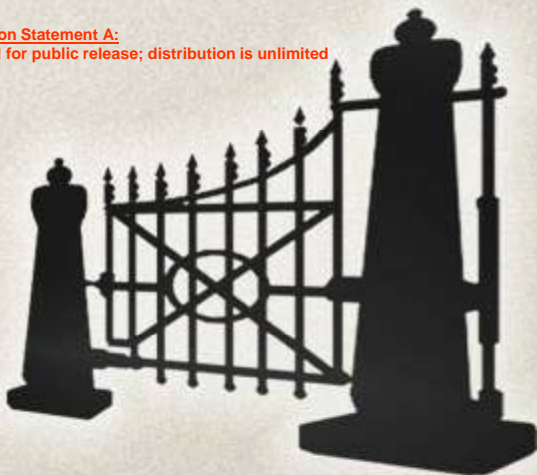


Project Manager Maneuver Ammunition Systems

Precision Strike Association (Affordable Precision Munitions)



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Chris Grassano
Project Manager

9 June 2009





Agenda



Small Caliber

- EXACTO

Medium Caliber

- Programmable Airburst Munition (PABM)
- 40mm Efforts

Large Caliber

- Advanced Kinetic Energy (AKE)
- Advanced Multi-Purpose (AMP)
- Mid-Range Munition (MRM)

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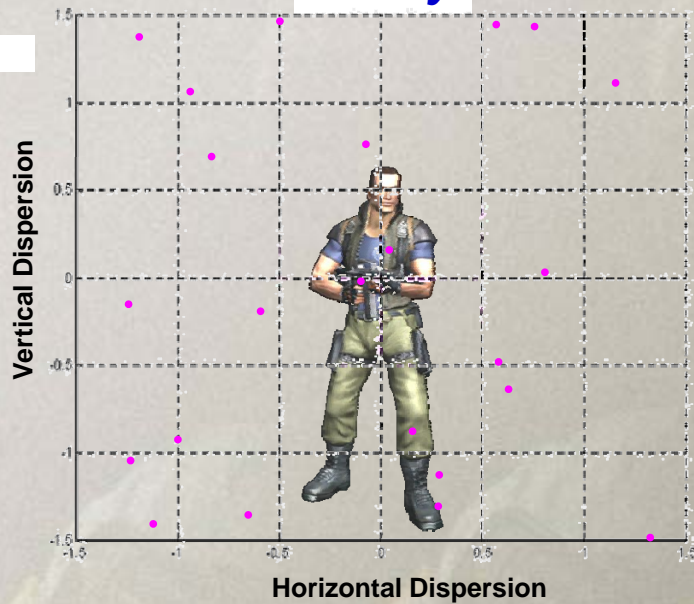
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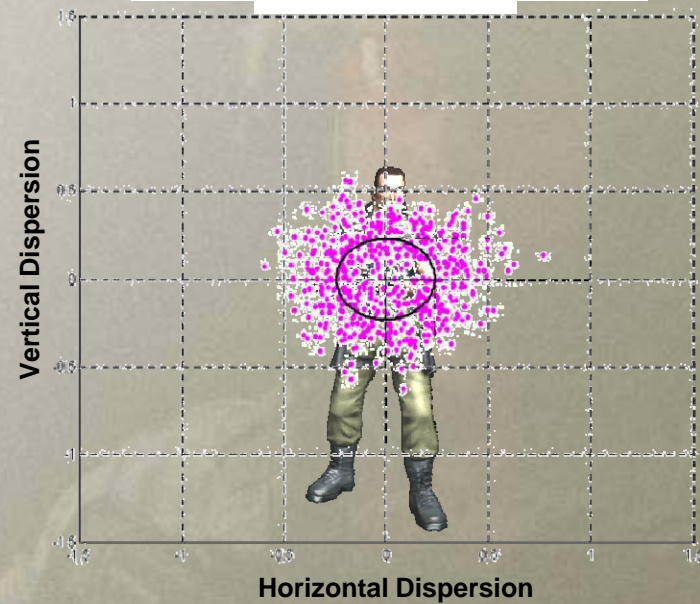
EXACTO (EXtreme ACcuracy Tasked Ordnance)



