U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – ARMAMENTS CENTER

Fuze S&T Overview at the 62nd NDIA Fuze Conference

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Fuze & Precision Armaments Directorate, Fuze Division

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CCDC-ARMAMENTS CENTER FUZE S&T

Organization

- Army Futures Command
- CCDC-AC and facilities
- Modernization Priorities
- FD Products and S&T Investment Areas

Ongoing Fuze Projects

Changes to Fuze S&T Focus

- Foundational Technologies (6.2)
- S&T Focus Definition Process
- FY20-FY25 Areas of Interest

Collaboration

Individual presentations

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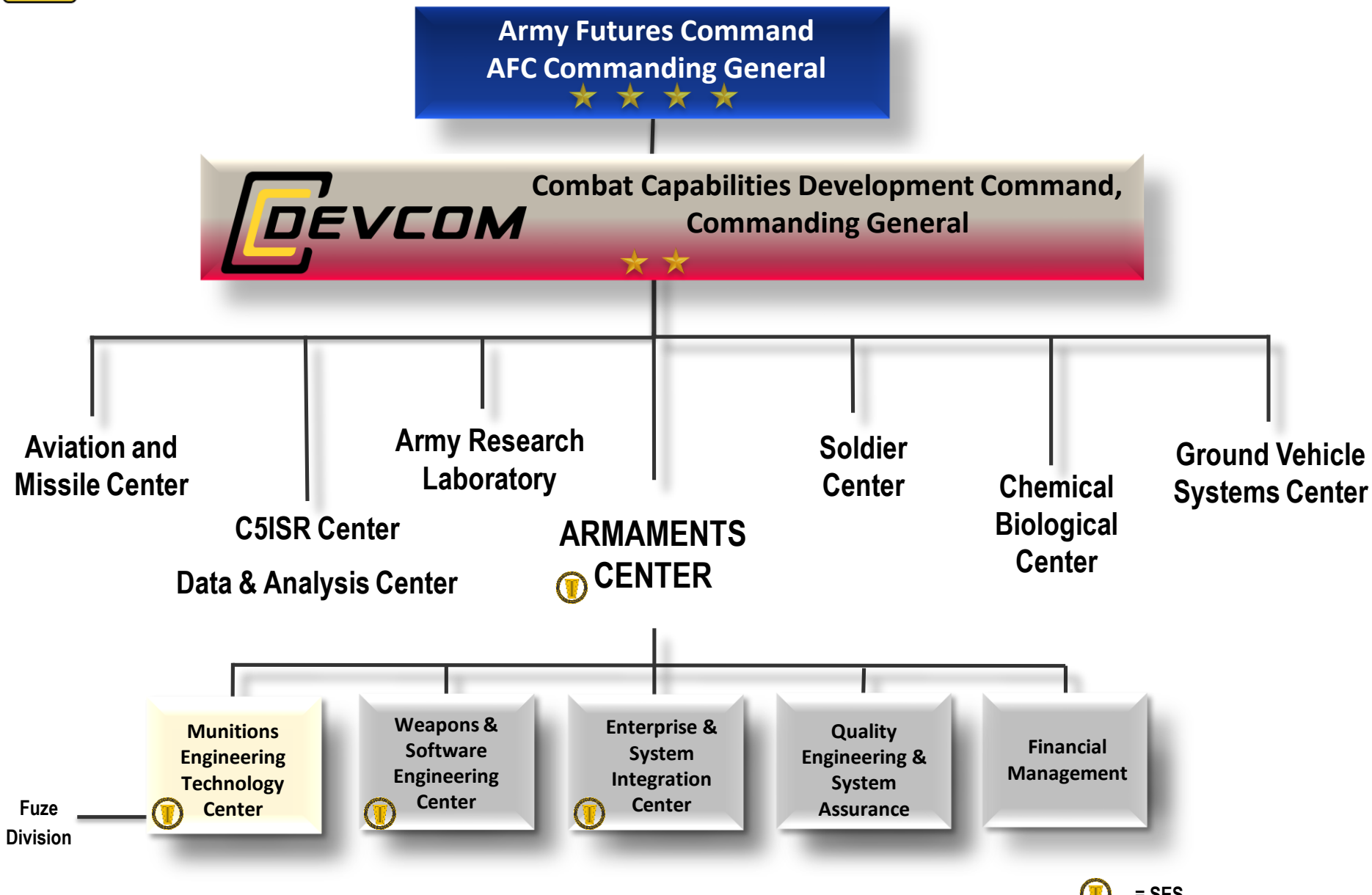
CCDC-AC CHAIN OF COMMAND



