AFRL

Fuze Science and Technology Overview

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Ordnance Division

AFRL Munitions Directorate

2021

A World-Wide Enterprise of Researchers

	Employees	Civilian	Military
Total	6,254	5,072	1,182
S&Es	3,611	3,041	570

AFRL/RW
The Munitions Directorate

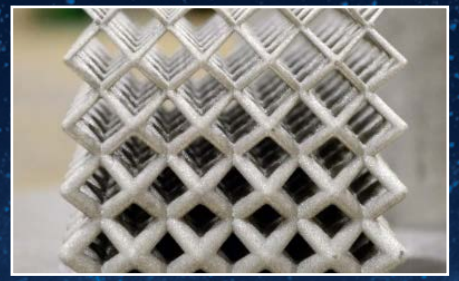
AFRL/RW Mission

Lead the discovery, development, integration, and transition of **affordable** weapons technology, enabling the warfighter to **win across all domains**

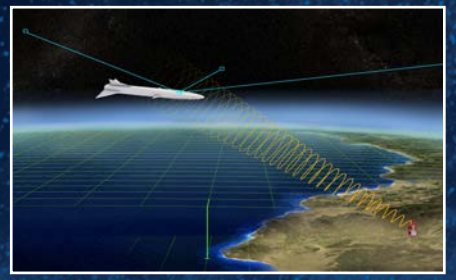
Better Buying Power 3.0:
Achieving Dominant Capabilities through Technical Excellence and Innovation

Our Responsibility to the Warfighter

Develop Superior Weapons Technologies That Are Effective & Affordable



3D Printed Structural Reactive Materials

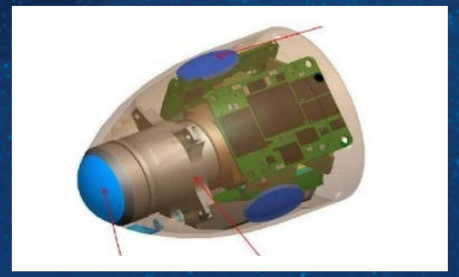


Alternative Navigation

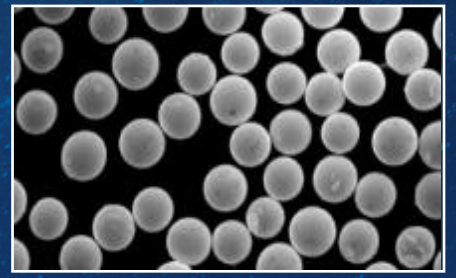
Autonomy / Networked

Selectable / Dialable Effects

Modeling & Simulation

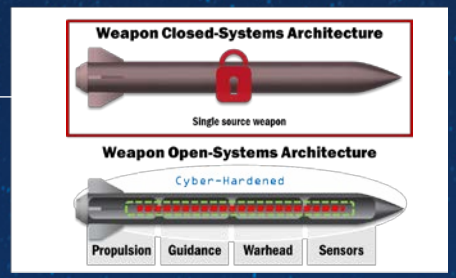


Advanced Seeker Technologies



Advanced Energetics

Stronger, Cost-Effective Metals



System Modularity

Maturing Tech to Give Our Warfighters an Asymmetric Advantage

Key Collaborative Partnerships

OSD(AT&L)

Office of Land Warfare & Munitions

- Joint Munitions Program
- Joint Fuze Tech Program
- Joint Insensitive Munitions Tech Program
- Leveraging Dept. of Energy – NNSA
- Common services challenges

International

- The Technical Cooperation Program
- Program Agreements (PA's)
- International Cooperative Research and Development (ICR&D)
- Coalition Warfare Program (CWP)
- AFOSR Int'l Offices of Aerospace R&D

Industry

- Open and Special BAA
- DEFENSEWERX (Doolittle)
- SBIR/STTR/STMP
- NAC – National Armaments Consortium
- IRAD - Industry Research and Development
- CRADA – Cooperative Research And Development Agreement

