

UNCLASSIFIED



**RDECOM**



*Cluster Munitions Replacement  
Gun & Missile Symposium*



**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

*Presented by:*

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- Cluster Munitions have come under ever increasing scrutiny for unexploded ordnance (UXO)
- US submunition payloads are classified as Cluster Munitions & required to meet a <1% UXO rate by 2018
- “Legacy” cannon fire Cluster Munitions in inventory not compliant
- Retrofit Self-Destruct Fuzing Technology has not been able to reach <1% UXO in current systems
- Monitor Domestic & Foreign Policy
- Significant opportunity to provide solutions through maturation of viable technologies





➤ Studies performed to examine CMs role

➤ Conclusions:

- “A **residual capability gap remains** for the attack of area targets even after programmed solutions are applied”

*(TRADOC Cluster Munitions Assessment)*

- “...a need for an alternative to cluster munitions (CM) in the attack of **area targets** and **inaccurately located targets**”

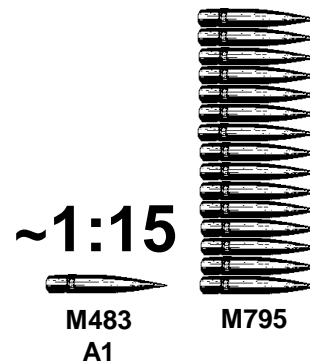
*(CAN 12-17 Materiel Domain Gap 1-n List)*

➤ Recommendations:

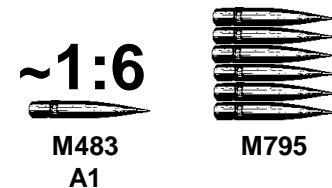
- TRADOC/FCoE recommends developing PRAXIS for 155mm cannon artillery
- Presented to VCSA on 16 February 2010

**Relative Rounds to Defeat:  
CM (M483A1) vs. HE M795**

### Hard Targets



### Soft Targets





| Timetable | FY11 | FY12 | FY13 | FY14 |
|-----------|------|------|------|------|
|-----------|------|------|------|------|

### Program of Record: 155mm CM Replacement



Signed TTA  
4QFY11

Blast Fragmenting Warhead  
*Beginning TRL = 3*  
*Goal TRL = 6*  
 Metric: 90% lethal area of M483 Payload



IM Booster Design & Test  
 Initial Arena & Lethality Tests



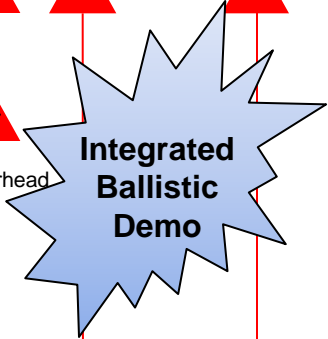
Initial IM Analysis  
 Baseline Testing & Design Optimization



Producibility Study  
 Lethality Verification



Live Warhead



Dispense/Stabilization System  
*Beginning TRL = 3*  
*Goal TRL = 6*  
 Metric: 50m Radius of Dispersion (Payload)



Wind Tunnel Testing  
 Helo Drop Test  
 YPG Horizontal Firing



YPG Elev Firings (KTM)  
 D-Fuze Stability Tests



YPG OBR Firings  
 Dispersion Test

Multifunctional Fuze  
*Beginning TRL = 3*  
*Goal TRL = 6*  
 Metric: > 99% Reliability



Explosive Train Tests  
 Helicopter Drop Tests



Static and Ballistic Ejection



Fuze Mode Reliability Tests

Integrated Submunition Payload  
*Beginning TRL = 3*  
*Goal TRL = 6*  
 Metric: < 0.25% UXO, 90% M483 Lethal Area, 4 ≤ & <10 Submunitions, 47.28 lb – Wt.



