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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT, & ENGINEERING CENTER (ARDEC)

Malcolm Baldrige National Quality Award 2007 Award Recipient

ARDEC Science & Technology … Maintaining Balance between Government and Industrial Partners

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ

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Mr. Joseph Pelino
ARDEC Director of Technology
27 February 2014

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Strategic Partners

Assigned/Direct Support
Coordination

Headquarters, Department of the Army

Assistant Secretary of the Army Acquisition, Logistics and Technology
Ms. Heidi Shyu

Army Materiel Command, AMC
Gen. Dennis L. Via

Joint Munitions & Lethality LCMC
BG Kristin K. French

TACOM LCMC
MG Michael J. Terry

- Program Executive Office Combat Support and Combat Service Support
- Program Executive Office Ground Combat Systems
- Program Executive Office Soldier

Research, Development and Engineering Command, RDECOM
Mr. Dale Ormond

PEO Ammunition
BG John J. McGuiness

Armament Research, Development and Engineering Center, ARDEC
Dr. Gerardo J. Melendez

ARDEC's Role

Engineering Lifecycle


RESEARCH


DEVELOPMENT


PRODUCTION


FIELD SUPPORT


DEMILITARIZATION

Advanced Weapons:

Line of sight/beyond line of sight fire; non line of sight fire; scalable effects; non-lethal; directed energy; autonomous weapons

Ammunition:

Small, medium, large caliber; propellants; explosives; pyrotechnics; warheads; insensitive munitions; logistics; packaging; fuzes; environmental technologies and explosive ordnance disposal

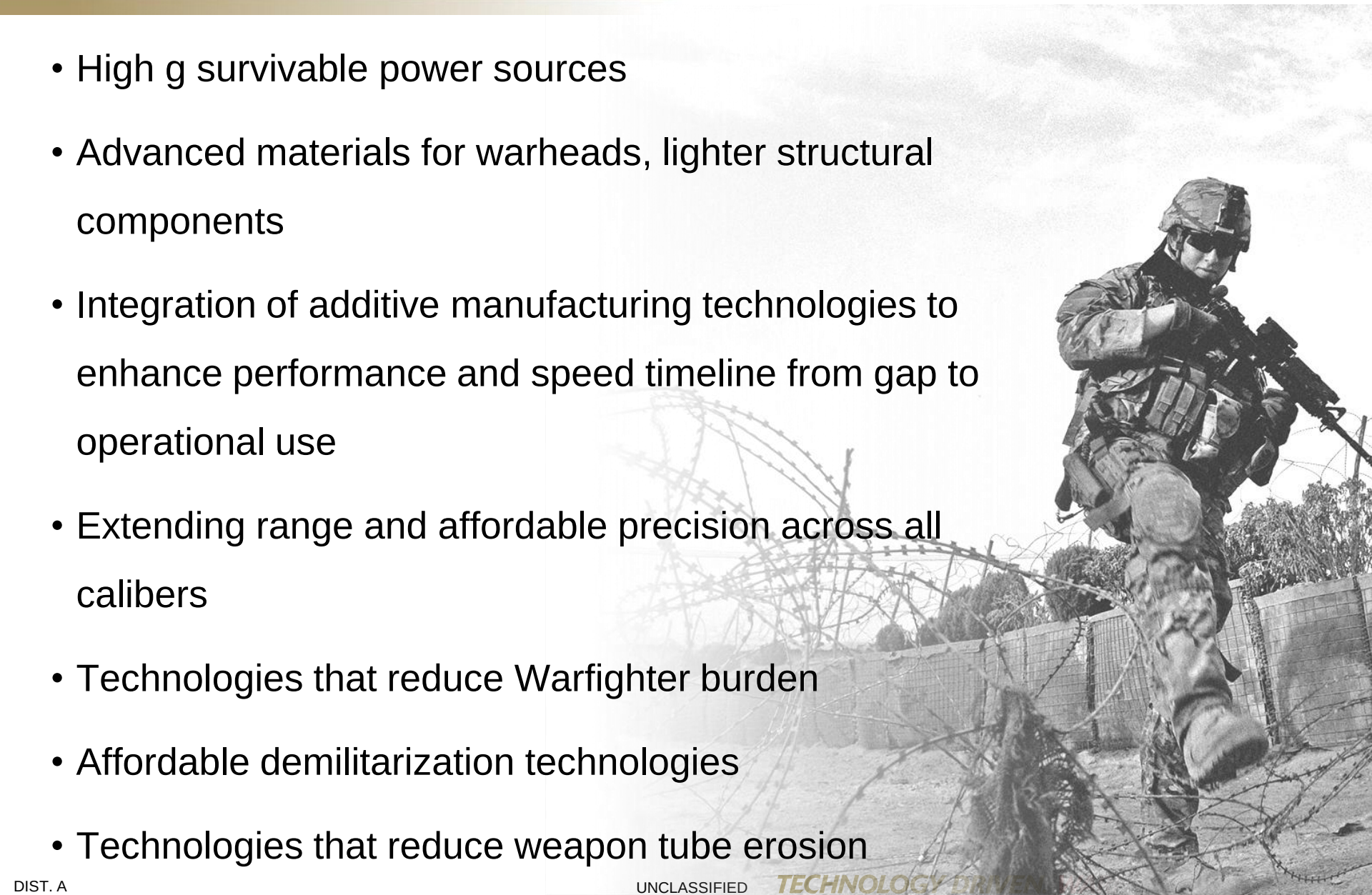
Fire Control:

