50th Annual NDIA Fuze Conference
ARDEC Fuzing Overview

Presented by:
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ARDEC Director
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U.S. Army Armament Research, Development, and Engineering Center (ARDEC)

Vision:

Innovative Armaments Solutions for Today and Tomorrow

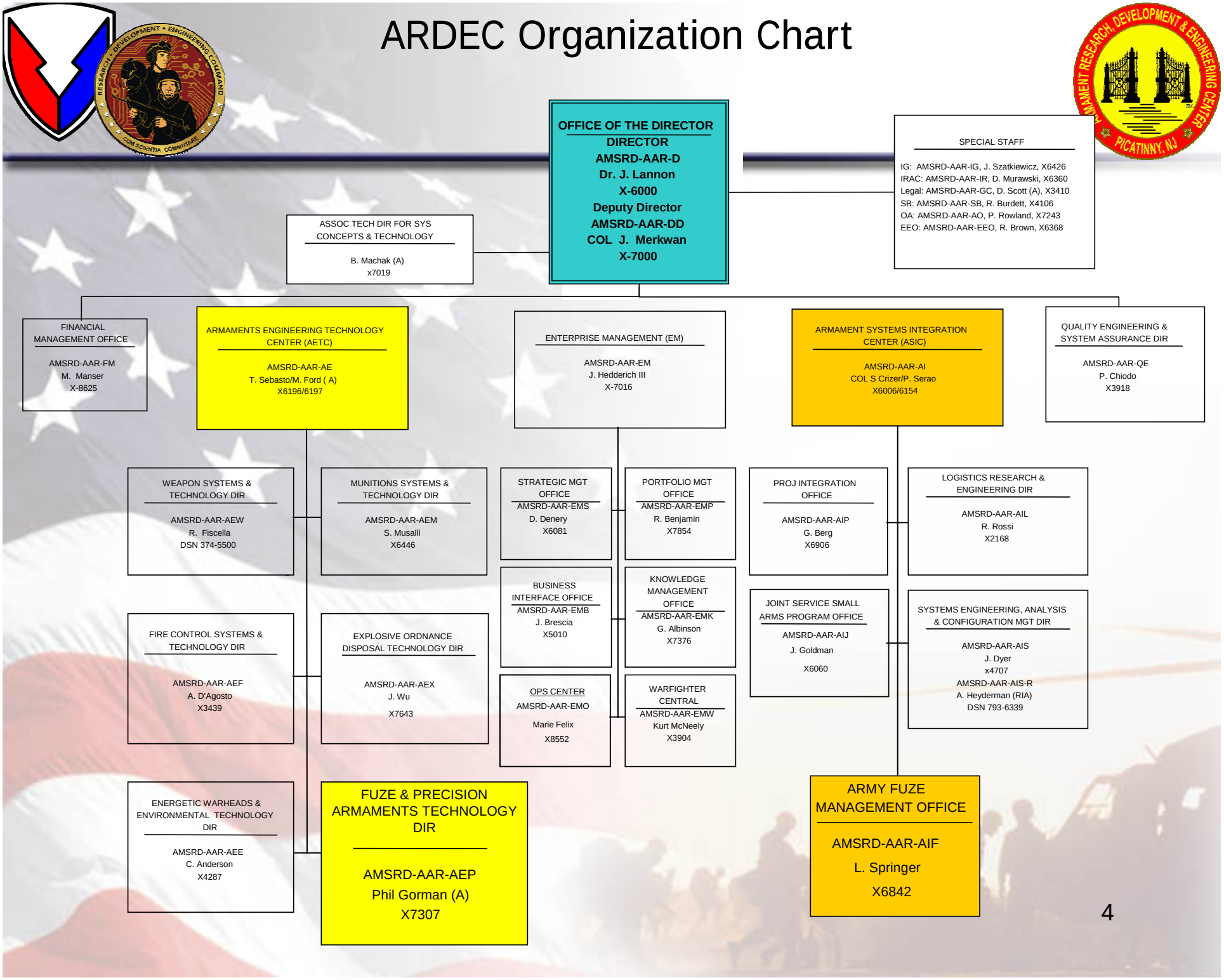
Mission:

Execute and manage totally integrated life-cycle engineering processes required for the research, development, production, field support and demilitarization of ammunition, weapons, fire control, and associated items.