Initial Ballistic Tests  
 SOD / STADIA f/M483 Comparison



YPG "Quicklook" Test  
 Submunition Integrity & Ejection



Pre-Demo Flight Test



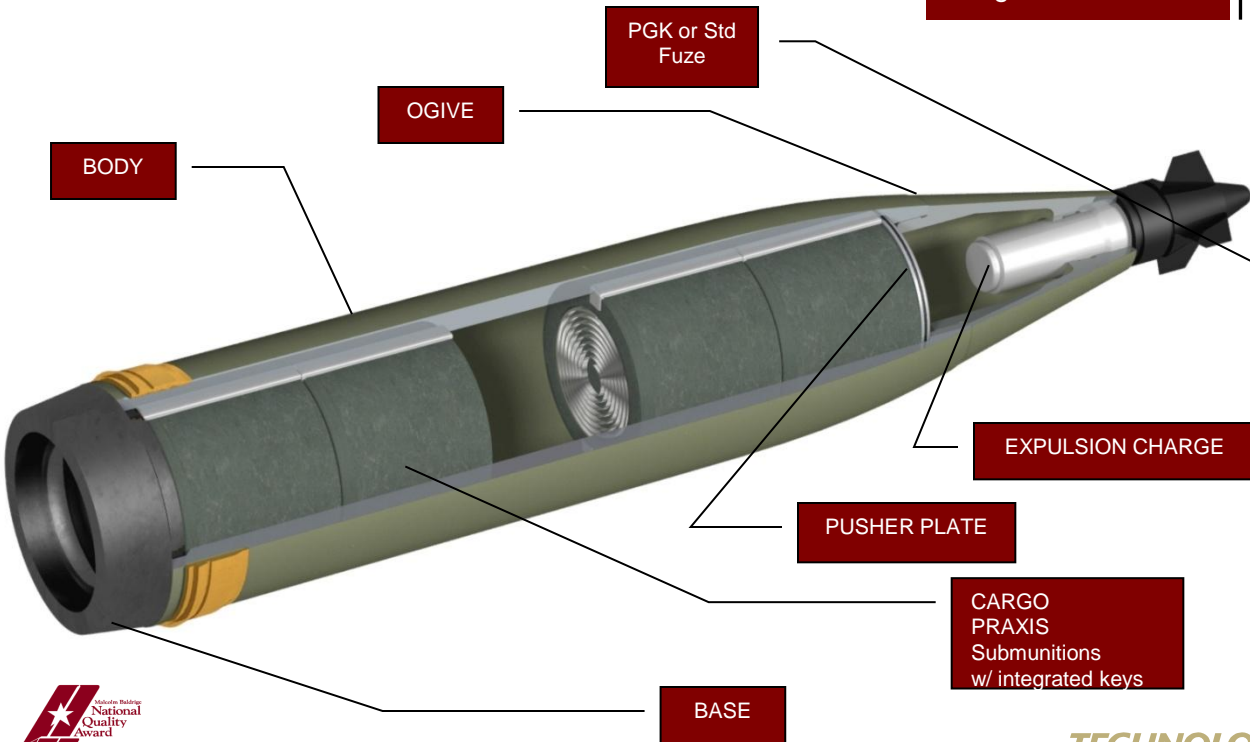
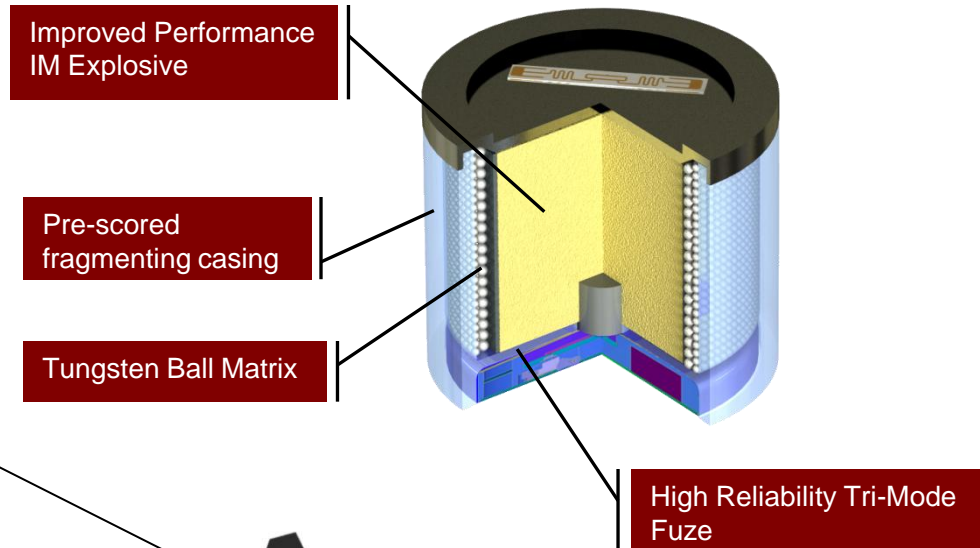
Optimize/Reliability Testing





