US ARMY RDECOM

U.S. Army Research, Development and Engineering Command

U.S. Army Aviation and Missile Research, Development, and Engineering Center Overview

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

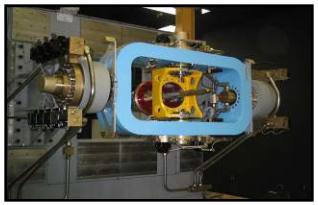
Presented to: **54TH Annual Fuze Conference**

Presented by: **Shannon Haataja**
AMRDEC

Date: **Wednesday, May 12, 2010**

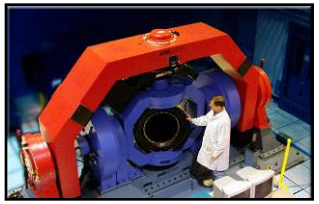
"The Fuzing Evolution – Smaller, Smarter, and Safer"

Agenda


- **Who are we?**
- **What do we do?**




AMRDEC Overview

AMRDEC MISSION: Manage and conduct research, exploratory and advanced development, and provide one-stop life cycle engineering and scientific support for aviation, missile, and unmanned systems platforms

Aeroflightdynamics Directorate
NASA Ames–Moffett Field, CA
Aviation S&T

Maintenance Eng. Div.
Aviation Engineering Dir.
Corpus Christi, TX
Aviation Sustainment Engineering

Aviation Applied Technology Dir.
Ft. Eustis, VA –
Aviation R&D, Systems Eng / Special Operations Forces Support

Joint Research Program Office
NASA Langley, Hampton, VA - Aviation S&T

AMRDEC HQ
Redstone Arsenal
Huntsville, AL
Missile R&D

Aviation & Missile Systems Eng.

Aviation & Missile Sustainment Eng. & Field Support

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Command Structure

AMSAA	ARL	AMRDEC	ARDEC	CERDEC	ECBC	STTC	NSRDEC	TARDEC
Army Material Systems Analysis Activity	Army Research Laboratory	Aviation & Missile Research, Development & Engineering Center	Armament Research, Development & Engineering Center	Communications Electronics Research, Development & Engineering Center	Edgewood Chemical & Biological Center	Simulation & Training Technology Center	Natick Solder Research, Development & Engineering Center	Tank Automotive Research, Development & Engineering Center

ARO
Army Research Office

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

The U.S. Army Aviation & Missile Research, Development & Engineering Center

RDECOM

AMRDEC STRENGTH THROUGH TECHNOLOGY

FRONT OFFICE

Executive Director (Acting) *
Dr. Robin Buckelew
(SES)

Deputy Director
COL John Oxford, Jr.

Director for Missile Development *
Mr. C. Stephen Cornelius (SES)

Director for Aviation Development *
Dr. James Snider (SES)

Director for System Engineering & Support (Acting) *
Mrs. Patricia Martin (SES)

Updated: 09/22/09

* SES Position

Click on Directorate Boxes for details

DIRECTORATES

- Aviation Engineering *
- Advanced Science & Technology
- Software Engineering
- Weapons Development & Integration *
- Aviation Applied Technology
- Aeroflightdynamics
- Engineering *
- Weapons Sciences *
- Technical Management *
- System Simulation & Development
- Center Support

Other Activities

- Joint Tech. Ctr. / Systems Integration Lab (JTC/SIL)
- Strategic Development Office (SDO)
- Information Office

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Weapons Development & Integration Directorate

ACTG DIRECTOR
Mr. James E. Hatfield

ST's & CHIEF SCIENTISTS
Dr. Paul Ruffin (ST), Dr. Jay Loomis (ST), Dr. Jamie Neidert

DIRECTOR FOR SYSTEMS
Dr. Mike Richman

- **Advanced Technology**
  MeLisa Cannon, Chief
- **Sys Dsn & Int Tech**
  Phil Jenkins, Chief
- **EAPS ATO-D**
  - Bill Nourse, PM
  - Dr. Jim Baumann, DPM
- **CIAPS ATO-D**
  - Don Lovelace, PM
- **A-SLCMC ATO-D**
  - Susan Dunbar, PM
  - Paige Walker, DPM
- **CCNWS ATO-D**
  - Susan Dunbar, PM
  - Greg Parker, DPM

