IEDs or fleeing
 - Small Fwd. Operating Base protection
- Reduced collateral damage/fratricide
- Transition to PM CCWS for FY15 LMAMS POR

LOWER-AD GUIDING PRINCIPLES

- Low cost is paramount
- High degree of reuse of existing technology
- Leverage S&T investment common across programs
- Minimize impact on force structure

FY14

FY15

FY16

FY17

FY18

Provide a low-cost materiel solution to engage and defeat threat UAS/CM at sufficient range to prevent aerial surveillance of protected assets

Products:

- Low cost C-UAS/CM interceptor with manufacturing cost < \$150k per kill
- Extended range intercept > 25km
- Affordable Active Seeker Technology
- Integrated System Demonstrated at TRL6/7

Payoff:

- Defeat of most likely and most stressing UAS threats with capability against Cruise Missiles, Large Caliber Rockets, Fixed and Rotary Wing Aircraft
- Active seeker enabling extended range intercept and use of existing radars
- Affordable, enabling missile technology with high-degree of reuse by other programs
- Interoperability with existing Force Structure

Transition:

- PEO M&S, Cruise Missile Defense Systems Project Office and Counter Rockets, Artillery, and Mortars Project Office



Low-cost precision fires variant capable of servicing target at a 200 km range threshold with a 200lb class warhead; Aim is to provide extended range capability for a cost much less than current fire support options

Enabling Technologies:

- Thermal barrier / pulse motor
- Investigating commonality in GNC/electronics with GMLRS
- Investigate integration of GMLRS warheads and fuzes
- Innovative navigation concepts for precision engagements in GPS denied environment
- Scalable Effects and/or Electronic Attack payloads

Warfighter Payoff:

- Greatly reduced costs per round
- Dramatic increase in number of serviceable targets as defined by TRADOC scenarios due to range extension
- Munition is capable of 200km+ carrying a 200 lb warhead

Requirements:

- Concept must be compatible with current launchers
- Changes must show a dramatic reduction in cost
- Current performance of MEOM can not be degraded

TECHNOLOGY DRIVER: WARFIGHTER FOCUSED.



Develop and demonstrate critical technologies and UAS integration approach to improve sensor to shooter synergy across Army Aviation operations

Purpose:

To ensure that Army Aviation has munitions suitable for the Full Spectrum of Warfare Operations.

Attributes:

- **Compatibility Across Aviation Platforms (Manned and Unmanned):**
 - Small Size
 - Lightweight
 - Reduced Power Consumption
- **Reduced Life Cycle Costs:**
 - Modular Munition Subsystems
 - Open Architecture Internal Interfaces
- **Selectable Lethality**

Payoff:

- Improved effects against fleeting/moving targets
- Reduced kill chain timeline
- Improved effectiveness against soft target set
- Improved control of collateral damage
- Increased stowed kill/endurance options for aviation platforms
- Reduced logistics burden
- Reduced acquisition schedule & cost for new capabilities

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

- ✓ FLEXIBILITY
- ✓ AFFORDABILITY
- ✓ IMPROVED RELIABILITY
- ✓ REDUCED LOGISTICS BURDEN