ARDEC Video

Click to start video.

ARDEC Organization Chart



U.S. ARMY FUZE MANAGEMENT OFFICE
Summary of Responsibilities

- **Centralized Life Cycle Oversight Management of All Non-Nuclear Army Fuzes**
  - Focal Point for PEO Ammo on Fuzing Issues
- **Ensure proper execution of fuze RDA programs**
  - **Appropriate designs**
  - **User needs**
  - **Applicable standards**
- **Intensive management of designated programs**
- **Guidance and Input To PEO/PM Community on Fuzing Issues**
- **Coordinate Fuze Tech Base Programs**
- **Propose, Recommend and Support Actions Directed Towards Ensuring the Fuze Industrial Base Is Properly Maintained**
- **Army's focal point for multi-service and international fuzing interaction**
  - **NATO AC310 SGII**
  - **DoD FESWG**
  - **JOCG Fuze Subgroup**
  - **DoD Fuze IPT**
  - **Munition Control case disposition**
- **Chair and Manage The Army Fuze Safety Review Board**

ARDEC Fuze Division

- **Total Life Cycle Fuzing Responsibility**
- **Fuze Products**
  - **Proximity, Time, Point Detonating & Delay Fuzes**
    - **Artillery, Mortars, Tank, Med / Sm Cal,**
    - **Missiles & Rockets, Networked Munitions,**
    - **Mines & Demo, Non-Lethal**
  - **Safe and Arming (S&A) Devices**
    - **Mechanical / Electro-Mechanical**
    - **Electronic S&A (ESA)**
  - **Fuze Setters**
  - **Advanced Sensors**

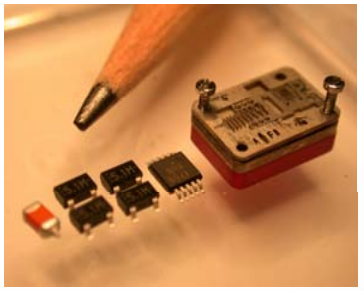
Customers/Interfaces

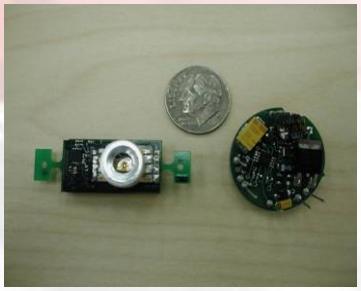
- **User Communities**
  - Ft. Benning
  - Ft. Sill
- **PEO Ammunition**
  - PM CAS
  - PM MAS
  - PM CCS
- **PEO Soldier**
- **PEO GCS**
- **Army Fuze Management Office (AFMO)**
- **PEO Missile & Space**
  - PM CCWS
  - PM JAMS
- **AMRDEC**
- **National & International Fuze Related Committees**
- **AFSRB**
- **DoD Fuze Committees**

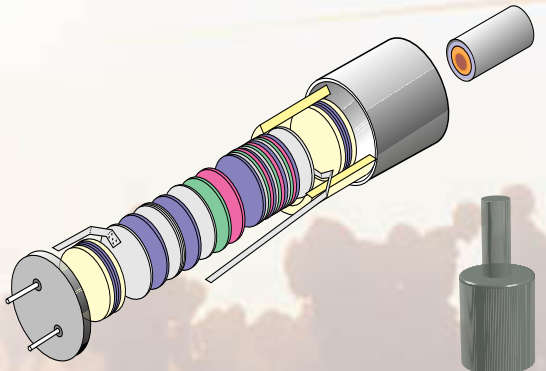
Fuze Competency Resides In The ARDEC Fuze Division