ACTG DEPUTY DIRECTOR
Mr. Paul Turner

SAFETY & FACILITIES
Steve Caudill, Andrea Grisham, Fred Randall

ACTG ASSOCIATE DIRECTOR FOR P&S TECHNOLOGY
ROBERT HELEM

FUNCTIONS

- **Systems & Warheads**
  Milton Henderson Jr., Chief
- **Aerospace Materials**
  Bob Evans, Chief
- **Missile Sustainment**
  Dr. Rob Little, Chief
- **Propulsion Technology**
  Dr. Jay Lilley, Chief
- **Platform Integration**
  Robert Helem, Chief
- **Energetic Materials**
  Mike Morrison, Chief
- **Controls & Electronics**
  Traci Ray, Chief (A)

ASSOCIATE DIRECTOR FOR SG&E TECHNOLOGY
Julie Locker

FUNCTIONS

- **Infrared & Optical Tech**
  Ricky Hammon, Chief
- **Image & Signal Proc Tech**
  Mike Wilson, Chief
- **RF Technology**
  Jim Mullins, Chief
- **Navigation Tech**
  Chris Roberts, Chief
- **Electronics & Computer Tech**
  Roger Berry, Chief

Business & Administration

Weapons Development & Integration Directorate (1 of 2)

Sensors, Guidance and Electronics Technology

CAPABILITIES:

- Guidance, navigation, and control solutions
- Infrared and RF sensors and seekers
- Image and signal processing
- Inertial and global positioning systems
- Real-time embedded hardware and software
- Automatic target recognition
- Hardware and software for fire control and platform integration
- Support and improvement for fielded systems
- Development and demonstration of new weapon systems

FUNCTIONS:

- Electronics and Computer Technology
- Image and Signal Processing Technology
- Infrared and Optical Technology
- Navigation and Control Technology
- RF Technology

FACILITIES:

- Embedded Processor Lab
- ATR/Tracker Laboratory
- Automated Infrared Sensor Test Facility
- LASER Countermeasures Lab
- Automated Laser Seeker Performance Evaluation System (ALSPES)
- Fiber Optics/MEMS Laboratory
- ***Additional facilities pictured left***

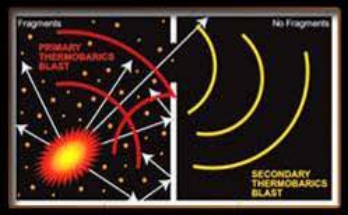
Weapons Development & Integration Directorate (2 of 2)

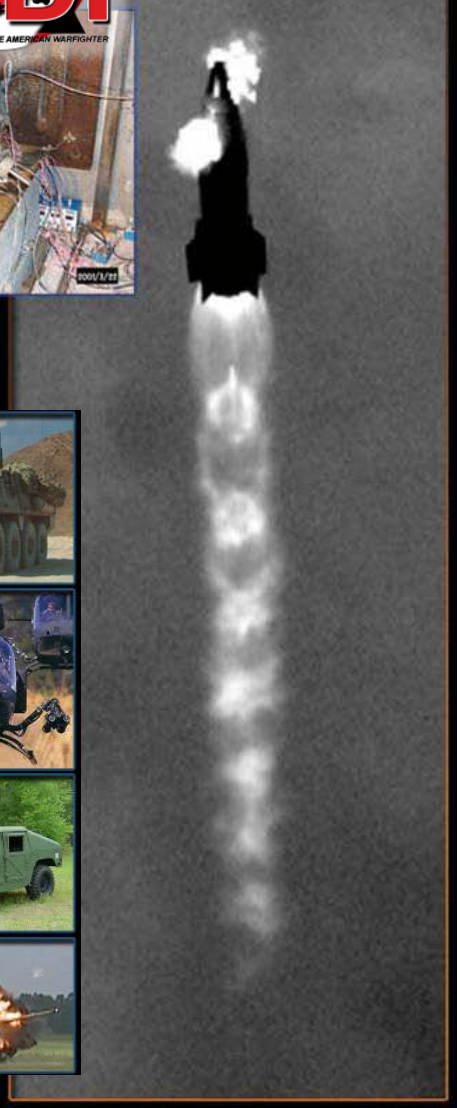
Propulsion & Structures Technology

- **Design, Analysis, and Testing of Rocket Motors**
  - **Solid Propulsion Systems**
  - **Gas Generators**
  - **Gel Propulsion Systems**
  - **Variable Thrust Nozzles**
- **Processing & Loading of Energetic Compositions**
- **Enhanced Blast Evaluation**
- **Composite Structures and Materials**
- **Corrosion Prevention**