Battlefield digitization; embedded system software; aero ballistics and telemetry

ARDEC provides the technology for over 90% of the Army's lethality and a significant amount of support for other services' lethality

Enduring & Future Thrusts

- High g survivable power sources
- Advanced materials for warheads, lighter structural components
- Integration of additive manufacturing technologies to enhance performance and speed timeline from gap to operational use
- Extending range and affordable precision across all calibers
- Technologies that reduce Warfighter burden
- Affordable demilitarization technologies
- Technologies that reduce weapon tube erosion



ARDEC S&T Portfolio & Needs Analysis

Source Library – Army Integrated Requirements Framework (IRF)
Identification/documentation of source needs and prioritization applicable to ARDEC S&T investments.

DOORS Architecture/Modules

Source Documents

- DoD/DA
  - OSD Elegant 11
  - Army Enduring Challenges
- PEOs/PMs
  - PEO AMMO
  - PEO Soldier
  - PEO GCS
- TRADOC
  - Warfighter Outcomes (WFOs)
  - Capability Needs Analysis (CNAs)
  - MCoE
  - MSCoE
  - FCoE

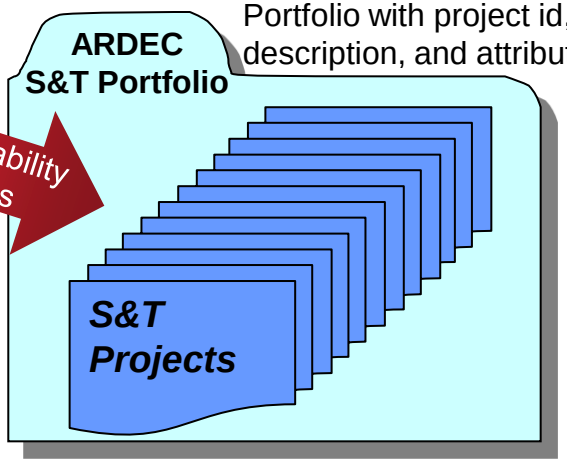
Traceability Links

ARDEC S&T Needs

ARDEC S&T Needs/Opportunities
Identification, coordination, organization of individual "Source Documents" needs/gaps/priorities into one list.

Traceability Links

ARDEC S&T Portfolio



ARDEC S&T Portfolio
Maintaining complete S&T Portfolio with project id, description, and attributes.

