U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND

Innovative Technologies for the Warfighter

BG Vincent Malone
Deputy Commanding General
CCDC
KEY POINTS

- RDECOM transitioned to the Combat Capabilities Development Command (CCDC) under Army Futures Command (AFC) in Feb. 2019

- Within AFC, CCDC will deliver scientific knowledge for future concepts to define requirements; discover, develop and integrate overmatch capabilities Soldiers need; and provide technology and engineering expertise for Combat Systems to deliver for warfighters

- We are maintaining a stable balance of S&T investments across the near, mid and far time horizons to posture the future force, in support of Multi Domain Operations

- Collaboration with industry, academia, DoD labs, and our international allies is essential
...a young company commander looks back to 2018 and thanks the Army’s Leadership for having the courage to reorganize the Army and stand up Army Futures Command because he/she was just part of the last battle of a short, sharp, successful joint campaign against a near-peer nation state.

And the thing that young company commander is most thankful for is that he/she had the tools necessary to dominate in the unforgiving crucible of ground combat and bring every last Soldier home to the families that trust us with the lives of their sons and daughters.
CCDC NATIONAL FOOTPRINT

National reach of supporting locations enables development of materiel solutions
CCDC GLOBAL POSTURE

Enabling Army Modernization Around the World with Our Service Components, Allies and Partners
# ARMY MODERNIZATION PRIORITIES

**CCDC INTEGRATION**

## MODERNIZATION PRIORITIES

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- **Green Circle**: CCDC CFT Lead
- **Yellow Circle**: CCDC Modernization Priority Investment

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**CCDC CFT**

**Lead**

**Priority Investment**
**Army Modernization Priorities**

### Investment Capability Areas

#### Long Range Precision Fires
- Advanced Propulsion
- Extended Range Cannon Artillery
- Precision and Cooperative Weapons (GPS Denied)
- Advanced Seekers

#### Next Gen Combat Vehicles (NGCV)
- Autonomy Architecture
- Lethality Architecture
- Vehicle Protection Architecture
- Power Architecture
- Vehicle Electronic Architecture

#### Future Vertical Lift (FVL)
- Advanced Rotorcraft
- Advanced Teaming for Tactical Aviation Operations
- Air Launched Effects
- Aviation Survivability

#### Network/C3I
- Protected SATCOM
- Cyber Operations
- Electronic Warfare
- Non-Traditional Waveforms
- Network Sensors

#### Air & Missile Defense
- Low Cost Extended Range Air-Defense
- Accurate Rapid Controlled Hybrid Effects Round
- Next Generation Fires Radar Technologies

#### Soldier Lethality
- Next Generation Squad Weapon (NGSW)
- Integrated Visual Augmentation System (IVAS)
- Monitoring & Assessing Soldier Tactical Readiness and Effectiveness (MASTR-E)
- One World Terrain (OWT)
- Live training
AVIATION SYSTEMS
SCIENCE & TECHNOLOGY INVESTMENTS

PLATFORMS
- Structures
- Concept Design & Assessment

MISSION SYSTEMS
- Survivability
- Avionics & Networks

VEHICLE MANAGEMENT & CONTROL AND ROTORS
- Rotors
- Vehicle Management & Control

MAJOR PROGRAM AREAS
- Joint Multi-Role Technology Demonstration
- Degraded Visual Environment – Mitigation
- Air Launched Effects

POWER
- Engines & Other Power Sources
- Drives

AEROMECHANICS AND BASIC RESEARCH
- Computational Aeromechanics
- Experimental Aeromechanics

AUTONOMOUS AND UNMANNED SYSTEMS
- Intelligent Teaming
- Human System Interface
ACTIVE SAFETY DRIVER ASSIST APPLIQUÉ KITS (2015)

- Fault-Tolerant Architectures
- Enable unmanned cargo delivery
- Enhanced Platoon, Squad, and Soldier situational awareness.
- Autonomy augments the Solider

EXTEND THE REACH OF THE WARRIORS (2020)

- Remote Lethality
- Semi-Autonomous Mobility
- Man/Unmanned Teaming Capability on legacy systems
- Autonomy as a force multiplier