Today



Tomorrow



Deadly Accuracy at Extreme Range

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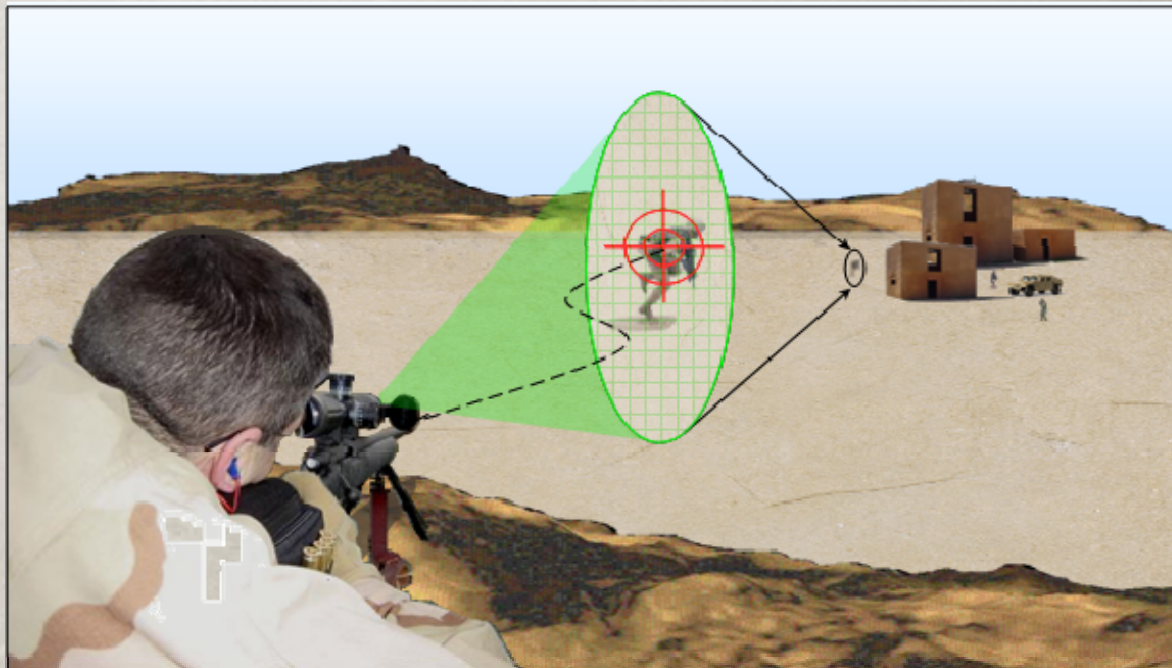


EXACTO Concept



EXACTO is a system composed of:

- An optical guidance system that provides information to direct the projectile to the target regardless of environmental or target perturbations
- An actively-controlled 50-caliber projectile that uses this information for real-time directional flight control



EXACTO delivers high accuracy against moving targets under environmental conditions

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Acquisition Strategy



- **Three phase program:**

Phase I: Component Development, Preliminary Design and Performance Validation

Phase II: System Integration and Prototype Demonstration

Phase III: Operational Assessment/Transition

- **Progression to subsequent program phases contingent on meeting end of phase go/no go criteria and availability of funds**

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Medium Caliber Precision Munitions: Areas of Focus



- **Current Effort: FCS 30mm Programmable Airburst Munition**
- **Potential Future Efforts: 40mm Suite of Munitions**
 - Increased Yield
 - Precision, Steerable Munitions

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Current Efforts: FCS 30mm Programmable Airburst Munition



■ Warhead

- High Explosive Air Burst with Base Mounted Fuze
- Hardened Nose for Performance Against Materiel Targets
- PBXN-5 Explosive
- Zirconium Incendiary

■ Cartridge

- Aluminum Case
- Single Base Propellant
- M36A2 Percussion Primer

■ Fuze Operating Modes

- Point Detonate
- Point Detonate Delay (up to 1 ms)
- **Air Burst**
- Self-Destruct: Detonates at Maximum Mission Time



■ Status:

