



DTRA Counter WMD Technologies

Fuzing & Instrumentation Technology Overview

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Outline

- **Mission & Campaigns**
- **Requirement for Hard Target Fuzing**
- **Current Fuzing and Instrumentation Technology Thrusts**
- **Summary**



DTRA Mission & Campaigns

Mission:

...reduce the threat to the United States and its allies from Weapons of Mass Destruction (CBRNE) by providing capabilities to reduce, eliminate, and counter the threat, and mitigate its effects.

Functions:

Conduct RDT&E programs...in areas related to WMD and designated advanced weapons to include...WMD-related targets and the entire class of hard and deeply buried facilities.

Campaigns:

Campaign 5: Transform the Deterrent - support the COCOMs' ability to hold WMD at risk through offensive means

Objective 5.2.1: ...leverage advances in ...intelligent fuzing... to counter the most difficult targets

Vision:

Develop, test, and demonstrate to the Warfighters reliable and effective solutions to defeat WMD and WMD-related functions protected in Hard and Deeply Buried Targets



Increasing Importance of Hard or Deeply Buried Targets

*“**Underground Facilities. The rising importance of hardened or deeply buried facilities to potential adversarial nations and non-national organizations is becoming more apparent each year. Whether those nations and non-government organizations are classified as **rogue, major, or emerging powers, or terrorist groups**, their critical military, leadership and national security assets are increasingly protected by these facilities. The growth and sophistication of Hard and Deeply Buried Targets (HDBTs) is especially significant among countries whose support for terrorism and potential possession of WMD constitute threats to world peace and U.S. Security... Their new and modified facilities incorporate features that make them more survivable against known U.S. weapons. Moreover, these countries are exporting underground construction techniques, and construction equipment.”***

Source: “Statement for the Record to the Senate Armed Services Committee”, Lt Gen Maples, Director, DIA, 27 February 2007, Page 29



Need for Intelligent Robust Survivable Fuzes

- Intelligence uncertainties
 - Target
 - Layering
 - Material strengths
 - Construction (columns/beams)
 - Location of vital centers
 - Geology
- Optimize detonation location – dependent upon desired effect
 - Minimize collateral damage
- Limitations of time fuzes
 - Uncertainty in weapon & target models makes fuze setting predictions difficult





Hard & Deeply Buried Target (HDBT) Defeat Critical to Counter WMD Mission

- Use of HDBTs is widespread among both hostile states and terrorists to protect WMD and WMD-related functions including:

- Production, storage, research
- Delivery systems
- Command and control
- National/terrorist leadership

**MOST
VALUABLE
ASSETS**



***You can't defeat WMDs, if you
can't defeat HDBTs!!***

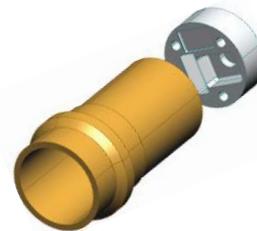
***You can't defeat HDBTs, if the
fuze does not survive!!***





Fuzing and Instrumentation Technology Vision

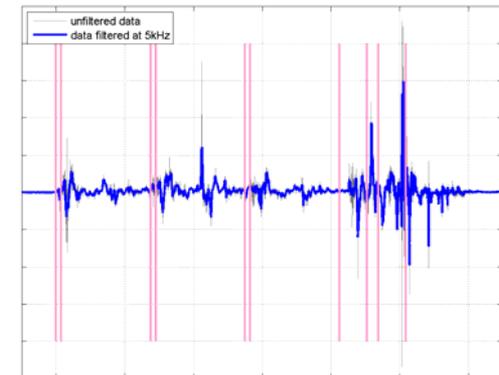
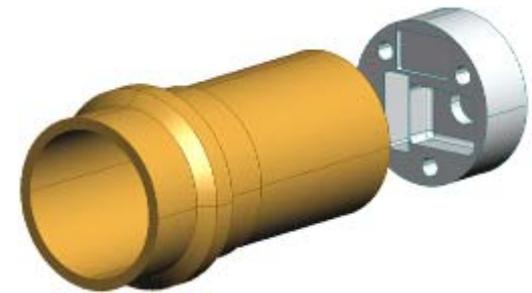
- Develop and demonstrate innovative **SURVIVABLE fuze technologies** to support the defeat of WMD related facilities
- Develop **SURVIVABLE instrumentation packages** to support development of
 - New fuzes
 - BDI technology





DTRA Fuzing and Instrumentation Technology Thrusts

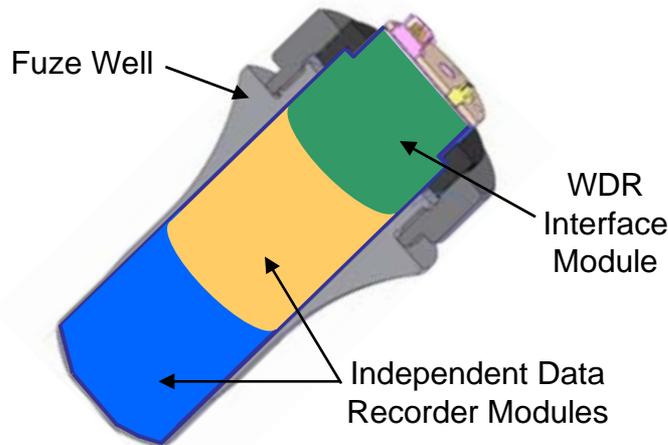
- Fuze Harsh Environment Characterization & Test Support
 - Fundamental understanding of forcing functions on the fuze and fuze components
 - System level aspects being pursued within the larger Community
 - Bottom Line: Need to be able to predict and test the multi-axis loads on fuzes