MID-TERM CAPABILITIES

- Autonomous Convoy Operations (2020-2025)
- Autonomous System operates as a team member
- Advanced machine learning
- Enable manned and unmanned teaming in both air and ground maneuver through scalable sensors, scalable teaming, Soldier-robot communication, and shared understanding
- Autonomous system operates as team member

FAR-TERM CAPABILITIES

2035

- Combined Arms Maneuver (2030-2035)
- Fully Integrated Kitted Solutions
- Purpose Built Unmanned Platforms

GROUND AUTONOMOUS SYSTEMS STRATEGIC CAPABILITY PROGRESSION

UNCLASSIFIED: Distribution Statement A.
EXTENDED RANGE CANNON ARTILLERY STRATEGIC CAPABILITY PROGRESSION

**Purpose:**
Provide integrated cannon artillery technology solutions to maximize performance at a system level and regain lethality overmatch for U.S. Army 155mm indirect fire systems for operations in emerging battle spaces and near-peer environments.

**Products:**
- Extended Range Armament system consisting of the XM907 Cannon, XM208 Mount and partial autoloader integrated into an M109 platform
- XM1113 Next Generation Rocket Assist Projectile – 70km(O)
- Extended Range Propelling Charge (XM654)
- Proven process for domestic source of High Strength Steel (HSS)
- Government Owned IP

**Payoff:**
- Lethality Overmatch with Extended Artillery Range out to 70km (Increment 1 & 2) and beyond (Increment 3)
- 300% improvement in area coverage for 155mm artillery
- Burst Rate of fire greater than 6-10 rounds per minute
- 30% Range increase for legacy artillery ammunition
- Extended Range Armament demo accelerated by 4 years
- Presents Early Program Risk Reduction and Transition Options
  - Armament to PM-SPHS
  - Super Charge to PM-CAS (Aligns with XM1113 transition)
  - Limited Magazine Auto-Loader

**Schedule**

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**AC working with OSD, FCoE, PEO GCS and PEO AMMO on Accelerated Demos, Transitions, & POM Strategies**
New material/process enabled development of an armor steel with >10% decrease in density

Transition from laboratory to industrial scale processing

Teaming with >20 Defense, Industry, and Academic Institutions

New S&T tools impact near- and long-term Army materiel development

Impact on Legacy Systems

Lighter Metals for CFTs & Army Modernization Priorities

Enabler for Cooperative & Adaptive Protection for MDO
TECHNOLOGY TRANSFER AT CCDC

Enables CCDC to accomplish technology transfer objectives for the warfighter while benefiting U.S. industry

Allows R&D collaborations, product development and testing with industry and academia

Enables industry, academia and other organizations to leverage CCDC’s unique assets: intellectual property portfolio, S&E expertise, and infrastructure

Technology Transfer Summary for FY18

Cooperative Research and Development Agreements

- Newly Executed in FY = 167
- Total Active = 636
  - Large Business ~ 49%
  - Small Business ~ 22%
  - Academia ~ 19%
  - International = 19%

Invention Disclosures and Patenting

- New Inventions Disclosed in FY = 148
- Patent Applications Filed in FY = 169
- Patents Issued in FY = 112
- Total Active Patents = 915

Patent Licenses

- New Patent Licenses in FY = 81
- Total Active Patent Licenses = 115

Other Technology Transfer

- Material Transfer Agreements = 47
- Testing Agreements = 139
- Personnel Exchanges
  - Academia = 25
  - Non-Academia = 11

CCDC transfers technology to the Industrial Base, enabling and accelerating transition to the Warfighter
MECHANISMS TO PARTNER

- Open Campus Initiative (Austin TX, Boston MA, Chicago IL, and Playa Vista CA)
- Cooperative Research and Development Agreements (CRADAs)
- Patent License Agreements (PLA)
- Joint Ownership Agreements (JOA)
- Technology Support Agreements (TSA)
- Engineering Service Agreements (ESA)
- Education Partnership Agreement (EPA)
- Partnership Intermediary Agreement (PIA)
- ManTech Program
- Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)
- Other Transaction Authority (OTA) Contracts
- Broad Agency Announcement (BAAs)

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DISCUSSION