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TEAM PICATINNY

Other Tenants

PEO Soldier
PM Soldier Weapons

PEO Ground Combat Systems
PM Ground Combat Vehicle

DCMA - Springfield

Civilian Human Resources Agency

Naval Surface Warfare Center

Marine Corps G Co 2-25

Army Contracting Center – ACC- NJ

Recruiting Northern NJ HQ (Company)

7245th Installation Medical Support Unit

Combat Capabilities Development Command – Armaments Center CCDC-AC

CG/JPEO Armaments & Ammunition

Garrison Commander

- PM CCS
- PM CAS
- PM MAS
- PM TAS
- PM JS
- PM JP

Joint Munition & Lethality LCMC

Office of the Executive Director for Conventional Ammunition O/EDCA

DoD Joint Specialty Site for Guns and Ammunition

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CCDC - ARMAMENTS CENTER

RESEARCH

DEVELOPMENT

PRODUCTION

FIELD SUPPORT

DEMILITARIZATION

Advanced Weapons:

- Line-of-sight (LOS), beyond line-of-sight (BLOS) and non line-of-sight (NLOS) fire
- Scalable effects; non-lethal; directed energy; autonomous weapons.

Ammunition:

- Small, medium, large caliber
- Propellants; explosives; pyrotechnics; warheads; insensitive munitions
- Fuzes
- Logistics; packaging; environmental technologies and explosive ordnance disposal

Fire Control:

Battlefield digitization; embedded system software; aero ballistics and telemetry

"Center of Mass" for Armament Systems and Munitions for Joint Services

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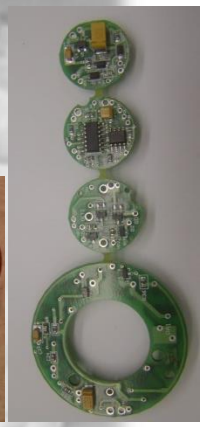
FUZE DIVISION PRODUCTS/PORTFOLIO



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6

WORLD-CLASS FACILITIES

Armament Software Engineering Center

Ballistic Gun Range Complex

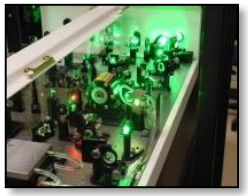
Energetics Synthesis, Formulation and Scale-up Complex

High Performance Propellants Complex

Davidson Warhead Facility

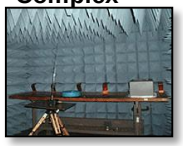
Automated Test Sets Facility

Fuze Development Center



Directed Energy Facility

Electromagnetic Effects Complex



Remote Armaments Facility

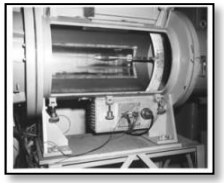
Soft Catch Gun Facility

Our Organic Facilities Enable Integrated Armament System Solutions

Demilitarization Facility

Drop Tower Facility

Non-Destructive Evaluation Facility



Wind Tunnel Facility

Precision Armaments Complex

DoD Joint Packaging, Handling, Storage, and Transportation Complex

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ARMY MODERNIZATION PRIORITIES

- **Cross Functional Teams (CFTs)**
  - **Long Range Precision Fires**
  - **Next Generation Combat Vehicle**
  - **Future Vertical Lift Platforms**
  - **Mobile & Expeditionary Army Network**
  - **Air and Missile Defense**
  - **Soldier Lethality**
- **CFTs: vehicle for sustainable reform of acquisition process**

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FUZE S&T INVESTMENT AREAS

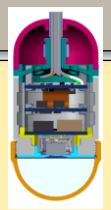
Advanced Fuze Setting
- PIAFS, ePIAFS, iPIK
- Medium Caliber setters

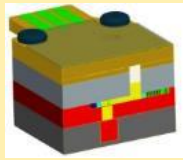

PIAFS


EPIAFS

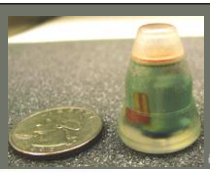

iPIK

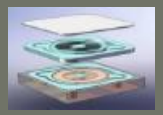
Advanced Warhead Initiation Schemes
- ESAD, miniature and embedded firesets, low-cost multi-point
- Micro-Scale Firetrain (MSF)





Launch and Target Sensing
- Next-Gen Prox and small, low-cost, robust
- G-Switch, Target Media Sensing