Other Gov't Entities

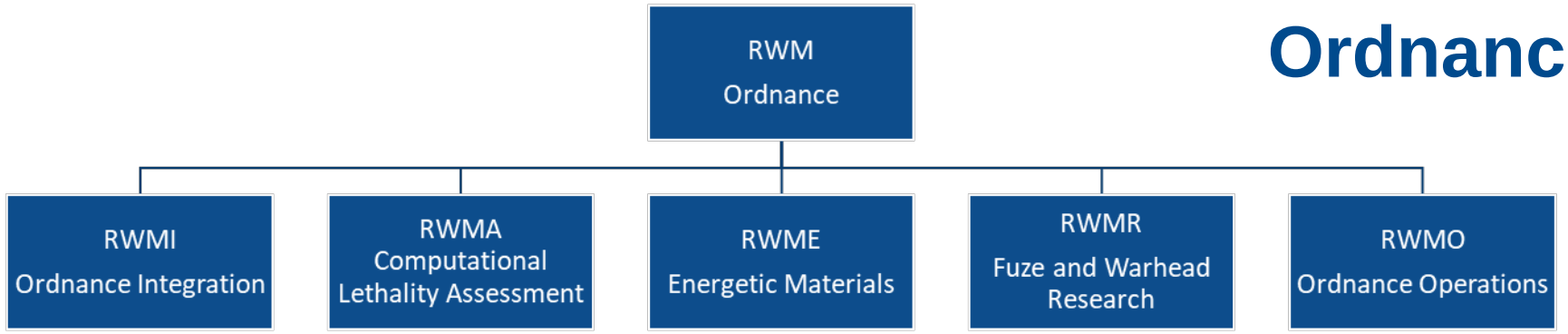
- DARPA
- DoD Labs
- Other
- Communities of Interest (COI)
- Joint Capability Tech Demonstration
- Quick Reaction Support
- Emerging Capability & Prototyping
- POM & Seedling Initiatives
- Joint Service MOA's

Academia

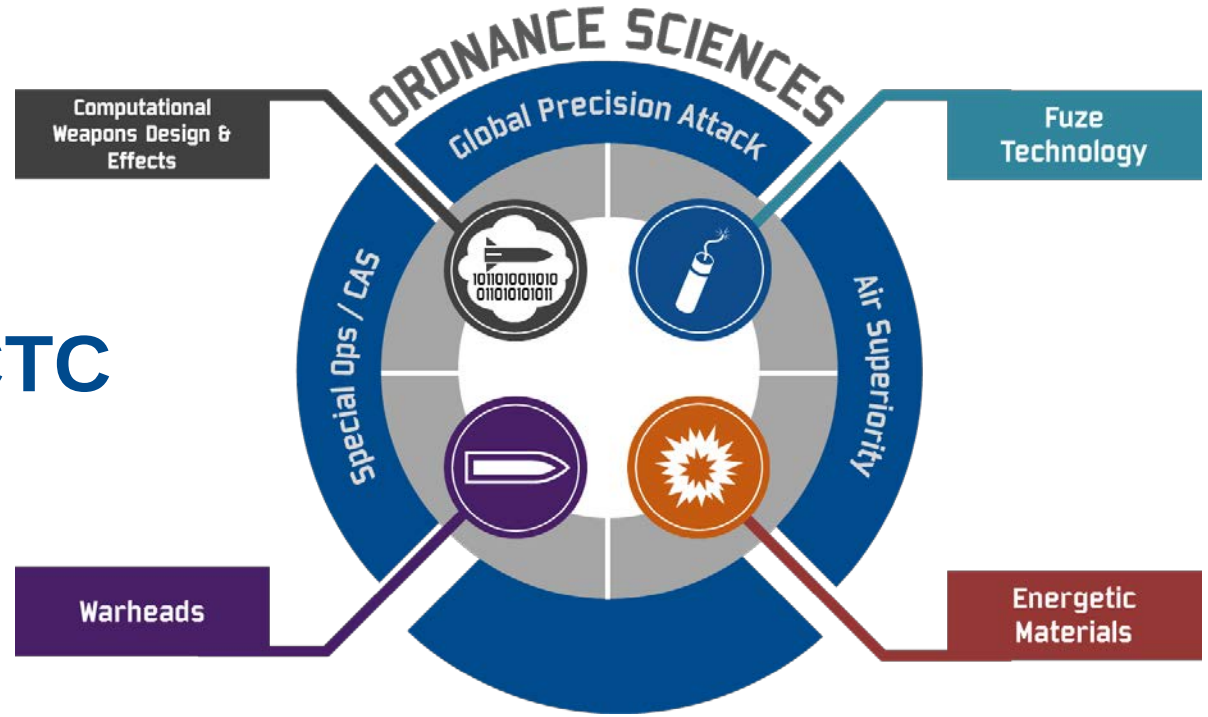
- AFOSR
- UARC- University Affiliated Research Center
- Centers Of Excellence
- Mathematics Modeling and Optimization Inst.
- Summer Faculty Fellowship Program
- SMART – Science, Mathematics & Research for Transformation
- AFRL Science and Technology Fellowship
- AFRL Scholars Program
- STEMM Academy

