



# ***Maneuver Requirements Division Industry Day 2023 Breakout Sessions***





# Agenda



Capabilities Development & Integration Directorate

- MRD Overview
- Light Systems Branch (Electrification)
- Heavy Systems Branch (Modular Turreted Mortar System)
- Combat Capabilities Branch (CCMS-H, FALCONS, Formation Protection)
- Mounted Mission Command Branch (MCE-FoS)
- Discussion



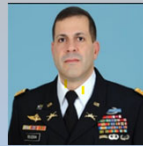
# MRD Mission



Capabilities Development & Integration Directorate

**Mission:** MRD determines and develops operational capabilities and materiel requirements for ground maneuver combat platforms and their ancillary sub-systems to provide our maneuver formations overmatching capabilities to deter or decisively defeat our adversaries.

## Maneuver Requirements Division



Director:  
COL Alexis Rivera



Deputy:  
Mr. Mark Andrews

### Light Systems Branch

- Infantry Squad Vehicle (ISV)\*
- Electric Light Reconnaissance Vehicle (eLRV)
- Tactical & Combat Vehicle Electrification
- CATV/ARCTIC
- MRAP/MATV
- MPF\*

### Heavy Systems Branch

- Abrams
- Bradley
- Stryker
- AMPV
- NGMBT\*
- MTMS

### Combat Capabilities Branch

- Vehicle Protection Suite
- Sensors (IFLIR, LRAS3, FALCONS, ITAS/MITAS)
- TOW/Close Combat Missile System (CCMS-H)
- Ammunition
- Composite Rubber Track (CRT)
- Directed Energy

### Mounted Mission Command Branch

- Mounted Computing Environment
- Joint Battle Command – Platform

\* Denotes efforts in support of other agencies

**Maintain the battlefield primacy of our Soldiers and the formations in which they fight!**



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# ***Light Systems Branch***

Branch Chief: Mr. Tom Stafford

Deputy Branch Chief: Vacant



# Platform Electrification



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## Vision

*“In 10 years, some of our brigade combat teams will be all-electric... that’s a generational change. It’s significant; and we’re going to do it; and we’re going to need industry’s help. There’s plenty of people who say we can’t do it.”*

Mr. Donald Sando, Maneuver Center of Excellence Deputy to the Commanding General, AUSA Annual Meeting October 2017

**Platform Electrification enables the Maneuver force to execute Multi-Domain Operations by conducting semi-independent sustained operations for extended duration with increased tempo over our adversaries**

*Maintain the battlefield primacy of our Soldiers and the formations in which they fight!*



# Tactical and Combat Vehicle Electrification (TaCV-E)



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**TACTICAL AND COMBAT VEHICLE ELECTRIFICATION (TaCV-E)**

CROSS-DOMAIN MANEUVER (CDM) IN SUPPORT OF MULTI-DOMAIN OPERATIONS (MDO) DRIVES THE NEED FOR OPERATIONAL ELECTRIFICATION

**Facilitates execution of Multi-Domain Operations**

- Enhances ability to exploit and re-compete in Close and Deep Maneuver Areas
- Enables independent, expeditionary and deep maneuver; enhances Army capability sets
- Enables cross-domain capabilities to support combined arms maneuver

**Electrification Enables:**

- Extended Operational Reach & Duration
- Reducing Logistical Demands; Decreased Reliance on Re-supply
- Semi-Independent Operations
- Enhanced Platform/Unit Survivability & Lethality
- Enhanced Mobility While Operating in Complex Terrain
- Improved Platform Reliability
- Enhanced C2/Mission Command Execution

**Ground Vehicle Electrification Characteristics**

- Signature Management (acoustic/thermal)
- Increased Mobility (Torque)
- CL III Demand Reduction
- Formational Power/Micro-Grid
- Smart Power (Advanced Management)
- Simplified Drive-Train
- Simplified Maintenance
- Increased Sustainability

Electrification Pillars set foundational categories for investment to advance ground vehicle electrification capabilities

Electrification contributes to **FREEDOM OF MOVEMENT AND ACTION**; capability to **MOVE FORMATIONS RAPIDLY, CONTROL TEMPO AND MOMENTUM**, and conduct joint combined arms operations of sufficient scale for **INCREASED DURATION & DISPERSION**.