Facilitate

>> Communication
>> Information
>> Planning
>> Priorities

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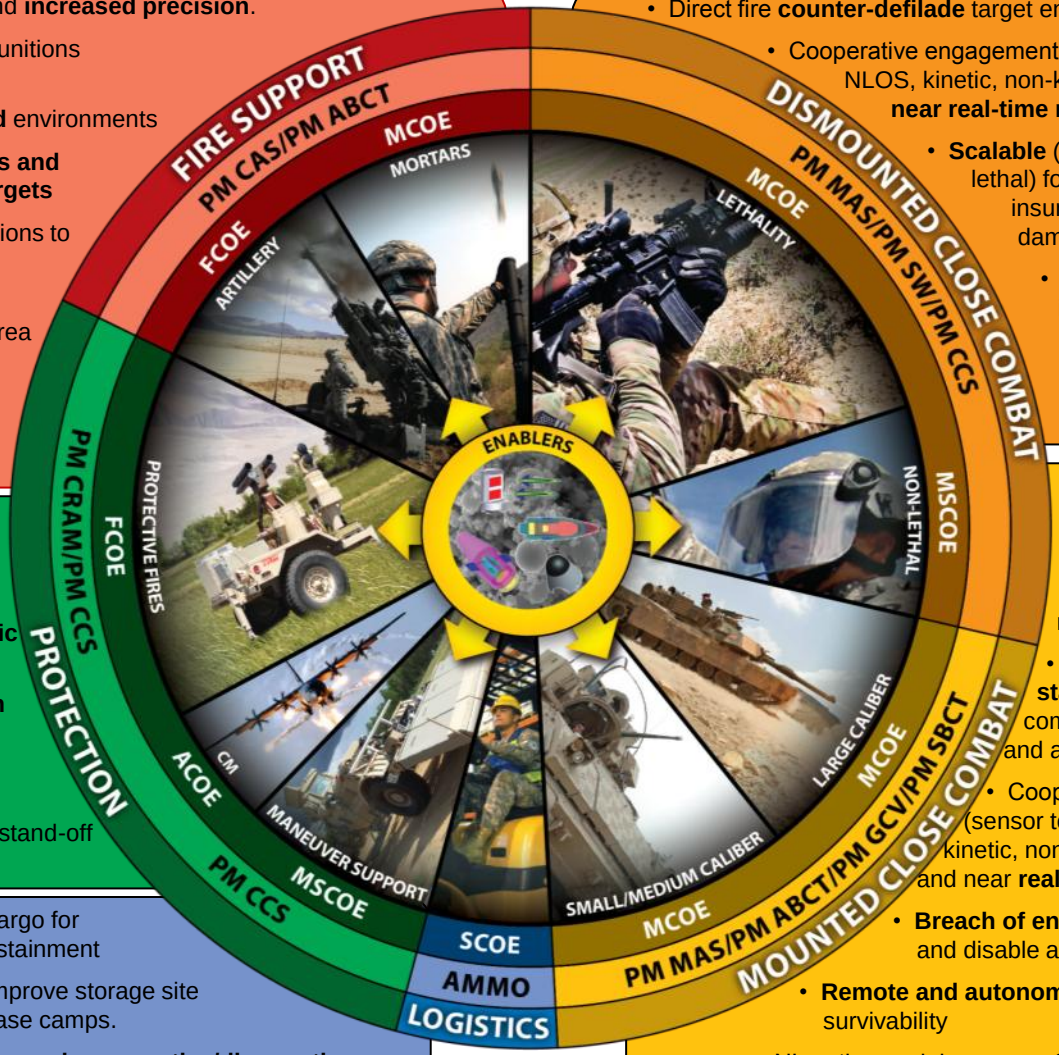
ARDEC S&T User Gaps

- 120mm Mortars **extended range** and **increased precision**.
- **Extended range** w/ conventional munitions and guided munitions
- Increased **precision in GPS denied** environments
- Munitions against **advanced armors and hardened above/below ground targets**
- **Tailorable effects** that match munitions to targets (to include scalable lethal to non-lethal)
- Cluster munitions replacement for area fires or imprecisely located targets
- **Remote** and autonomous delivery of **fires** for increased survivability

- Direct fire **counter-defilade** target engagement capability
- Cooperative engagements (sensor to shooter, LOS, NLOS, kinetic, non-kinetic lethal capabilities) and **near real-time networked fires**
- **Scalable** (non-lethal and non-lethal to lethal) force to shape the fight, defeat insurgents, reduce casualties, minimize damage
- **Multispectral obscurants and illumination** to limit enemy freedom of action
- **Imperceptible trace** to prevent enemy detection of U.S. forces



- **CUAS** at close range
- **CRAM** for base protection and armored vehicles on the move
- Detect and **counter electromagnetic or directed energy** attacks
- **Explosive detection/neutralization** above/below ground, at standoff distances, and convoy speeds
- **Breach of entry points** into urban infrastructure & disable assets from stand-off