RWM Integrated Ordnance Fuzes

Ordnance Division (RWM)



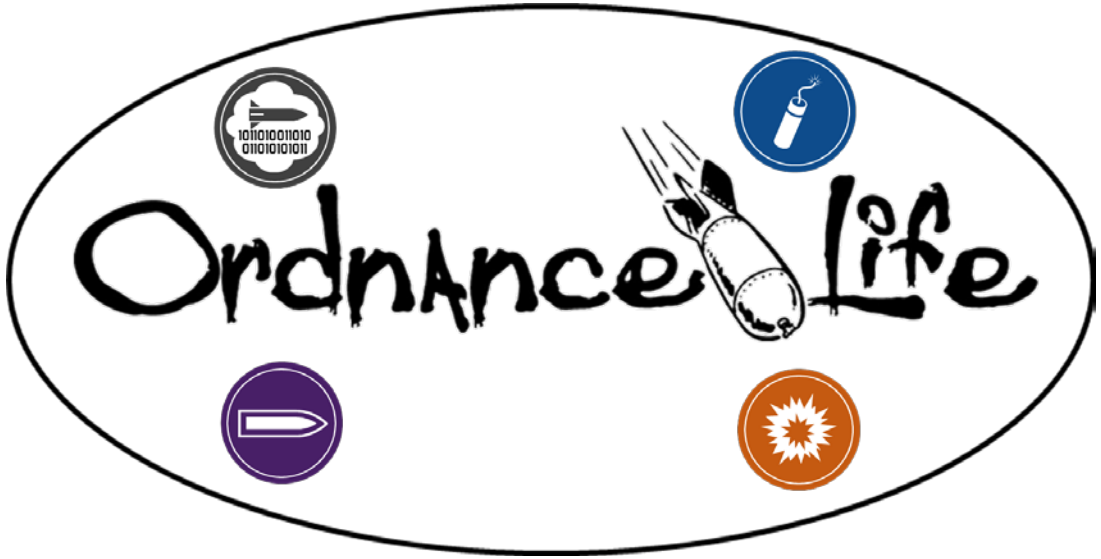
Ordnance Sciences CTC



Delivering Ordnance Technologies for Optimal Kinetic Effects Against a Broad Spectrum of Targets