## PRAXIS features

- Full bore submunition
- Extreme Reliability Tri-Mode Proximity Fuze
  - Proximity
  - Impact
  - Time
- CMR Objective- < 0.25% UXO
- Fired at MACS5
- Reuse existing M483A1 metal parts

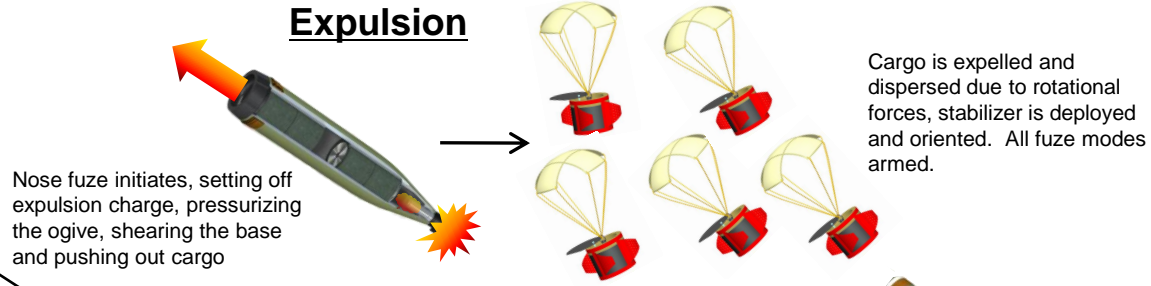




## Projectile Fuzing



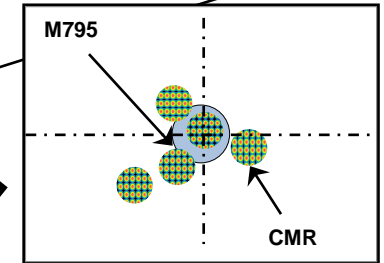
## Expulsion



## Firing

Fire projectile at intended target  
Fully zoneable up to MACS5

22.5 KM Max Range

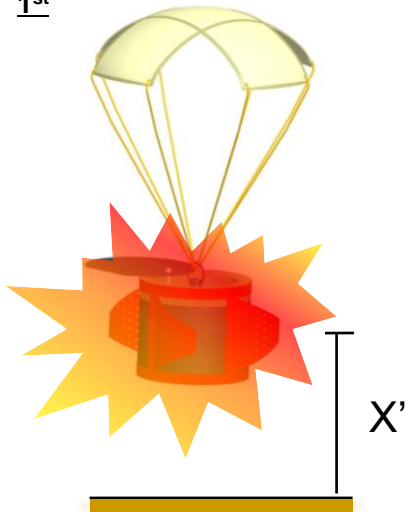




### Fuze Functioning

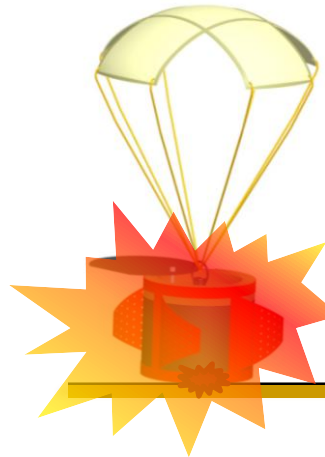
All three fuze functioning modes operate in parallel, removing common point failures.