- Large Cal direct fire to defeat ATGM
- Large Cal to defeat ATGM teams with **precision airburst munitions**
- Lethal overmatch and **tactical standoff** to extend the close-combat battle against tanks and armored vehicles
- Cooperative engagements (sensor to shooter, LOS, NLOS, kinetic, non-kinetic lethal capabilities) and near **real-time networked fire**
- **Breach of entry points** into urban infrastructure and disable assets from stand-off
- **Remote and autonomous delivery of fires f**or increased survivability
- NL anti-material weapon effective at extended ranges

- **Efficient handling/throughput** of cargo for faster/more effective deployment/sustainment
- **Explosives safety techniques** to improve storage site planning and minimize footprint at base camps.
- Real-time, automated, **asset tracking and prognostics/diagnostics** systems to manage/maintain ammunition.
- **Automated** rapid weapon system **rearm** and **resupply** to reduce manpower requirements s and soldier exposure to risk.
- Lightweight **renewable/recyclable/reusable packag**ing to reduce operational energy usage during distribution and retrograde.

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ARDEC S&T Portfolio FY13-19

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2.5%
- 120mm Guided Enhanced Fragmentation Mortar Program (6.3)
- 81mm Precision NLOS Munition for Light Forces (6.3)
- 81mm Automated Direct/Indirect Fire Mortar (ADIM) (6.3)
- Extended Range Projectile Technology Research (6.2)

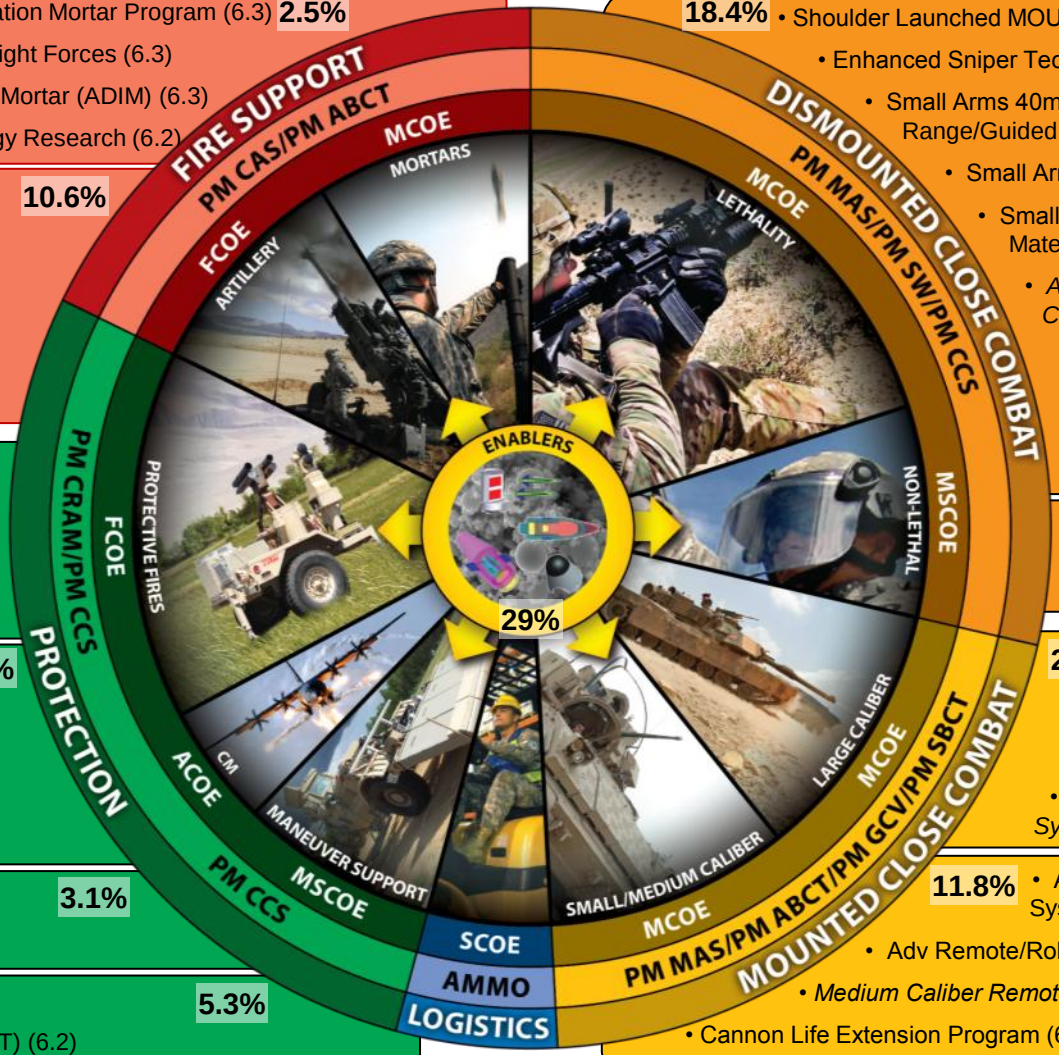
10.6%
- Cluster Munitions Replacement (6.3)
- *Extended Range Munition Integration (Artillery)* (6.3)
- *Extended Range Indirect Fire Weapon (6.2/6.3)*
- *Collaborative Engagement Munitions (6.2)*