- PABM-T Fuze Design accepted by Army, Navy working mods
- Joint Qualification Test to Date Resulted in 43% Functional Failures
- Approximately \$1.5M additional required to Achieve >85% Reliability
- FCS program cuts may end this program

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Future Efforts: 40mm Suite of Munitions

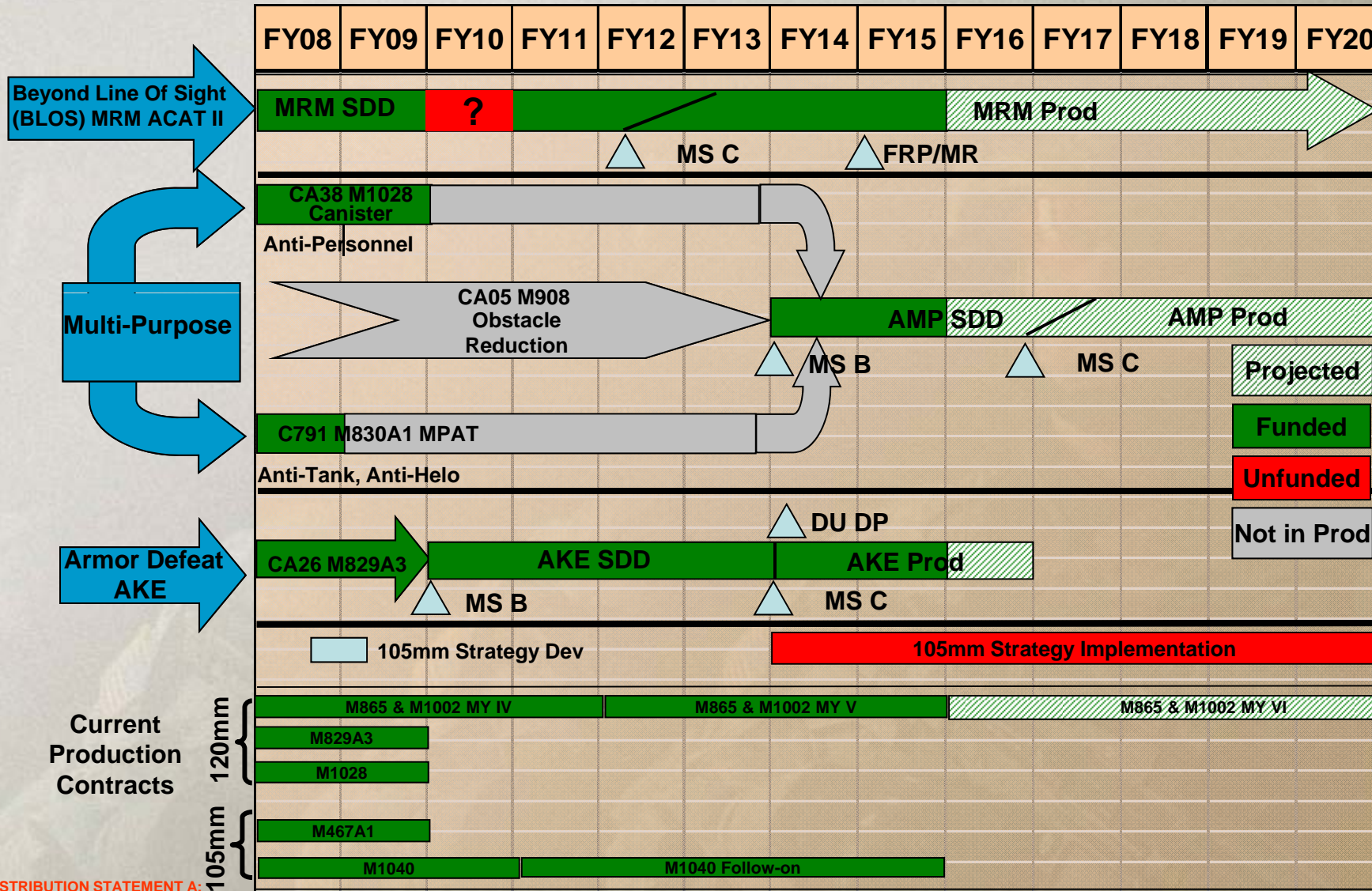


- **BLUF:** There are currently **NO** requirements for 40mm accuracy / lethality improvements...but:
 - Increased explosive yield has been mentioned by soldiers in the field
 - Future Requirements may call for steerable/ guided munitions and associated sighting systems:
 - 40mm rounds have room for micro-electronics
 - New platforms (i.e. M320 GLM) allow for longer rounds