**Electrification Pathway**

Light Vehicle Fleet (Near 2022-2027) → Medium Vehicle Fleet (Mid 2028-2037) → Heavy Vehicle Fleet (Far 2038-2050+)

**Natural Pathway to Electrification: Increasing Capability and Difficulty Build, Test, Learn & Adjust**

**Hybrid Mod of Medium Vehicle Fleet, New Starts/Early Transition to All-Electric**

**Next Capabilities:** eLRV, Liquid Fuel Reduction, Silent Mobility, Silent Watch, Support Power, Reduced Thermal, Increased Reliance Maintainability

**Eventually Capabilities:** All-Electric Platforms (Likely Purpose-Built), Liquid Fuel Reduction, Silent Mobility, Silent Watch, Export Power, Reduced Thermal, Micro-Grid, Increased on-board power, Supports high energy demand systems, All-Electric Sustainment Capabilities, Supports Directed Energy Systems

**eLRV A-CDD Desired Capabilities**

**Desired Capabilities:** Capacity, Electric Propulsion, Transportability, Power Storage, Silent Watch, Power Management, Recharging, Formation Power, Mobility, Survivability, Lethality, Vehicle Curb Weight/Full Mission Payload, Sustainability

**Prototyping/Refinement:** eLRV Market Survey's, Electrification Campaign of Learning, eLRV Desired Capabilities, Warfighter Feedback, Vendor Prototypes

**Requirements Validation:** Soldier Vehicle Demonstration, Soldier Touchpoint #1, Soldier Touchpoint #2 (militarized), DOTMLPFP, Limited User Test

**Validated Requirements & Future Decision Points:** Refined requirement & DOTMLPFP, Defines performance parameters, Informs acquisition entry point/development & timeline

**TOTAL ONBOARD POWER:** Silent Watch, Silent Mobility, Silent Watch

eLRV A-CDD desired capabilities informed through prototyping & buy, try, decide framework to inform eLRV CDD

## KEY HIGHLIGHTS:

- TaCV-E ICD- AROC/JROC APPROVED
- Continued DoD & Congressional Interest in Ground Vehicle Electrification (Log FCB, DASA IE&E)
- Electrification included in AEWE to inform learning demands
- AFC Operational Energy Guidance Development – On-going
- Power & Battery Modernization Framework development to address power & battery challenges: On-going
- eLRV A-CDD- AROC APPROVED
- eLRV Acquisition Strategy for MTA Rapid Prototyping- APPROVED
- Off-road COTS EV Demonstration and Characterization: On-going

Maintain the battlefield primacy of our Soldiers and the formations in which they fight!



# Key Challenge Area: Fast Recharge/Mobile Charging



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| Type of Charging                | Level 1 – 110V (~1.4kW)                                  | Level 2 – 220V (~7.2kW)                       | DC Fast Charger (50kW)                               | Tesla SuperCharger (140kW)                       | Extreme Fast Charging (350kW)*  |
|---------------------------------|--|---|--|--|---|
| Charging Station 101            | Provides same electricity as a regular electrical outlet | More powerful than Level 1 charging           | DC current directly supplied to vehicle              | Only available for Tesla vehicles                | Provides significantly faster charge rates than anything else on market |
|                                 |  | Comprises the majority of stations in the U.S | Commonly adds 40 to 60 miles of range in ~20 minutes | Offers fastest charging rate currently available |   |
| Range Gained per Hour of Charge | 3-5 miles  | 25 miles                                      | 100 miles  | 330 miles  | 787.5 miles   |
| Time to Charge for 200 miles    | 40 hours   | 8 hours                                       | 2 hours  | 36.55 mins                                       | 15.25 mins  |

## DOE Efforts in Extreme Fast Charging

Fast Recharge Capability is a result of combination of fast charge batteries and availability of high-capacity chargers.

- Leverage the work being done at DOE on fast charge batteries – This will be done with GVSC future high voltage battery development programs.
- *Challenge:* Commercial focus remains on stationary rechargers - need to focus resources on deployable recharge stations – limited commercial focus on this (no commercial pull). Commercial focus is limited to ~400kW, therefore may have limited ability to support larger military EVs.
- Other alternative is on-board APU based range extension.