6.1%
- Extended Area Protection & Survivability (EAPS) (6.3)
- Integrated Fixed/Mobile Close-in Counter UAS (6.3)
- *Squad CUAS (6.2/6.3)*

3.3%
- Integrated Base Defense Hostile Protection System (6.3)
- *Next Generation Ground Based Scalable Munitions (6.2)*
- Solid State Active Denial Technology (SS-ADT) (6.3)

3.1%
- Tunable Pyrotechnics (6.2/6.3)
- Counter-counter measures (6.2)

5.3%
- Wall Breaching (6.3)
- IED Neutralization Technology (IEDNT) (6.2)
- *Explosive Hazard Predetonation System (6.3)*
- *Explosive Detection Technology Integration (6.3)*
- *Area Clearance Capability (6.3)*



18.4%
- Shoulder Launched MOUT/Urban Lethality Technologies (6.3)
- Enhanced Sniper Technologies (6.2/6.3)
- Small Arms 40mm Grenade Precision and Extended Range/Guided (6.2/6.3)
- Small Arms Weapons and Fire Control (6.3)
- Small Arms Technology Concepts & Material/Process Technology (6.2/6.3)
- *Advanced Energy Small Arms Concept Exploration (6.2)*
- *Squad Multi-Role Armament Technologies (6.2)*
- *Integrated Decision Enhancing Capabilities for Fire Control (6.2/6.3)*

4.1%
- *Individual Non-lethal System (INS) (6.2/6.3)*
- *Hand Held Active Denial (6.2/6.3)*

2.8%
- Next Generation Kinetic Energy Cartridge (6.2/6.3)
- *Recoil Reduction Disruptive Technologies (6.2)*
- *Large Caliber Remote Armament System Integration (6.3)*

11.8%
- Advanced Lethality and Accuracy System for Medium Caliber (6.3)
- Adv Remote/Robotic Armament Sys (ARAS) (6.3)
- *Medium Caliber Remote Armament System Integration (6.3)*
- Cannon Life Extension Program (6.7)

3%
- Automated Material Handling (6.3)
- *Total Ammunition Logistics Knowledge (6.3)*
- Explosives Safety for Automated Base Camp Planning (6.2/6.3)
- *Adaptive Packaging (6.3)*

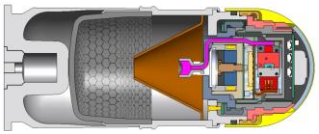
Italics = Future

% represent FY13-19 funding

ARDEC S&T Portfolio
Dismounted Close Combat – Lethality

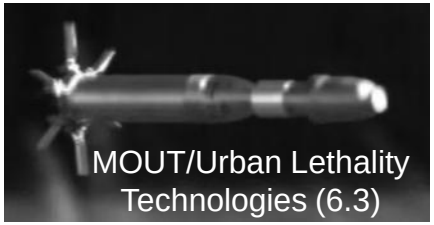
EXAMPLE

NEAR (FY13-16)	MID (FY17-20)	FAR (2021+)

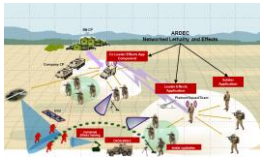


Improved Air Burst Accuracy 40mm LV Grenade (6.3)

Extended Range/Guided 40mm LV Grenade (6.2/6.3)



MOUT/Urban Lethality Technologies (6.3)



Integrated Decision Enhancing Capabilities for Fire Control (6.2/6.3)