1<sup>st</sup>



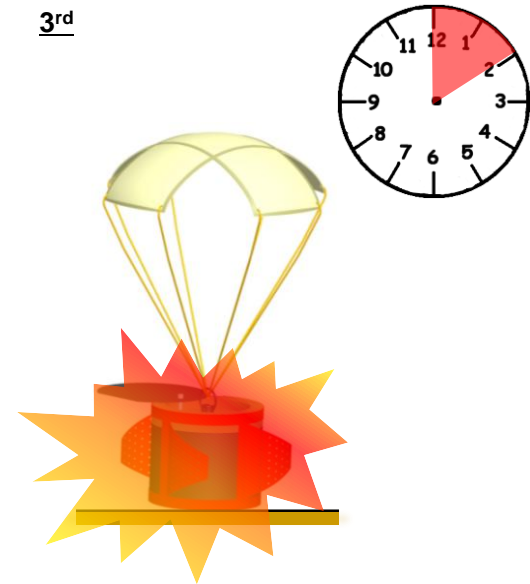
Primary mode is **proximity**, detonating PRAXIS a set distance off the ground

2<sup>nd</sup>



If proximity does not initiate, secondary **impact** mode will detonate PRAXIS

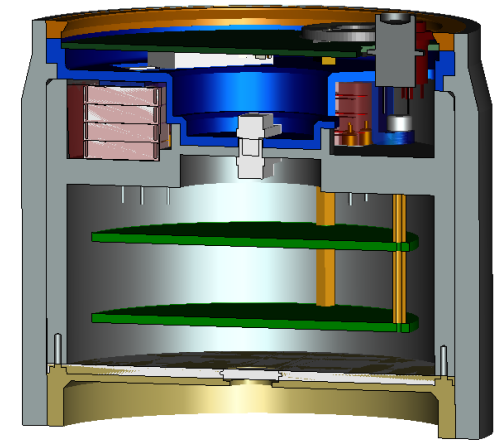
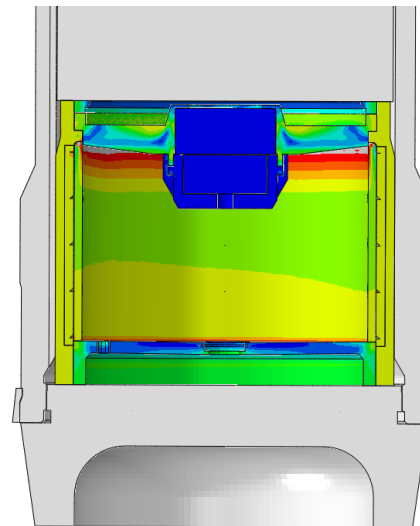
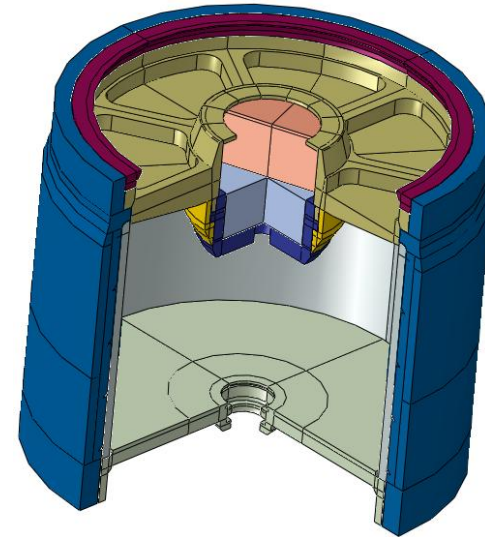
3<sup>rd</sup>