- **Active Protection Systems Against RPGs/ATGMs**
- **Survivable Modular Fuzing**
- **Multi-Mode Warhead**
- **Hypervelocity Kinetic Penetrators**
- **Insensitive Munitions**
- **Thermobaric Explosives**
- **Demilitarization**
- **Stockpile Reliability**
- **Service Life Assessment**

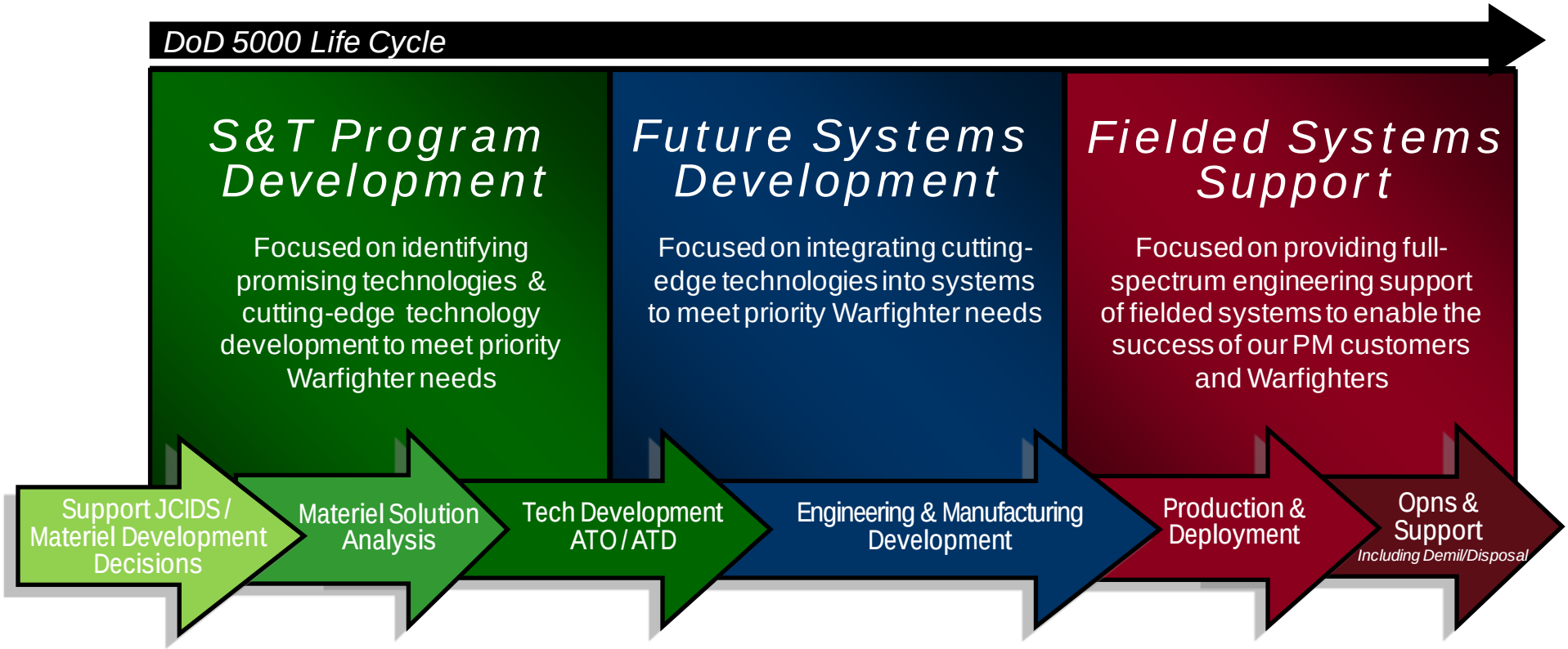
- **Weapon and Platform Integration**
- **Vehicle Mobility and Transportability**
- **Shock, Vibration and Modal Testing**
- **Structural Analysis (Static & Dynamic)**
- **Fatigue, Fracture, Hydraulics**





Focus: Lifecycle Support

AMRDEC provides... Scientific & Engineering Expertise and Support to PEO's, PM's and Users Across the Full System Lifecycle.