PM-Large Caliber 120mm Ammunition Strategic Capabilities Plan



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M829E4 (AKE) APFSDS-T



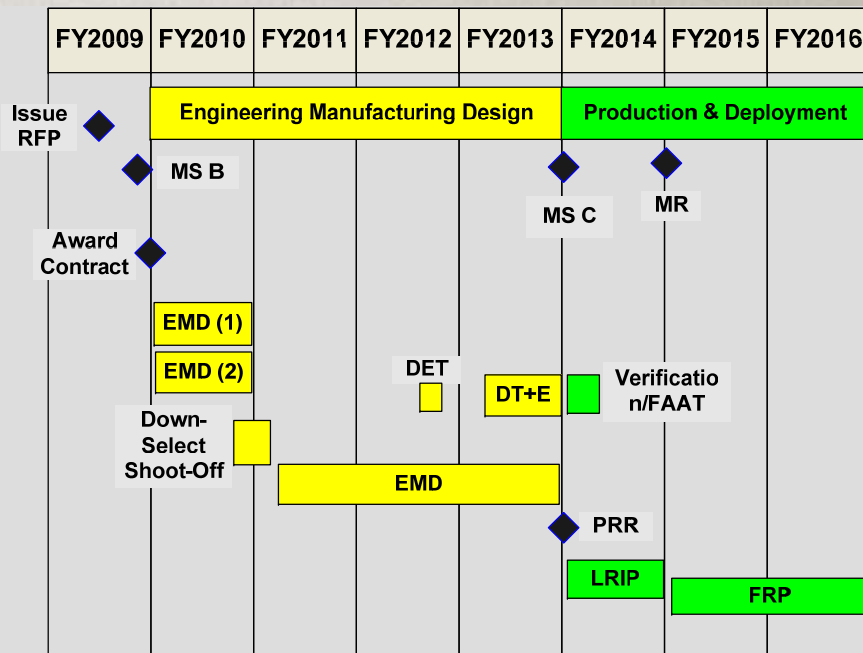
Description & Requirement

- The M829E4 is the 5th Generation 120mm Kinetic Energy Cartridge Developed to Provide the Abrams M1A2 SEP with Heavy Armor Defeat Capabilities
- M829E4 Provides M1A2 the Capability to Engage and Destroy Main Battle Tanks with Advanced ERA at extended ranges

Status/Key Accomplishments

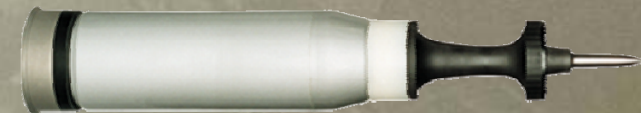
- EMD/ Production Acquisition Prepared
- Draft RFP Released
- Industry Day Complete
- Milestone B Documentation Being Prepared

Top Level Schedule



Acquisition Plan:

- Full & Open Competition to Select Two Phase I EMD Competitors
- Contract is for EMD Phase I (FY10) With Options For EMD Phase II, LRIP, FRP I, FRP II
- Down select Based Upon Shoot-Off & Updated Proposals
- Restrict To Depleted Uranium (AEROJET)



M829E4



AMP 120mm (Advanced Multi Purpose)



Description

- Incorporate the Performance of M908 (Obstacle Reduction), M830 (HEAT), M830A1 (MPAT), and M1028 (Canister) within a Single Cartridge
- Multi-Mode Programmable Fuze
- Reduced Logistic Footprint
- Adds Capability of Engaging Infantry in Open at Significantly Increased Range
- Breach Rebar (Concrete Reinforced Wall)
- Airburst Technology
- Program Start planned for FY14