OPPORTUNITIES

- Enhancing Squad effectiveness while reducing soldier load: precision, longer range, CUAS
- Technologies that enable affordable precision engagement in 40mm low and high velocity grenades: GNC, terminal guidance, GPS Denied environment, MEMS-based components, embedded on munition sensor/signal processing
- Multi-Purpose Technologies - enable a single munition to engage variable targets and target types
- Technologies that enable the next generation, Soldier-carried weapon system that will be lightweight, multi-functional, mission-configurable, and effective against exposed and defilade targets out to extended ranges

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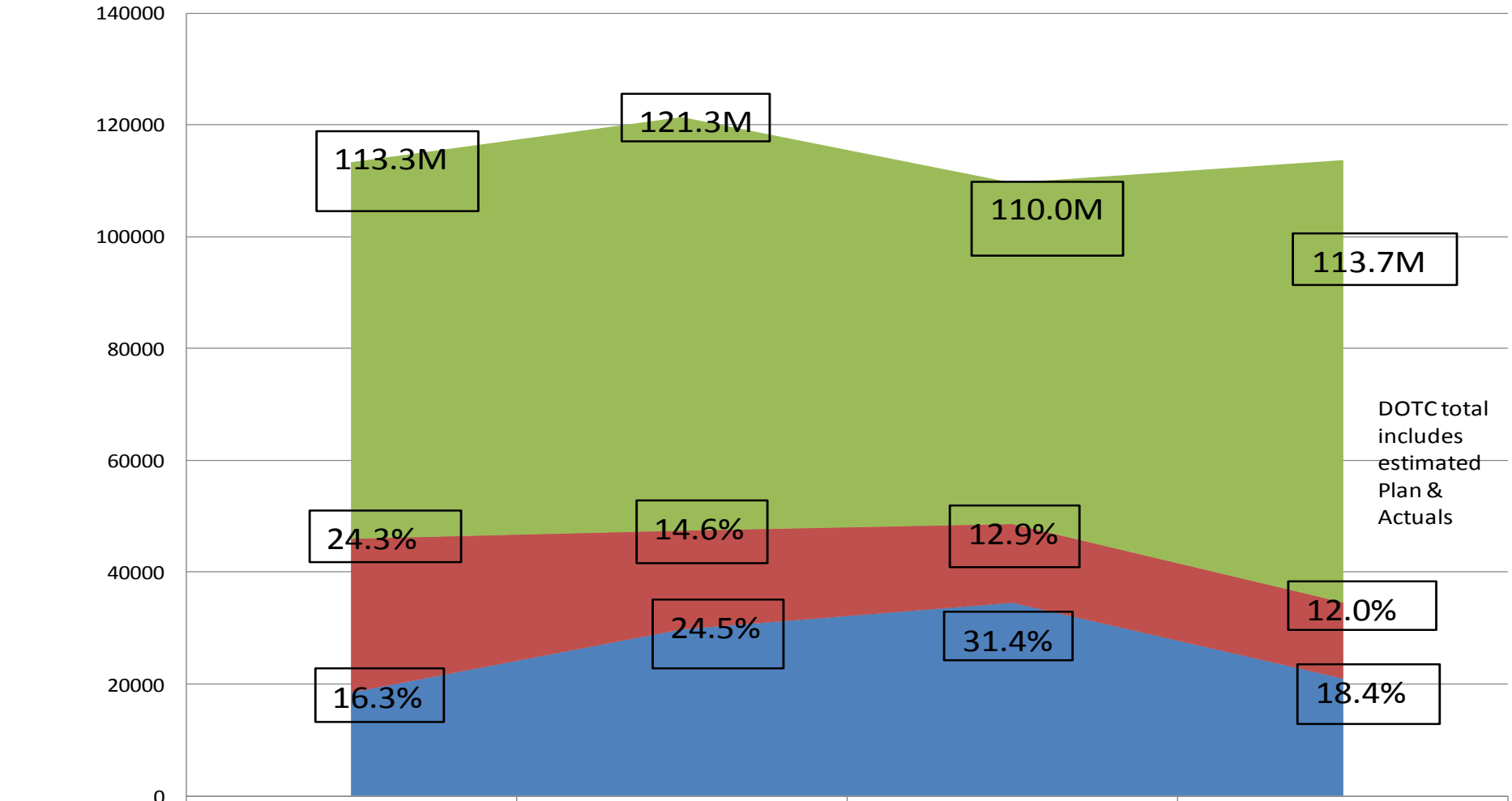
Science & Technology Funding Trends