If impact does not initiate, tertiary, **time** mode will detonate PRAXIS after a set amount of time has elapsed



- Fuze will have three modes of functioning in parallel
  - Prevents common point failure
- Will incorporate advanced technologies in new applications while leveraging existing, proven components
- Pursuing risk mitigators in parallel to ARDEC effort
  - Advanced battery work
  - Parallel fuze design

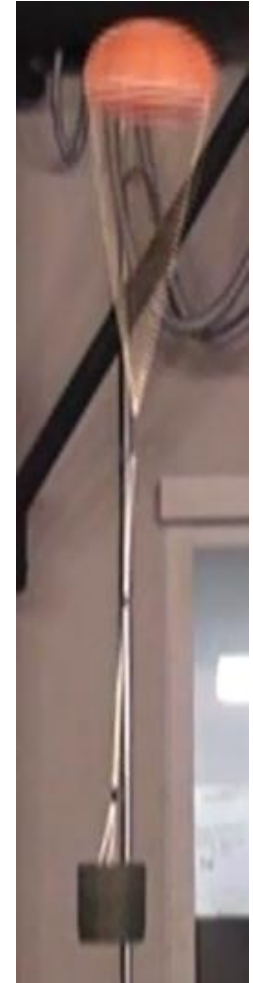
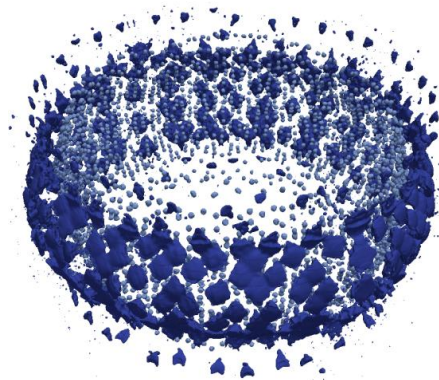
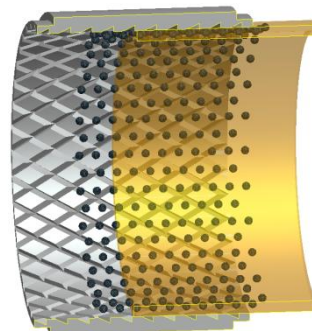
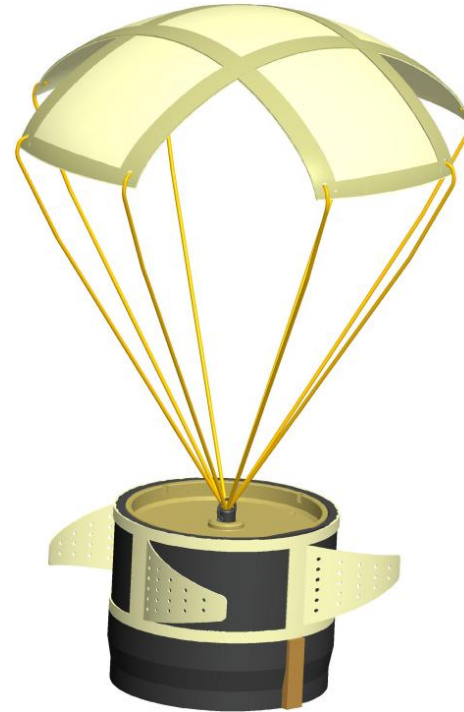


**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**





- Aero will separate, despin and orient submunition
  - Stabilizer, expulsion concepts being refined
- Warhead will address soft to medium targets
  - IM explosives have been selected
  - Testing being conducted on performance
- Solid, structural, fragmentation and fluid dynamic models being utilized
- Solution to fit within existing M483A1 space and weight claim





- In 2018, User will lose Cluster Munitions
- Cluster Munitions still desirable
- ARDEC currently developing a viable solution
- Mature advanced technology while leveraging existing components
- Baseline design backed by extensive M&S
- Component testing underway
- Demonstration tests planned for FY13