Requirements

- Defeat ATGM Team
- 30" x50" Hole in Wall
- Bunker Defeat
- Defeat Light Armor BMP with ERA
- Infantry / Anti-Personnel

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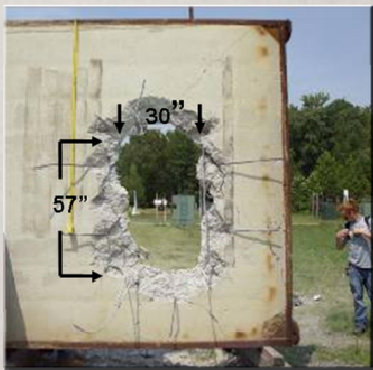
AMP Summary



Bunker Defeated 1 Shot



T-55 Defeated 1 Shot



**Double Reinforced Concrete
Defeated 2 Shots**



Simulated ATGM Defeat

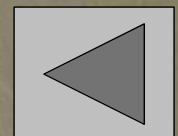


30 Man Platoon Defeated

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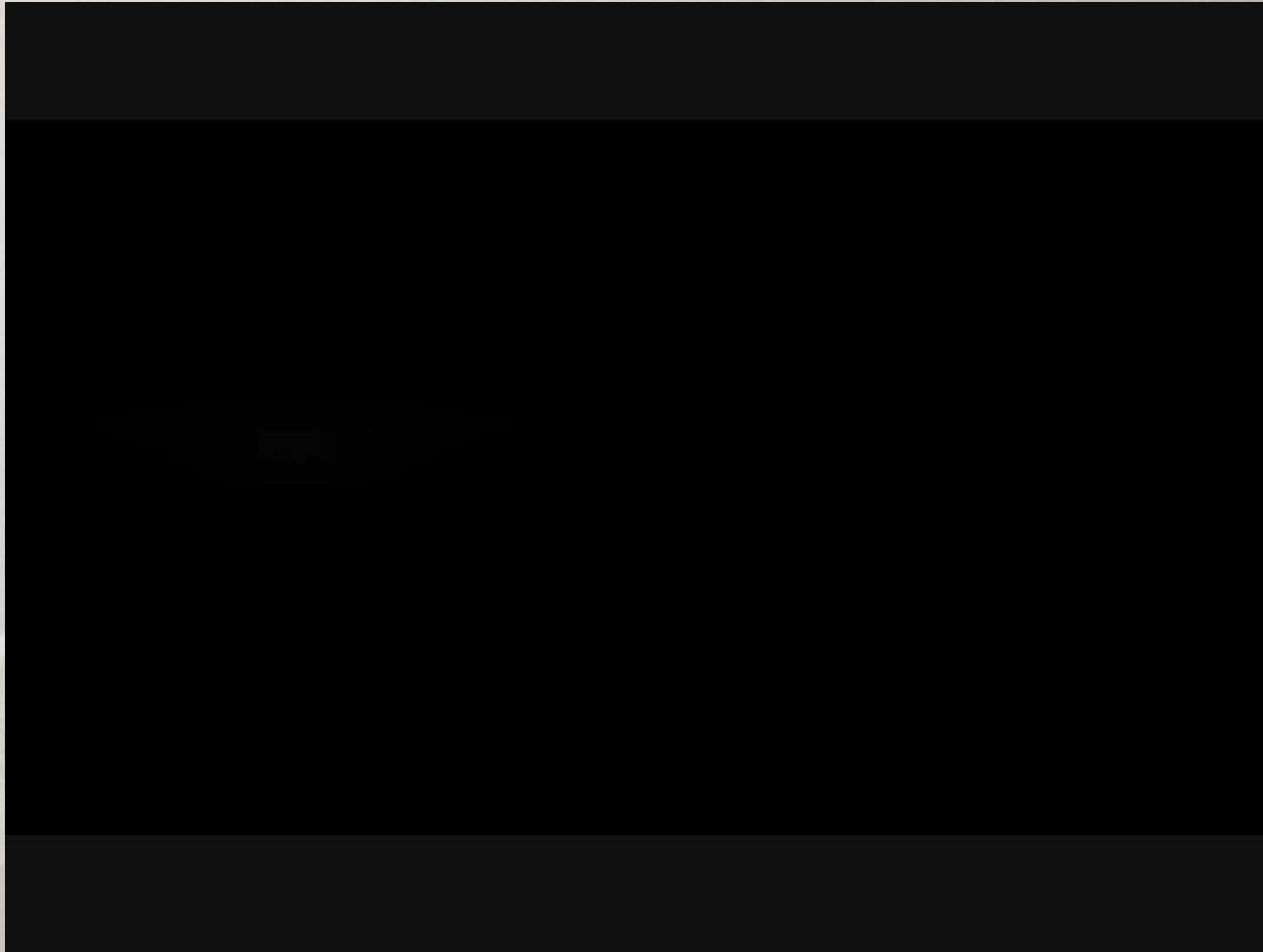
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AMP Video