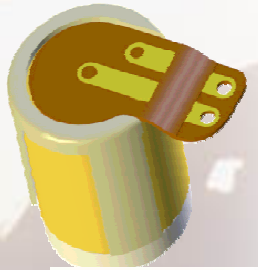
Army Technology Objective
Fuze and Power for Advanced Munitions

- User Payoff:
  - **Fuze Components**
    - Multipurpose & Multimode Capability
    - Customizable Lethality
    - Increased Safety
    - Affordability
  - **Power Sources** (Advanced On-Board Munitions Power Systems)
    - Increased Energy and Power Densities
    - Enables Longer Range Performance
    - Improved Producibility
    - Decreased Emphasis on Single Battery Solutions









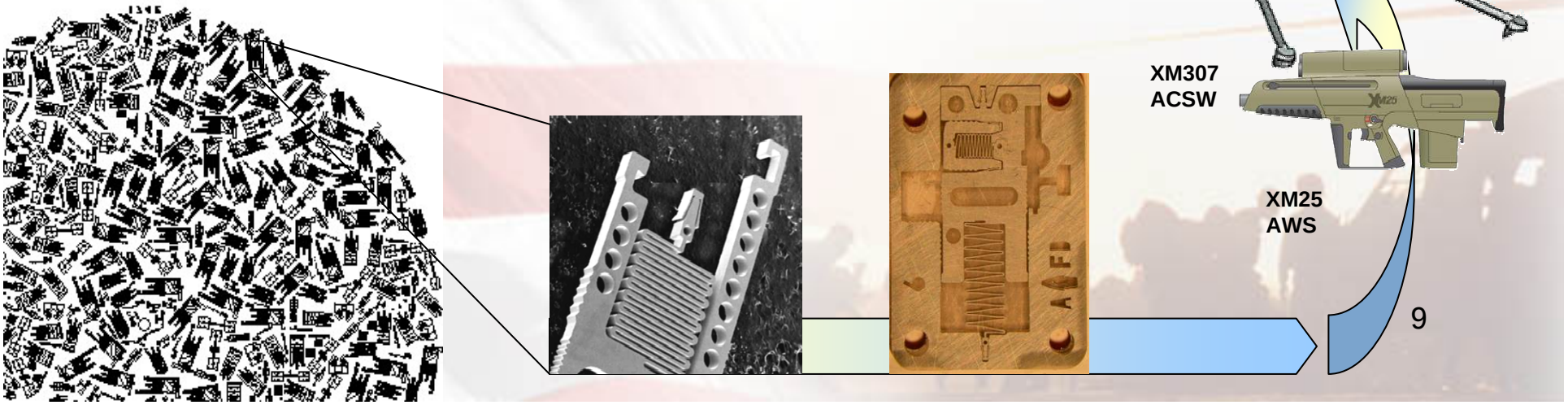
Army Technology Objective
Fuze and Power for Advanced Munitions

- **Fuze Technology Thrusts:**
  - **Multi-point Electronic Safe & Arming Devices (ESAD)**
  - **Micro Electro-Mechanical Systems (MEMS) Safe & Arming (S&A)**
    - **Large Caliber Applications**
  - **Advanced Sensors**
    - **Proximity Sensors For Direct Fire Applications**
    - **Environmental Sensors / Impact Sensors**
- **Power Source Technology Thrusts:**
  - **Thermal Battery Prototypes**
    - **Higher Energy Densities In A Smaller Volume**
  - **Novel Liquid Reserve Battery Prototypes**
    - **More Producible and Cost Effective**
  - **Hybrid Power System Prototypes**
    - **RF Energy Harvester**
    - **Piezo Electric Harvester**
    - **Thermophotovoltaic**
    - **Super Conductors**

Army Manufacturing Technology Objective - MEMS Safe and Arming

- Technology Thrusts:
  - MEMS-Based S&A Device Producibility
  - Scaleable Micro-Scale Explosive Loading Technologies
  - Common Device Form Factor for Medium and Large Caliber Applications