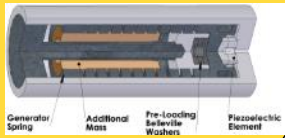



Fuze Decision Logic

Novel Power & Energy
- Thermals, liquid reserve, harvesters

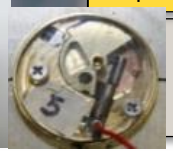
Thermals


Liquid Reserves



Advanced Safe and Arming

MEMS S&A



Rotor S&A

ONGOING FUZE PROJECTS

Emerging & MaturingTechnologies

Gold, 17-G-
Green, 18-G-
Blue, 19-G-

6.2 OSD Joint Fuze Technology Program

- Muzzle Velocity Correction for Medium Caliber, Neeb
- MEMS Stab Detonator, Romaniello
- Flyer-Enabled MEMS S&A, Ziegler
- Net Munition, Zienowicz
- Near Burst Prox Fuze & Range Doppler Tracking Algorithm, BB
- Miniature Setback Generator, Romaniello
- Low Cost Tracking Proximity Sensor, Barton
- Fuze Component Functionality During High-Shock Events, Neeb
- Characterization of Engineered Wood Targets, Ginetto
- Fracture & Damage Mechanisms of LIGA MEMS, Smyth

6.3 OSD Joint Fuze Technology Program

- Target Scene Generator, Cook
- Determination Optimal Potting Hi-G Electronics & Fuzes, Haynes
- MEMS S&A Command Latch, Robinson
- Replacing Lead Azide with DBX-1, Sweterlitsch
- Low-Cost, High-Voltage Power Generation for ESAD, Pirozzi & Khuc
- COTS Accelerometer As Impact Sensor, Scaduto
- MEMS Escapement S&A, Romaniello
- Gun Launch Harvesting for Spin & Nonspin Rounds, Ziegler

AFC-CCDC-Armaments Center S&T Projects & Demonstrations

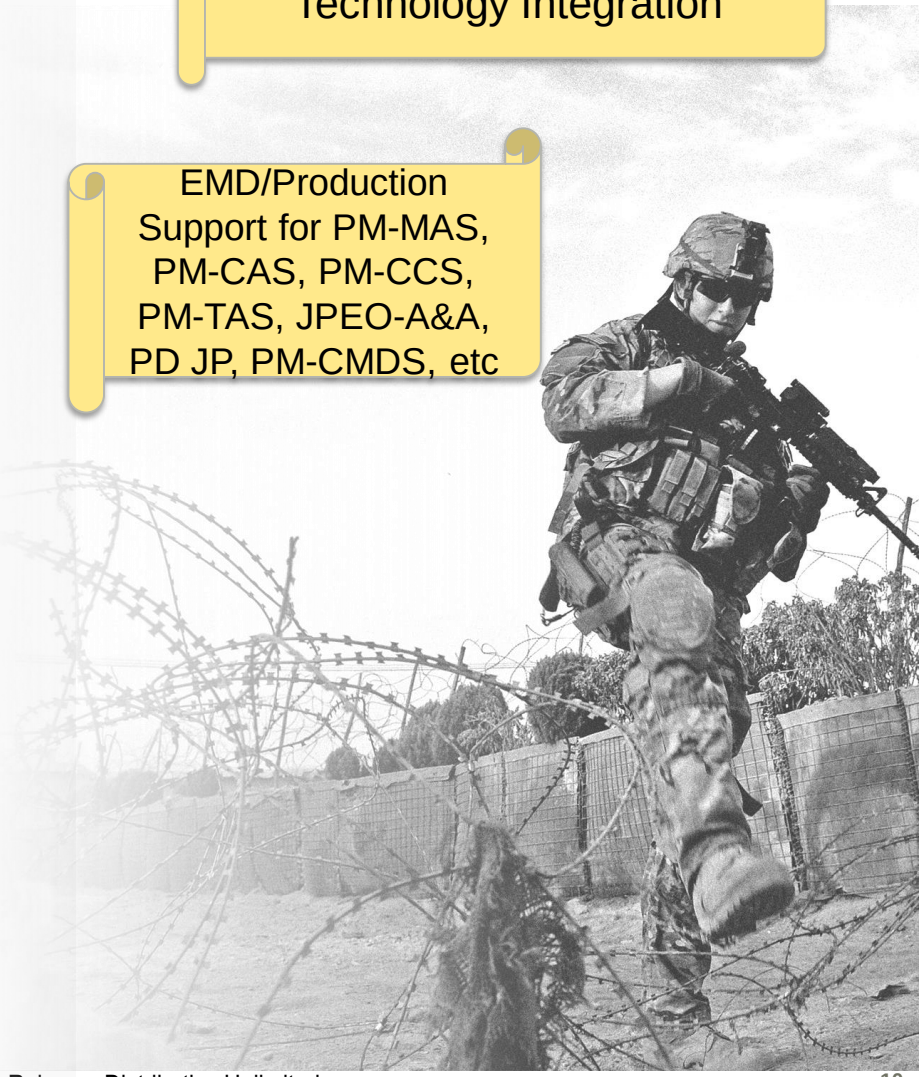
- Fuze & Power Tech Enablers: FEAR, NGS&C, NGLCS and PAM
- Aviation Armaments System Technologies (30mm ask TE)
- Cluster Munitions Replacement Technology
- XM1166 HEAB
- Fuze & Power Technology Enablers for Munitions