AMP Video



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Mid Range Munition



Description & Requirement

- Mid Range Munition (MRM) Round is First Generation Fire and Forget Gun-launched Precision-guided Munition
- Materiel Solution For Beyond Line Of Sight (BLOS) Capability Gap
- Originally Developed to Provide Future Combat System (FCS) Mounted Combat System (MCS)
- Current Design Is Interoperable With Abrams
- Provides Capability to Engage & Destroy High Value Moving and Stationary Enemy Targets Throughout Area Of Operations up to 12km
- Dual Mode Gun Launched Precision Munition
 - Semi Active Laser (SAL)
 - Imaging Infra-red (IIR)
- Target set Includes:
 - Main Battle Tanks
 - Light Armor
 - Self-propelled Artillery
 - Air Defense Artillery
 - Earth and Timber Bunkers

Key Accomplishments

- Successful Cartridge Integration Test Dec 08:
 - Fired From Abrams M1A2 SEP
 - Autonomous Shot Using IIR Hit T-72 at 5.2km
 - IIR seeker searched, acquired & tracked
 - No external queuing
- SAL Shot Successful Against Moving T-72 at 8.7km
- Dual Mode Shot (SAL and IIR) Successful Against Stationary T-72 At 5.2km
- Airframe and Propulsion Test Sequences Underway
- Warhead Down-Select Completed



MRM

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Modes of Operation



Three Modes of Operation (Video)