Focus: Lifecycle Support
Science & Technology

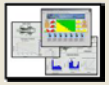
Aviation Science & Technology Areas

- Structures
- Aeromechanics
- Survivability
- Engines/Transmissions
- Teaming/Autonomy
- Mission System Integration
- Modeling & Simulation
- Operations Support & Sustainment

Aviation ATOs
(Army Technology Objectives)


Intelligent Decision-Aiding for Aircraft Survivability


Aircrew Survivability Technologies (AST)


Capability-Based Operations & Sustainment Technologies - Aviation


Rotor Durability


Advanced Affordable Turbine Engine

Missile Science & Technology Areas

- Aerodynamics
- Composite Structures & Materials
- Computer Hardware/ Software
- Energetics & Warheads
- Guidance, Navigation & Control
- Image & Signal Processing
- Optical, IR, RF, and MEMS Sensors
- Propulsion Technology

Missile ATOs
(Army Technology Objectives)

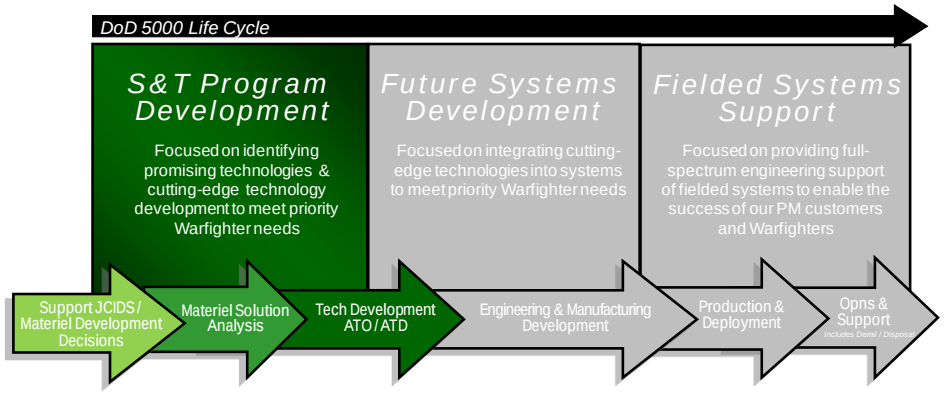

Extended Area Protection & Survivability (EAPS) Integrated Demo

Embedded Deeply Integrated Guidance & Navigation Unit (DIGNU) Tech Advancements


Kinetic Energy Active Protection System (KEAPS)


Applied Smaller, Lighter, Cheaper Munition Components


Close Combat Networking of Weapons & Sensors



AMRDEC Provides…

Next generation technology development of component-level, state-of-the-art aviation and missile technologies…