DTRA Fuzing and Instrumentation Technology Thrusts

- **Recorders for Harsh Environments**
 - OSD Hosted Data Recorder Workshop (Feb 09)
 - Weapon Data Recorder (WDR)
 - ICD Being Developed in FY09
 - Follow-up Workshop Planned for Spring 2010



WDR Features

- 3" Data Recorder Instrumentation Package
- Size & weight of current legacy fuzes
- Standardized Robust/Reliable Interfaces
- Cantilever or Compression Mounted
- Independent Data Recorders
 - Threshold of 2
 - Goal of 3



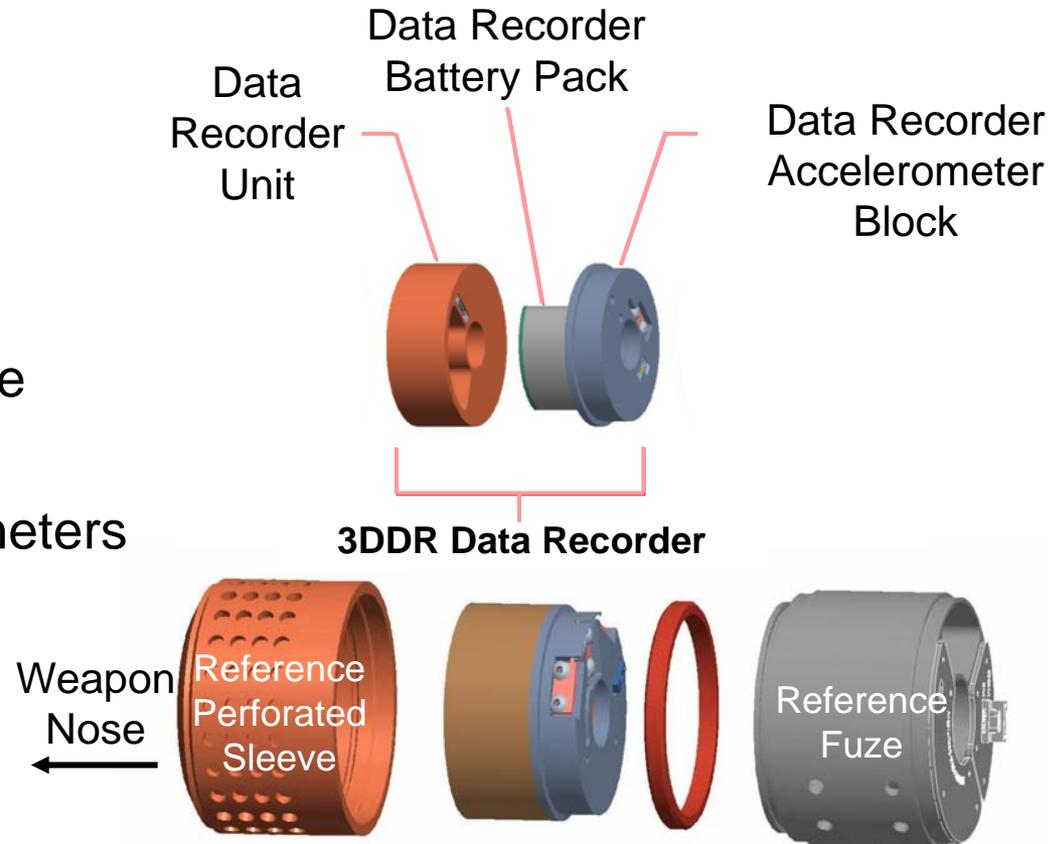
DTRA Fuzing and Instrumentation Technology Thrusts

• Recorders for Harsh Environments (Cont)

• 3-Axis DTRA Data Recorder (3DDR)

Recorder (3DDR)

- Booster Cup Compatible
- 3 Unit Design
- Replaceable Accelerometers



Photos Courtesy of Sandia National Laboratory
Public Releasable: SAND # 2009-0918 P



DTRA Fuzing and Instrumentation Technology Thrusts

- Fuze **Survivability** Thrusts
 - Developing diagnostic fuze post impact module
 - Failure mechanisms of individual components
 - Component mounting techniques
 - Potting material characterization
 - Shock mitigation materials
 - Fuze system design techniques/architectures
 - Engaged in penetration community
 - Transfer functions through the various weapon system interfaces to assess the impact loading on the fuze
 - Explosive fill (live & inert simulate) material properties characterization
 - TCG-XI Concrete Modeling and Simulations Working Group
 - TCG-X and XI Collaboration Effort
 - Improving existing test protocols to increase fuze survivability confidence levels
 - Test beyond weapon system specifications for initial impact conditions
 - Sub-scale multi-axis tests
 - Full-scale multi-layer targets for flight testing



Summary

- Hardened or deeply buried facilities are becoming:
 - More important to potential adversarial nations and non-national organizations
 - Harder to defeat
- Capability to defeat HDBTs is critical to Counter-WMD mission
 - Fuze survivability is essential to defeating HDBTs
 - Smart post-impact burst point control required
- Fuze harsh environment characterization is essential
 - Predictive capability for fuze/fuze component survivability
 - Development of robust sub-scale multi-axis test protocol
 - Defining robust full-scale tests compatible with limited resources
- Focused on fuze & instrumentation survivability in harsh environments
 - Developing diagnostic fuze post impact module
 - Engaged in penetration community to work system level issues