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MRM Video



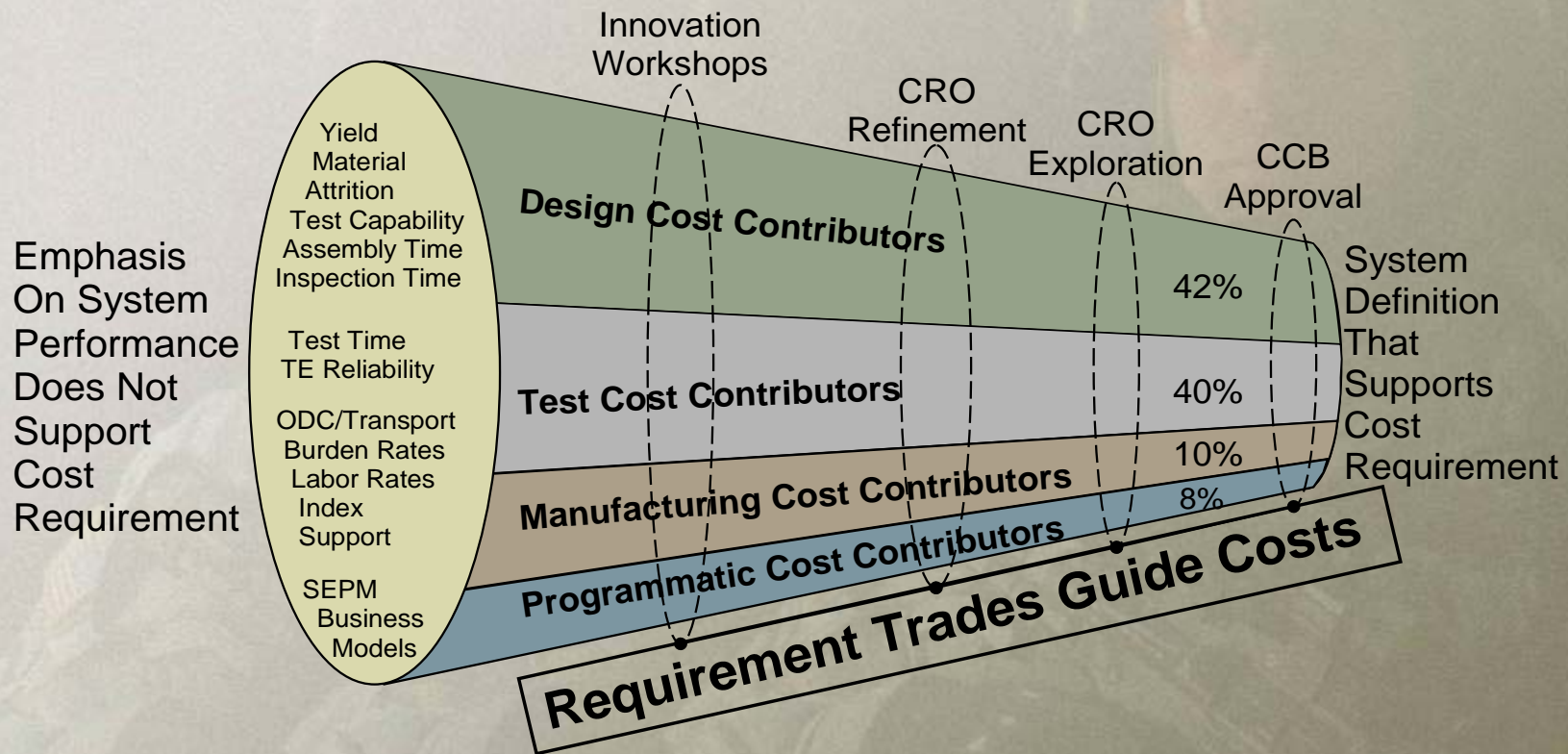
MRM **(Mid Range Munition)** **December 2008**

Autonomous Engagement
5.2km Stationary Target



Affordability

Cost Drivers of the System





Refining Cost Reduction Opportunities



1. Innovation Workshops

Definition of Trade Space & Cost Drivers
1 – 2 Day Focused Idea Generation
Cross Functional With Outside Thinking

2. Refinement Project

Opportunity Worksheet
Cost Model & Performance Model Analysis
IPT Schedule Insertion Roadmap

3. Exploration Project

Targeted Workshop
Prototype Validation
Update Drawing Package
Cost Model Update

Chaos

~ 200 Ideas

Innovation Workshops

~ 20 Ideas

Refinement

~ 2 Ideas

Exploration

ORDER

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Enabling An Affordable Solution



- Know your cost targets
- Document and understand your entire value stream
- Aggressively identify cost reduction opportunities and submit them to the opportunity register
 - Eliminate waste in EMD and LRIP
- Identify requirements that drive cost and flow it back to systems
- Design to eliminate current production rework drivers
- Incorporate Critical Parameter Management to ensure your design is within manufacturing process capability
- Make affordability part of your performance development goals

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MRM Current Situation



- **MRM Program was Initially Funded to Support the Future Combat System (FCS) Mounted Combat System (MCS)**
- **MRM is Required to be Fully Compatible with the Abrams Cannon**
- **An Abrams Capabilities Development Document (CDD) is Currently in Staff which Contains a Key Performance Parameter (KPP) for the Beyond Line of Sight (BLOS) Mission that only MRM can Fulfill**
- **FY10 President's Budget Indicated Zero Funding for MRM**
- **Government Direction Provided to the System Contractor regarding the following:**
 - Reduction of Program Scope
 - Utilize Existing Funding to Work Critical EMD Efforts and Close-Out Activities
- **The Revised Plan will Continue at a Reduced Level at which point the Program will either be Restructured or Terminated**



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Summary



- **Advancing “Precision” Munitions Across Calibers**
 - Providing Improved Capabilities
- **Pursuing Cost Reduction and Affordability**
 - Lean Innovation
- **Committed to Providing the Warfighter with the most Reliable, Lethal and Affordable Ammunition Available**