Providing payoff at the system level

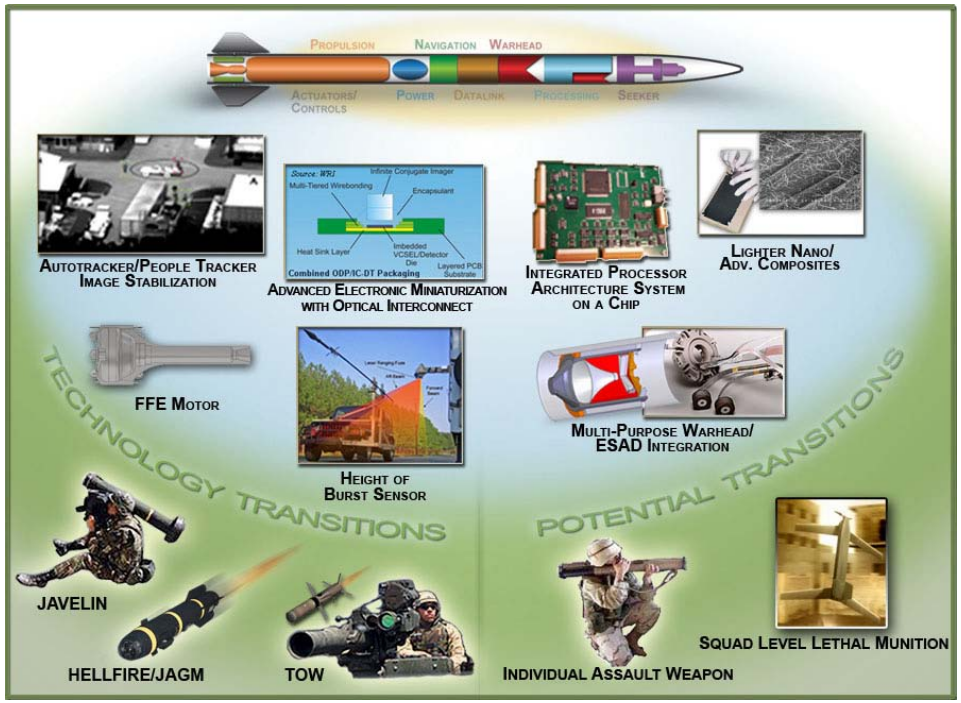
TECHNOLOGY DRIVEN. ***WARFIGHTER FOCUSED.***

AMRDEC Fuze Group
What we do?

- **Development Efforts**
  - Miniaturization
    - ESAD and Fireset component evaluation and integration.
  - Survivability
    - System and component high G urban target survivability.
  - Tailored Effects
    - Selectable yield unitary.
    - Real time target classification.

- **Program Office Support**
  - Programmatic fuze safety certification guidance.
  - Conduct fault tree analyses.
  - Assist in requirements and qualifications development.
  - Active participation in fuze development as SME.
  - Participate in failure investigations.

Smaller, Lighter, Cheaper Munition Components (SLCMC) ATO



Schedule & Cost

MILESTONES	FY09	FY10	FY11
Rqmts Analysis/Trades	3/4		
HW/SW Sys Engr/Design			
Development/Fabricate		4/5	
Integrate/Component Demos			6

Purpose:

Provide smaller, lighter, cheaper missile components & subsystems that enhance Javelin/TOW and Hellfire/JAGM capabilities and mature technologies for next generation small precision munitions

Products:

- *Enabling components/designs ready for transition or system-specific tailoring*
  - *Lighter nano/adv. composite structures*
  - *Miniaturized guidance electronics*
  - *Advanced sensors (including image processing)*
  - *Electronic Safe & Arm Device for multipurpose warheads*
  - *Propulsion Technology*

Payoff:

- *Increased lethality*
- *Reduced logistics burden: smaller, lighter missiles with common components*
- *Reduced cost missiles*

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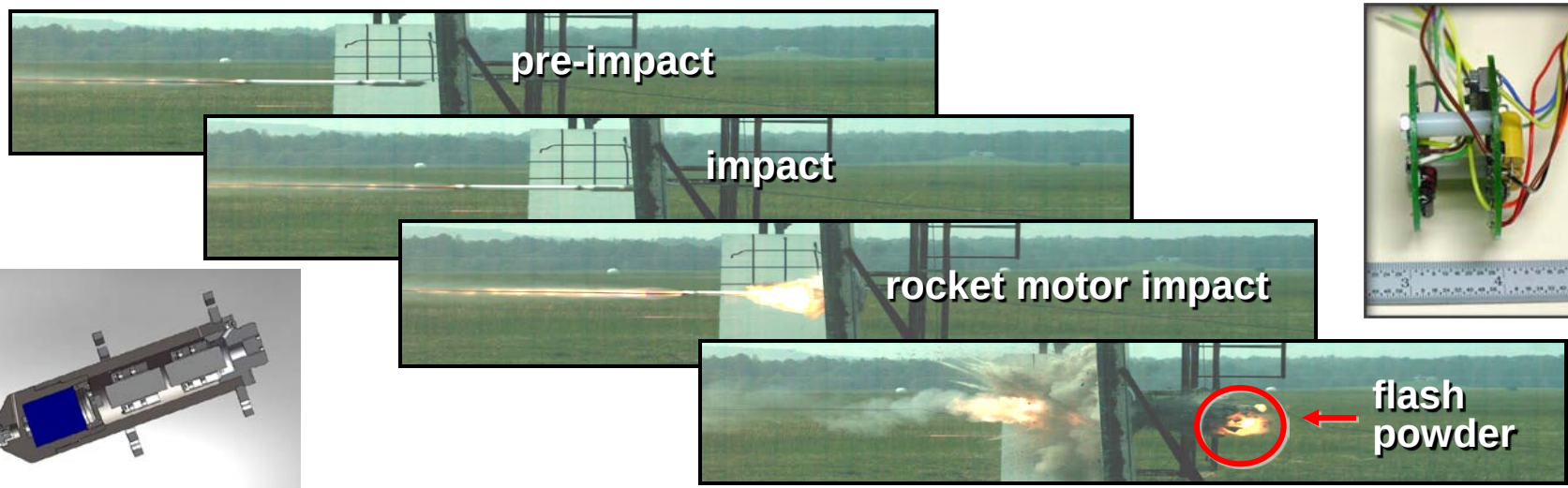
Survivable Modular Fuzing