RWM Technology Area Priorities

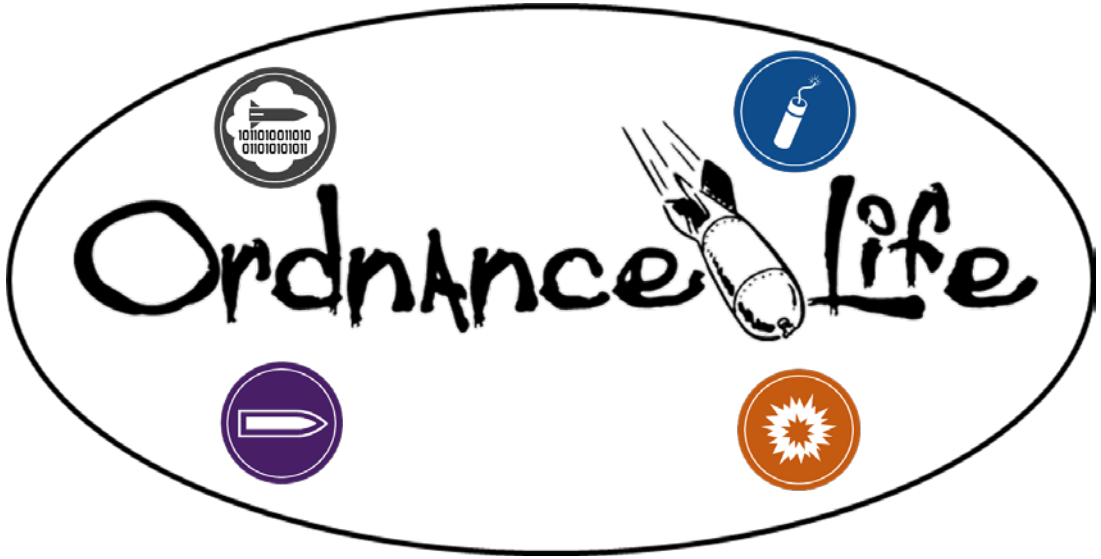
- **Hypersonics**
- **Selectable Effects**
- **Hard Target Defeat**
- **Air-to-Air**
- **Distributed, Collaborative, Cumulative Effects**



Integrated Research Teams

RWM Technology Area Priorities

- Hypersonics
- ~~Selectable Effects~~
- Hard Target Defeat
- ~~Air-to-Air~~
- Distributed, Collaborative, Cumulative Effects
- Emerging Technology



Integrated Research Teams

Fuze S&T Decomposition - Hypersonics

- **Initiation**
  - Initiation characterization of HE formulations
  - High temperature detonator and booster HE
  - Initiation and survivability of Pressed Explosives
- **Multipoint (Forward Modules)**
  - OSD funded JHTO program. SNL collaboration
  - Heavily leverages AFRL Distributed Embedded Fuze Sys (DEFS) Research
  - Focus is a single module that allows for both above and post perforation detonation.
  - Optimized location for survivability, lethality (asymmetric warhead shape), and reliability.
- **Sensors**
  - Proximity Sensor with High Temperature antenna
  - S&A Sensor
- **High Temperature Electronics**

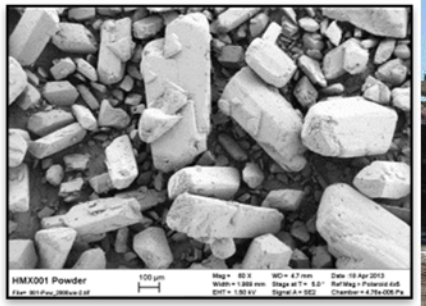
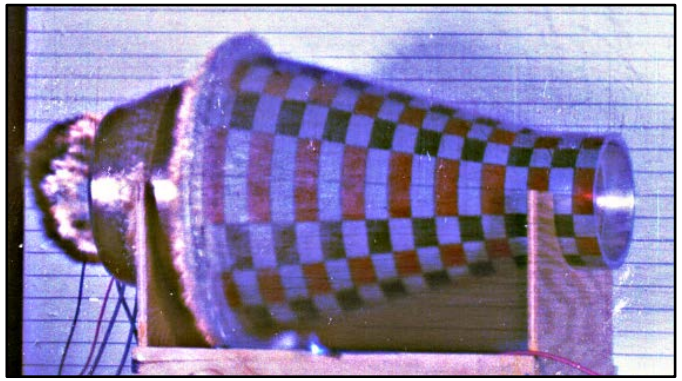