S&T (6.2, 6.3 & ManTech) Historical Trends

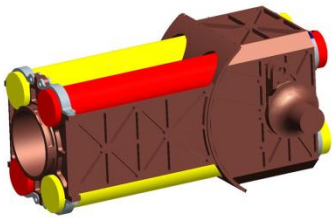


	FY11	FY12	FY13*	FY14*
In-house/OGA	67336	73978	61036	79132
Other Contracts	27535	17687	14129	13651
DOTC	18441	29729	34475	20,918

Extended Range Cannon Artillery (ERCA): Systems Approach

Utilizing a systematic, system of systems, approach to provide range extension, weight reduction, accuracy improvement, and improved rates of fire for 155mm artillery.

Advanced Lightweight weapon system



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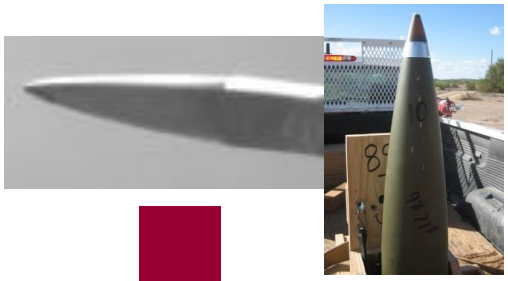
Extended Range Projectile Family



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Novel Propellant Charges

Self-propelled

Towed

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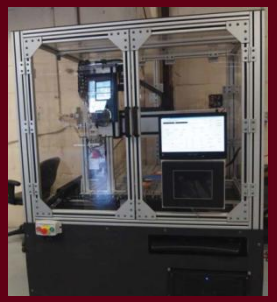
Additive Manufacturing

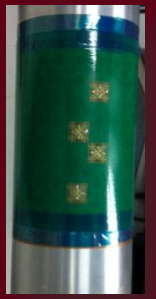
Purpose:

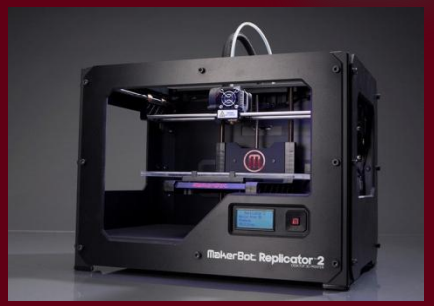
Develop and optimize additive manufacturing systems and materials to enhance Warfighter capability while reducing logistics burden

Focus Areas:

- Nano Materials
- Energetic Materials
- Munitions Optimization
- Weapon System Components
- Real Time R&D Development







Payoff:

- Immediate response to Warfighter need
- Reduce development-to-field timeline
- Reduce logistics trail

Laying the ground work to allow our Warfighter to 'print' needed equipment and capability at the front line…

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Teaming with ARDEC

- **Science & Technology and Manufacturing Technology**
  POC: Joseph Pelino, joseph.pelino.civ@mail.mil
  - **Small Business Innovation Research**
    POC: Carol L'Hommedieu, carol.j.lhommedieu.civ@mail.mil

- **CRADAs/Patent Licenses/Testing Services/Engineering Services**
  POC: Tim Ryan, timothy.s.ryan.civ@mail.mil

- **IR&D Technical Interchange**
  POC: Sylvester Anyanwu, sylvester.o.anyanwu2.civ@mail.mil

- **International Cooperation**
  POC: Lu Ting, lu.ting.civ@mail.mil

- **DOTC**
  POC: Don Geiss, donald.a.geiss.civ@mail.mil
  - **Small Arms Consortium**
    POC: Mike Tauber, michael.j.tauber.civ@mail.mil

Going Forward

- Budgets will remain constrained for the foreseeable future
- Senior Army leadership will continue to play a greater role in dictating RDT&E direction
  - AAE Roadmapping effort
  - Chief of Staff “Force 2025” effort
  - Sequestration & President’s Budget FY15
- Industry partners play a significant role in ARDEC’s S&T program
  - 41% of funding over last 3 years, DOTC efforts increasing
  - Working strategies to increase S&T transition in partnership with industry
- Emerging enabling technologies will play a significant role in how we produce and resource our Warfighter with capability

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Questions?