Henry Kerwien
Scalable Lethality: ‘Dial-a-yield’ approach to greater precision engagement
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Distribution A: Approved for public release.
Scalable Lethality provides more engagement options
  – Improves Weapon Effectiveness
  – Reduces Collateral Damage

Enables Military Operations in Complex Environments (MOUT, Defilade, Wooded Terrain, In the Open)

Applicable to a range of munition calibers (Missiles, Artillery, Medium Caliber)

Requires Integrated Advanced Component Technologies (multi-purpose energetics, reactive materials, advanced fuzing & lethal mechanisms)

Key User-Identified Need
STAR IPT

ARDEC, AMRDEC, ARL & ERDC Core IPT Members
LLNL, AFRL, SNL & China Lake are Shell IPT Members

Demonstration objectives and requirements are coordinated with
USAIC & USFAS, PEO Ammunition, PEO M&S, PM MAS, PM CAS, PM PFRMS

ARDEC
ATO Mgr 30mm
105mm Warheads
Energetics Propulsion
Fuze Systems Analysis

ARL
ATO Mgr Warheads
Energetics Propulsion
Systems Analysis

AMRDEC
250mm Warheads
Energetics Fuze
Systems Analysis

ERDC
Terminal Effects

LLNL, AFRL – Eglin AFB
USFAS
NAWS - China Lake
USAIC

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Engagement in Close Proximity with Low Collateral Risks

Current Munitions

- Collateral Region
- Lethal Region

Scalable Munitions

- Control Collateral Region
- Enhance Lethal Region
- Focused Effect
- Large/Small Area Effect

Provides Increased Effectiveness with Reduced Logistics
How We Achieve Scalable Lethality

- Scalable Explosives (Energetic Materials)
- Controlled Fragmentation (Lethal Mechanisms & Fuze)
- Combined Effects (Blast & Fragment)

Scalable Lethality

Effectiveness Assumes Precision Delivered
How We Achieve Scalable Lethality

Advanced Energetics
- Combined Effects/Scalable Explosives
- Reactive Materials – IM Performance & Increased Controlled Energy Output
- Dual Purpose Energetics/Rocket Assist

Warheads
- Directional/Selective/Preformed Fragmentation
- Liners/Composites
- Reactive Materials - Output Energy, IM Compatibility, Reactive & Consumable Fragments

Fuze & Power
- Height of Burst Algorithms (HOB)
- Initiation Train
- Hybrid Power Sources/Thermal & Liquid Reserve Batteries

Advanced Propulsion
- Coated Single Base or Hybrid Propellant
- Ballistic Efficiency/Flat Temp Profile
- Increase MV/Range
- Cooler Flame Temp
- Deterrent Migration/Shelf Life/Cost
- Advanced Igniters
Modeling & Simulation to Optimize Effectiveness in the Urban Environment

- **Objective**
  - BLUFOR
  - Forces Level Effectiveness Analysis
    - RDECOM Modeling Architecture for Technology, Research, and Experimentation (MATREX)
      - Virtual Test Bed utilizing ARDEC Armaments Server

  - 85% Fewer Individual Combatant Losses
  - 17% Fewer Aircraft Losses
  - 6% Fewer Ground Platform Losses

  - 154% More OPFOR Individual Combatant Losses
  - 34% More OPFOR Ground Platform Losses
  - 30% More OPFOR Air Defense Losses

- Scalable Lethality Enabled Engagement of Targets in Collateral Damage Sensitive Sites
- Attacks on otherwise protected targets forced relocation of critical OPFOR assets and prevented OPFOR from returning fire
- Destruction of OPFOR Air Defense Systems Enabled BLUFOR Aircraft to Participate in Battle and Identify & Engage Targets

The Entire Force Benefits from Scalable Lethality
All in the Same Weapon

- Warfighter selects lethality based on target type
  - Fragmentation for Personnel & Materiel
  - Blast against Structures
  - Hardened for Penetration of Bunkers & Structures
  - Focused Effects – Point Target

Fragment Types
- Small and/or Big Fragments
- Directional-Focused, Variable Velocity Fragments

Fragments + Blast
- All Blast
- All in 1 round

Dial-A-Yield Capability
- All Blast
- No Fragments
All in the Same Weapon

Capabilities to Demonstrate

250mm (GMLRS)

- Scalable Explosives – Deflagrate-to-Detonate
  - Effective against structures and personnel in complex environments where collateral damage is a concern

105/155mm Artillery

- Controlled Fragmentation & Blast
- Hardened against Structures
- Advanced Fuzing & Power Sources
  - Effective against structures and personnel in complex environments where collateral damage is a concern

30mmx173mm Medium Cannon Caliber

Demonstrations in 2011
Summary

• Scalable Lethality provides more engagement options
  – Improves Weapon Effectiveness
  – Reduces Collateral Damage

• Enables Military Operations in Complex Environments
  (MOUT, Defilade, Wooded Terrain, In the Open)

• Applicable to a range of munition calibers
  (Missiles, Artillery, Medium Caliber)

• Integrated Advanced Component Technologies

42% More Effective than Conventional Munitions
Questions

CONTACT INFORMATION

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