Rocket-On-A-Rope

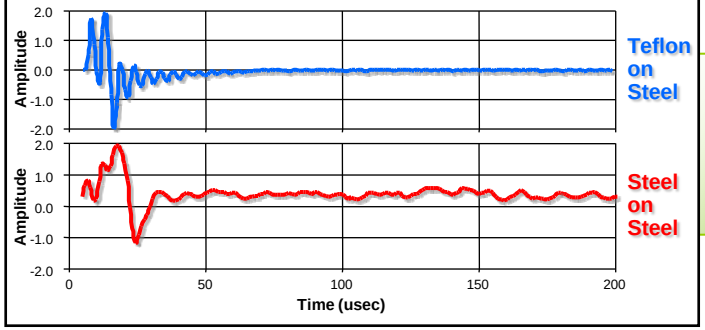
Utilizes a 2.75-inch NDI rocket motor to propel a test article at supersonic speeds along dual high tensioned ropes for accurate hit point and missile orientation



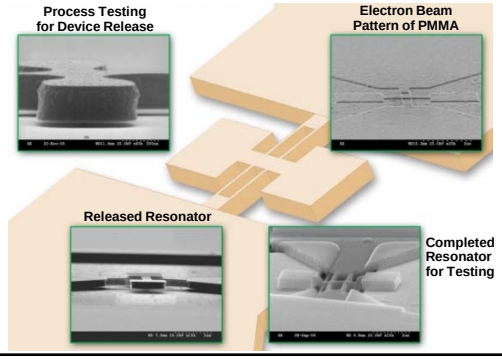
SWFTICE TECHNOLOGY:

- Enables "multi-mission" missile concept:
  - Simplifies logistics.
  - Increases stowed kills.
  - Enables expeditionary deployment.
- Decreases gunner workload by autonomous operation.
- Provides increased capability for legacy systems.
  - No launcher upgrades required for "smart missile" avoids platform retrofit costs.

TARGET IMPACT PHENOMENOLOGY PREDICTED THROUGH MODELING, VALIDATED THROUGH TESTS



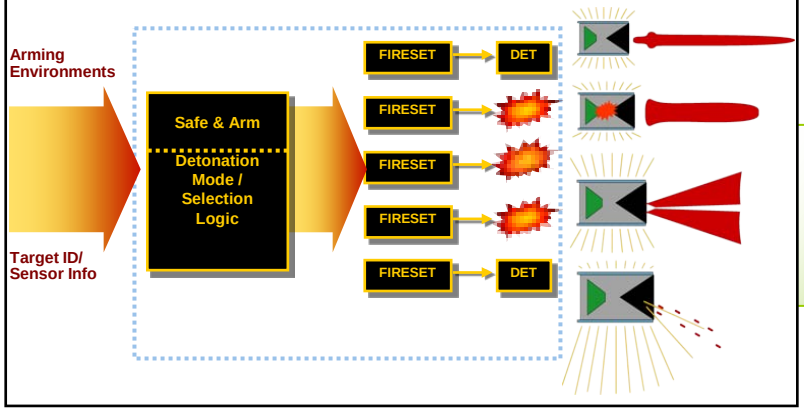
ADVANCED DESIGN ISTAR Transducers



INTEGRATED ISTAR SENSOR

- Leverages Army/DoD investments in:
  - Advanced Warhead Technology.
  - ESAD Technology.
  - Firing System Technology.
  - Energetics Technology.