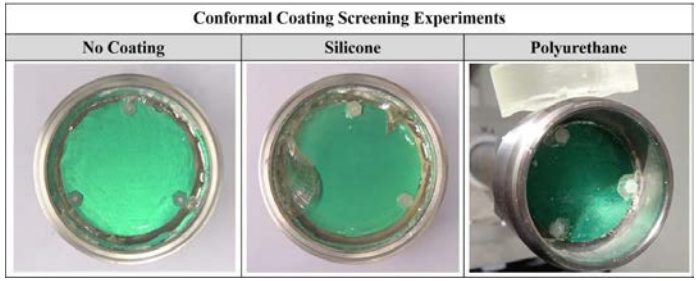
Figure 93: Sled2 Target Impact

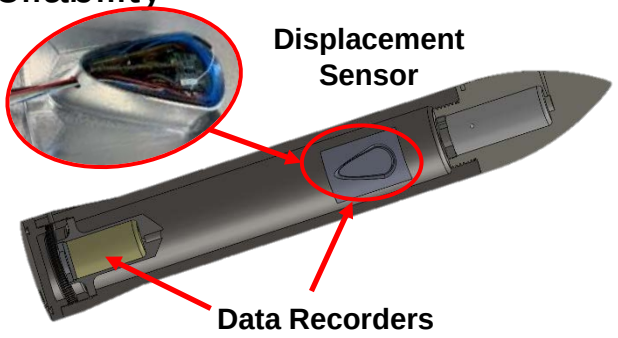
AFRL High Velocity Experimentation Facility

Fuze S&T Decomposition – Hard Target Defeat



- **Initiation**
  - Reliable initiation of advanced formulations (Cast-cure and Pressed)
  - Initiation to detonation in cellular/lattice structured warhead
  - Effective initiation of combined DE/KE mechanisms
- **Multipoint (Forward Modules)**
  - Heavily leverages AFRL DEFS Research
  - Wireless technology to accommodate internal structures and increase reliability
  - Layer/Void detection

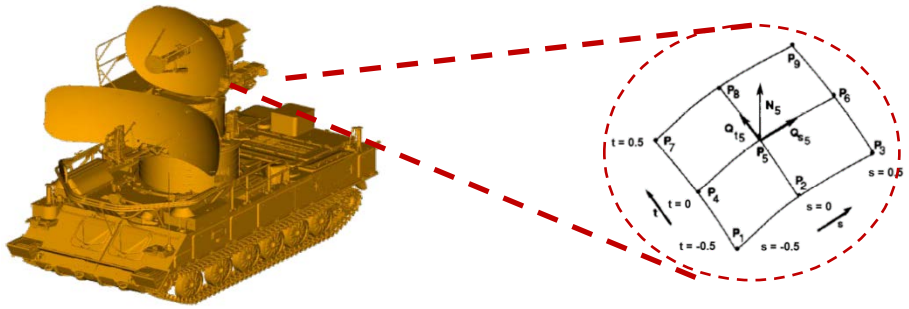




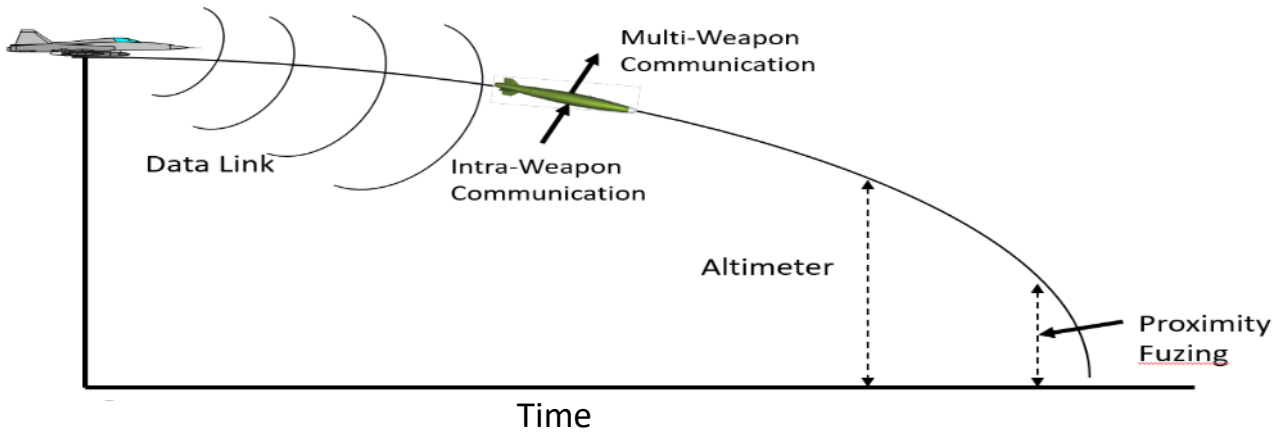
- **Sensors**
  - S&A Sensor
  - Terra sensing (non-inertial or tuned warhead)
  - Health Monitor Salvage