- Payoff:
  - High Volume Manufacturing Capability
  - Technology Affordability



ARDEC Fuze Division Developmental Programs

- **XM784/785 ET Mortar Fuze**

- **XM395 PGMM Fuzing**

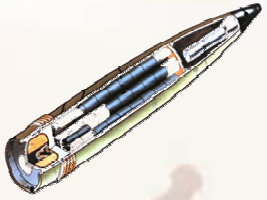
- **Precision Guidance Kit (PGK)**

- **EPIAFS**
- **XM 982 EXCALIBUR (integral Fuze)**

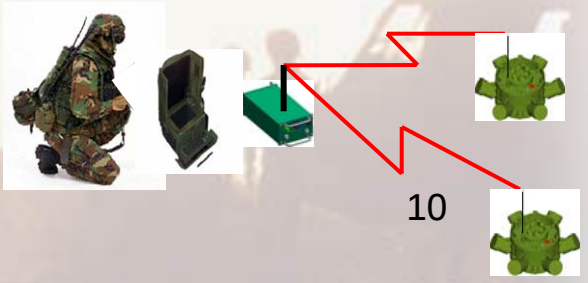
- **Medium Caliber Bursting Munitions**
  - XM25 – Shoulder Fired Weapon

  - XM307 Advanced Crew Served Weapon (ACSW)

- **40 mm Proximity Fuzing**
  - Lethal & Non- Lethal
- **Line Of Sight – Multi-Purpose (LOS – MP) – ARDEC ATO**
- **Self Destruct Fuze for M864 RECAP**
  - M223E1 (BTFP) & XM242 (ATK / IMI)



- **Network Munitions**
  - Spider
  - Intelligent Munition System (IMS)



ARDEC Fuze Division Production Programs

Artillery Fuzes
- M782 Multi-Option Fuze for Artillery (MOFA)
- M762A1/767A1 Artillery Electronic Time (ET) Fuze
- M234 Self-destruct Fuze
- M1155 PIAFS

Mortar Fuzes
- M734A1 Multi-Option Fuze for Mortars
- M783 Point Detonating Fuze for Mortars
- M772/M776 Mechanical Time Fuzes
- Mortar Practice Fuzes
- M935 Point Detonating/Delay

Grenade Fuzing
- M213 for M67 Grenade
- M228 Practice for M69
- M201A1 for M18 Smoke
- M201A1 MOD 2 for Stun Grenade

Countermines/Demolitions/AT Munitions
- APOBS Fuzing
- M1134A3 for MICLIC
- M147 TDFD
- M87A1 Volcano

Rocket/Missile Fuzing
- M423, M439, M442 – 2.75 in. rocket
- MK 420-BD

Medium Caliber Fuzes
- M549/M549A1
- M759 (30mm)
- M550 Escapement (S&A)


M1155


MOFA


M734A1


M228


M789 w/M759 Fuze

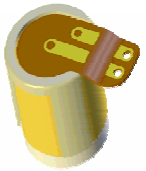

M762A1/767A1


APOBS Fuzing

Tank Fuzes
- M774 Point Initiating Base Detonating (M830A1)
- M74 Proximity Switch (M830A1)
- M578E1 Base Detonating (M393 Cartridge)

Fuze Technology Integration

- Technology Insertion To Current Munition Items
- Addresses Industrial Base Single Point Failure Issues
  - Risk Mitigation:
    - Battery Aging / Battery Airgun Test Facility
    - Signal Processor / MMIC Transceiver 2nd Source
    - M74 Proximity Switch
  - Block Upgrades:
    - Improved Bunker Defeat Munition Sensor
    - Update M734A1 Signal Processor
    - 2nd Env Safety Sensor Using Optics
- PEO Ammunition / User Payoff:
  - Insert Current Technology Into Today's Munitions
  - Preclude Obsolescence By Incorporating Component Technology
  - Provide Safer, More Reliable and More Lethal Munitions