Selectable Multi-Point Initiation System



SENSOR, WARHEAD & FUZE TECHNOLOGY INTEGRATED FOR COMBINED EFFECTS
SWFTICE ATO

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Army Selectable Yield Unitary

Schedule & Cost

MILESTONES	FY08	FY09	FY10	FY11
Multi-output explosive & coupled Reactive Materials development	3	4	5	
Novel dynamic propellants & thruster development	3	4	5	
Advanced fuze & power development	3	4	5	
Warhead scaleable/selectable performance against multiple targets		4	5	6
Integrated Demos of Prototype Adaptive Munitions		4	5	6

Purpose:

- *Provide capability for scalable, selectable, and adaptive lethal effects against platforms and personnel to selectively destroy target function and/or neutralize attributes while limiting damage to surrounding structures/personnel*

Products:

- *Demonstration of agile technologies for scalable, selectable & adaptive lethal effects in large, medium, and small diameter munitions & missiles*
- *Development of controlled lethal effects, multi-purpose energetics & formulations, reactive materials and advanced fuzing and power technologies*

Payoff:

- *Improved weapon effectiveness/lethality*
- *Reduced collateral damage*
- *Rapid mission execution with less ammunition expended (reduced logistics)*
- *Tech transition to PEOs, AMMO, M&S, Soldier: 155 VAPP, Javelin, TOW, JAGM, XM1069, MAPAM, M430*
- *Demos: 250mm (GMLRS), 155mm (Excalibur), 30mm (M789/Mk238)*

AMRDEC Support Efforts
PEO-MS SDD (or other) Programs

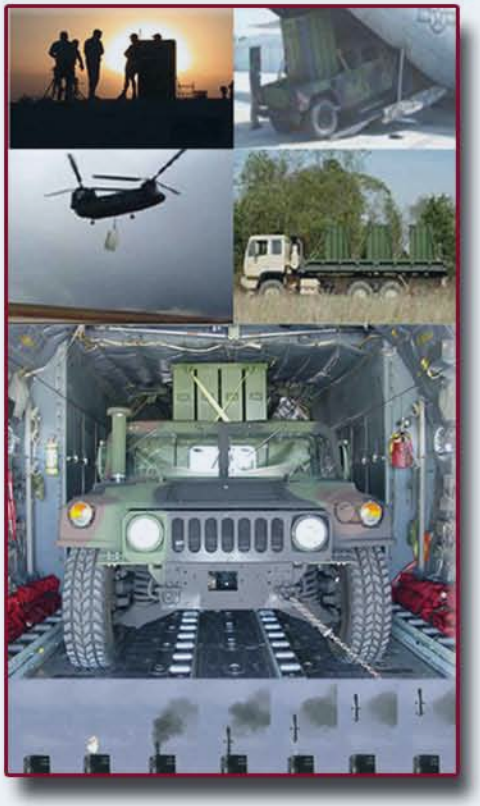
Precision Fires Rocket and Missile Systems (PFRMS) PMO

- GMLRS DPICM ESAD
- GMLRS Unitary ESAF
- TACMS Unitary Fuze(s)

Precision Fires for Current and Future Forces

Non-Line Of Sight (NLOS) PMO

- Electronic Safe & Arm Device
- Inline Ignition Safety Device
- Note: Joint Development with USN



Unmanned Fire Support

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AMRDEC Support Efforts
PEO-MS SDD (or other) Programs

Close Combat Weapon Systems (CCWS) PMO

- TOW Fuze (In-house design transitioned to PMO)
- Javelin ESAF

Anti-Armor and Target Acquisition for the Front-Line Warfighter

Joint Attack Munition Systems (JAMS) PMO

- Hellfire ESAF
- JAGM ESAF
- 2.75” Rocket Common Fuze

Aviation Rockets and Missiles for the Joint Force

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

AMRDEC " Community " Participation

- Fuze Engineering Standardization Working Group (FESWG)
- U.S. Army Fuze Safety Review Board (AFSRB)
- U.S. Army Ignition System Safety Review Board (ISSRB)
- DOD Fuze IPT
- Defense Ordnance Technology Consortium – Fuze Subgroup
- Joint Fuze Technology Program
- Technical Coordinating Group X (TCG-X) – Firing Systems

The U.S. Army Aviation & Missile Research, Development & Engineering Center

AMRDEC
STRENGTH THROUGH TECHNOLOGY

Questions