Fuze S&T Decomposition – Distributed, Collaborative, Cumulative Effects

- **Initiation**
  - Miniaturized Firesets
  - Focused Effects



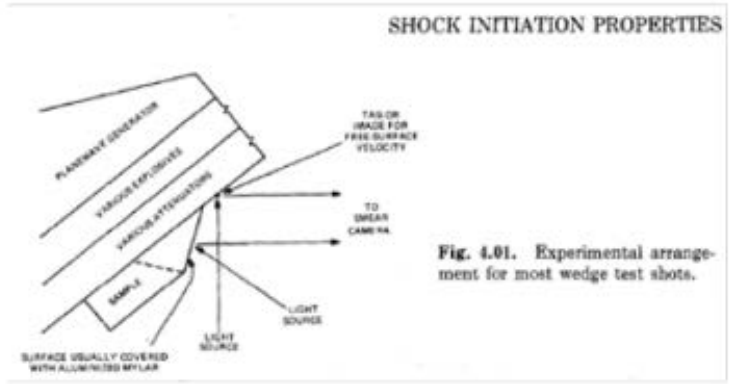
- **RF Communication for Weapon Collaboration and Synchronization**
  - Data Link Radar Suite
  - Guidance Integrated Fuzing



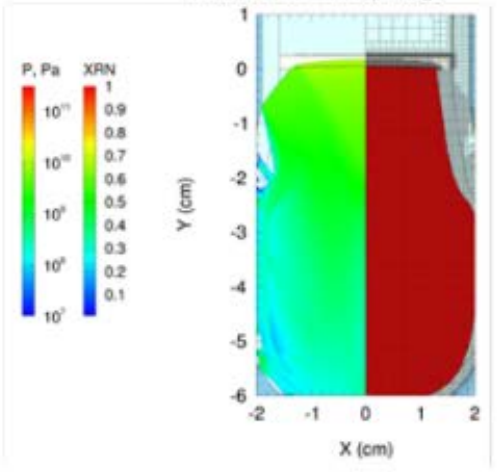
Fuze S&T Decomposition – Emerging and Pervasive Technology

- **Initiation**
  - Scalable and Transportable Explosive Experimental Capability for Economic Formulation Qualification

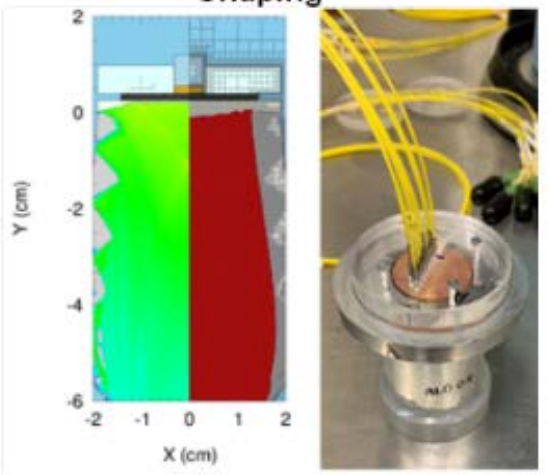
Traditional Explosive Plane Wave Lens



Initial Configuration without Shaping



Optimized Configuration with Shaping



Questions?