6.7 Fuze Technology Integration Efforts

- M734A1 Electronics Upgrade
- Replace Obsolete Prox Electronics Components
- M550 Spinlock Redesign
- ESAD Enhancements for Precision Munitions
- Hand Grenade Fuze Improvements
- Power Source Improvements and M734A1 µC Replacement

On-going 6.7 RDTE Fuze Technology Integration

EMD/Production Support for PM-MAS, PM-CAS, PM-CCS, PM-TAS, JPEO-A&A, PD JP, PM-CMDS, etc



FORWARD-LOOKING S&T AREAS OF INTEREST

- Many Point ESADs for Multi-Role Munitions
- Hyper Velocity Fuzing and Power
- Embedded Electronic Fuzing
- MEMS S&A Dynamic End-to-End Model
- Reserve batteries
- Super Capacitor Material Research
- Secure Wireless Data Transmission for Fuze Setting
- Networked Fuzing Architectures
- Low Cost Tracking Proximity Sensors

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ADJUSTED S&T FOCUS

- **FY20-25 S&T "Foundational Technology" 6.2 (applied research) up to TRL5**
  - Technologies that support multiple CFT areas vs. one specific program
  - Address technical high-risk areas unlikely to be worked by industry IR&D
  - Provide a stream of foundational fuze technologies:
    - For munition developers, advanced system demonstrations, and industrial base
    - Avoid investing in proprietary technologies
  - Plausible transition into future 6.3 weapon/munition technology demonstration efforts
- **How Foundational Investment Areas Emerge**
  - CFTs and 6.3 system demonstrations
    - Alignment, balance risk, cost and technology disruption
  - Government/Industry subject matter engagements, both formal and informal

EXEMPLIFYING COLLABORATION

- **Industry to CCDC-AC engagements**
  - Formal IR&D Reviews with CCDC-AC
  - Informal IR&D Reviews with Fuze Division
  - Cooperative Research and Development Agreements (CRADAs)
  - DoD Fuze IPT
- **DOTC**
  - Industry-suggested topics
  - Annual plan feedback
  - Enhanced-whitepaper feedback
  - General Membership Meeting one-on-ones
- **Joint Fuze Technology Program**
- **OGAs**
- **DTIC Reporting**

BRIEFINGS TO FOLLOW:

Presenter/Author	Titles	Session	Time
Jeffrey Fornoff	Unmanned Systems Safety Precepts	OPEN	Tues 3:40pm
Jeffrey Smyth	Exploring High-Strain-Rate Deformation of *Metal MEMS* Using Customized Taylor Anvil Impact Test	OPEN	Tues 4:20pm
Stephen Redington	Prototyping Fuze Electronics for High Reliability Manufacturing	OPEN	Wed 9:00am
Kevin O'Connor & Kevin Aghaei	Drop Testing of LIGA MEMS Parallel Beam, Bi-Stable Latching Mechanisms	OPEN	Wed 11:00am
Laura Ostar-Exel	Development and Testing of Setback Locks for High Reliability in DPICM-XL Grenades	OPEN	Wed 3:20pm
Andrew Warne	Development of Electronics for DPICM-XL Cluster Munitions Replacement Technology	OPEN	Wed 4:00pm

BRIEFINGS TO FOLLOW:

Presenter/Author	Title	Session	Time
Lynne Rider	MEMSAD – Maturing the Technology	CLOSED	Tues 2:20pm
Charles Romaniello	Neyer Testing Results for MEMS S&A Bridgewires	CLOSED	Wed 8:40am
Jason Sweterlitsch	M550 Safe & Arm Redesign	CLOSED	Wed 9:00am
Alex Neeb	Fuze Enhanced Airburst Response (FEAR) for Medium Caliber Munition	CLOSED	Wed 10:20am
Dexter Cook	Target Scene Generator	CLOSED	Wedn 11:00am
Evan Young	CCDC-Armaments Center Fuze S&T	CLOSED	Wed 1:20pm

FUZE S&T NEEDS

How are We going to do it?

- **Foundational Technologies supporting CFT priorities**
- **Partnering and Collaboration**

62nd Fuze Conference

"Fuzing Innovations for Tomorrow's Weapons"

Thank You!!

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