Fuze Division Success Stories

- XM784 / XM785 Mortar Electronic Time (ET) Fuze
  - Successful Ballistic Testing: Feb 06
- M782 Multi-Option Fuze for Artillery (MOFA)
  - Materiel Release: Nov 05
- Self Destruct Fuze for M864 Recapitalization (RECAP)
  - M223E1 (BTFP) Successful Engineering Test
  - XM242 (ATK / IMI) Successful Engineering Test
- Line-Of-Sight Multi-Purpose (LOS-MP)
  - Latest Tests Look Promising In PD & Air-Burst Mode
- M762A1 / M767A1 Electronic Time (ET) Artillery Fuze
  - 53 Consecutive Successful Lots (Since Production Started 2001)
    - » 99.7% Overall Reliability
- Excalibur S&A and HOB Sensor
- Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS)
  - In Support of Excalibur (Integration Into PEFCS)
- M734A1 Multi-Option Fuze for Mortars
  - 99.46 % Overall Reliability (70 Consecutive Successful Lots)
- Advances In MEMS S&A Devices
- 40 mm Lethal and Non-Lethal Proximity Demonstrations

Excalibur

Fuze Development Center

- Provides Rapid Response to User and Customers
  - Fabricate and Test Under One Roof
  - Acquisition of Material / Parts Blanket Purchase Agreements
  - Continuous Investment in Facilities Maintains Relevance to New Technologies
- Facilitates Government/Contractor joint efforts.
  - Structured Data, Document, and Process Development Allows for Rapid Handoff To Production Vendor
- Programs Already Benefiting From The Facility:
  - 40mm Lethal and Non-Lethal Proximity Fuze
  - Excalibur Sub-Assembly Testing
  - Marine Corp PIAFS Training Kit
- Future Programs:
  - Mortar Mission Setter.
  - Enhanced Active Protection System (EAPS)
  - FTI Efforts

ARDEC In-House Fuzing Capabilities

- Engineering Modeling and Simulation
- Electromagnetic Environmental Effects (E^3)
- Armament Technology Facility
- Centrifuge Capabilities
- Air Gun / Rail Gun
- Environmental Conditioning
- ARDEC Soft Recovery System (SRS) Facility
  - 155 mm Soft Catch (Scat) Gun
    - » 39 – 62 Cal Capability
- Fuze Development Center

Armament Technology Facility

Soft Recovery System Facility

Defense Ordnance Technology Consortium (DOTC)

Mission: Provide rapid transition of new lethality and protection technology

DoD Ordnance Laboratory Center

- DoD, DoE, Other Agencies and Departments

National Warheads and Energetics Consortium

- Contractors, Academia, Not-for-profit/Non-profit Organizations
- 67 Consortium Member Agreements (CMA) with industry and academia
- Members partner in submitting project proposals
- Members May Offer cost sharing in their project proposals

...Partnering to leverage investment and capability

- Utilizing Other Transaction Agreements (OTA) – Section 485
- Leading to: Task Order Sub-Agreements (TOSA), CRADAs, DEAs

FY06 Funded Projects (Fuze Area)

- Micro Fabrication R&D
- Foundry Services
- Proximity Fuze R&D
- Fuze Integration
- Fuze Prototyping
- Sensor Development
- Battery/Energy Development

ARDEC Overview Summary

- **Fuze Division Mission Spans Total Fuze Life Cycle**
- **Full Breadth of Munition Product Lines:**
  - **Artillery, Mortars, Tank, Medium / Small Cal,**
  - **Missiles & Rockets, Networked Munitions,**
  - **Mines & Demo, Non-Lethal**
- **Recent Technology Investments:**
  - **Advances Battlefield Capabilities**
  - **Puts ARDEC In Best Position To Support Warfighter**

Fuzing Is At The Forefront Of Safety & Lethality