**Commercial focus on fast recharge limited to stationary chargers and 400kW**

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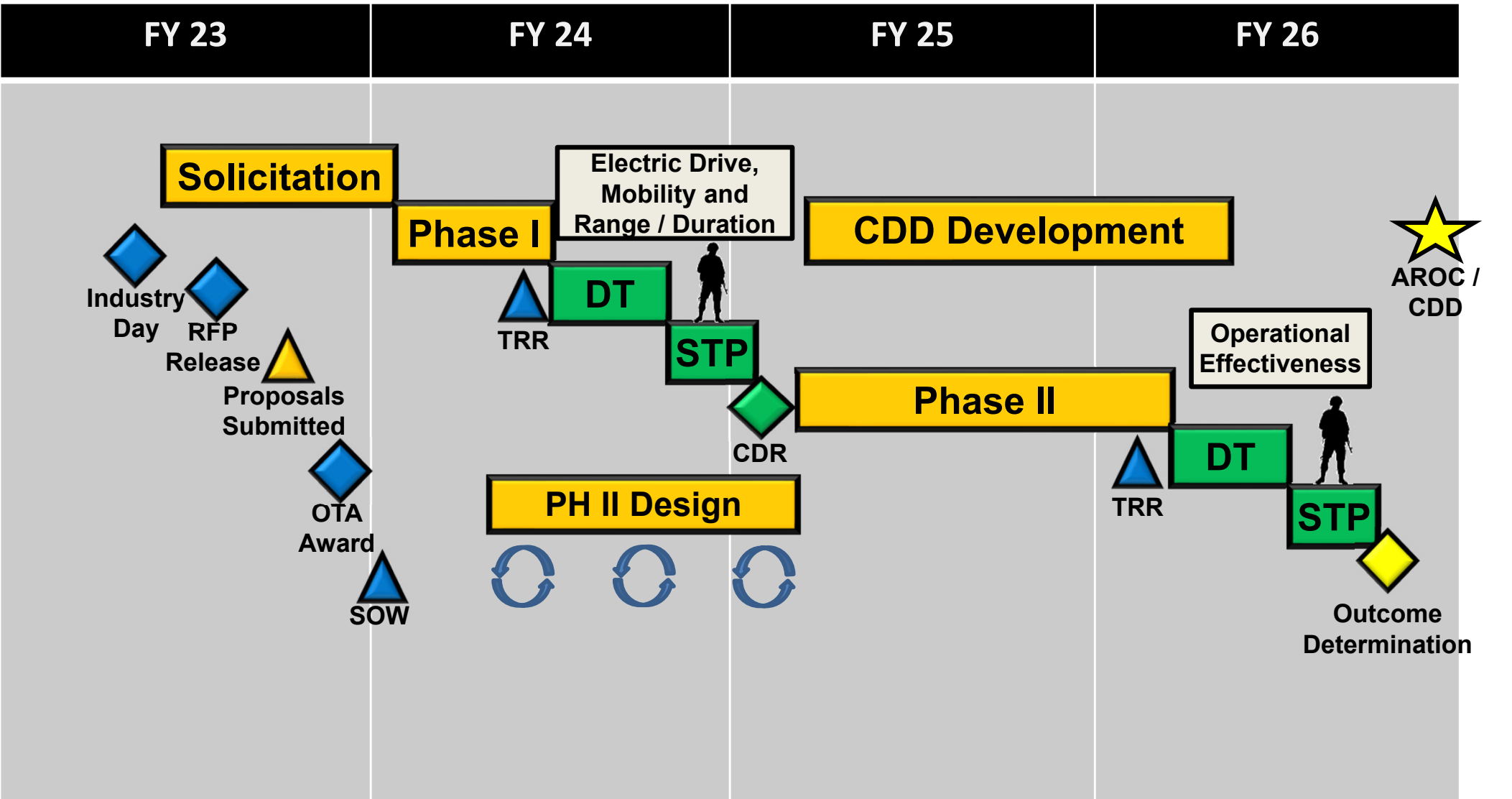




# eLRV Prototyping Path



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Be on the lookout for Draft RPP and eLRV Industry Day



# Successful Prototype Determination



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Technology Readiness Level



## DESIRED CAPABILITIES

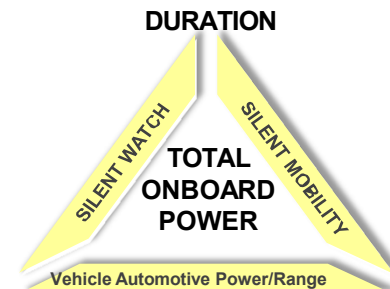
- Capacity
- Transportability
- Electric Propulsion
- Power Management
- Silent Mobility
- Silent Watch
- Duration
- Sustainability
- Lethality
- Survivability
- Reliability

## SUCCESSFUL PROTOTYPE

Enables IBCT Scouts to conduct Reconnaissance and Security Missions (R&S) in support of Large-Scale Combat Operations in a Multi Domain environment



Successful Prototype data will inform CDD requirements, providing achievable metrics



**Successful Prototype Determination will Inform Future Requirements**

*Maintain the battlefield primacy of our Soldiers and the formations in which they fight!*



# ***Heavy Systems Branch***

Branch Chief: LTC Seth Langston

Deputy Branch Chief: Mr. Robert Hay



# Desired Characteristics Modular Turreted Mortar System



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## Current Capabilities:

- Firing from stationary or on short halt.
- Open to enemy fire and must fire with hatches open.
- Subject to counterbattery due to displacement speeds.
- Orientation limits fields of fire.
- Positioning relative to the FLOT limits range.
- Soldiers subject to blast overpressure.



## Desired Characteristics:

- Timely, accurate, and rapid fires while stationary or on the move.
- Ability to shoot on the move or and/or while under fire.
- Massing of simultaneous fires (Multi-Round Simultaneous Impact (MRSI)).
- Firing in any direction through semi-automatic or automatic gun lay with a manual back-up.
- Provide for both indirect and direct fire engagements
- Retain or increase the combat load of the current MCV.
- Minimize MCV crew exposure to hostile counter fire and blast overpressure



# Modular Turret Mortar System (MTMS)



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Enhance Organic Indirect Fires capabilities within the Battalion and Squadron while conducting Large Scale Combat Operations (LSCO), enabling the ability to conduct semi-autonomous maneuver, and operating over large geographical areas.

Conduct independent maneuver alludes to formation possessing the capacity, capability, and empowered initiative to operate under the constraints of the operational environment.

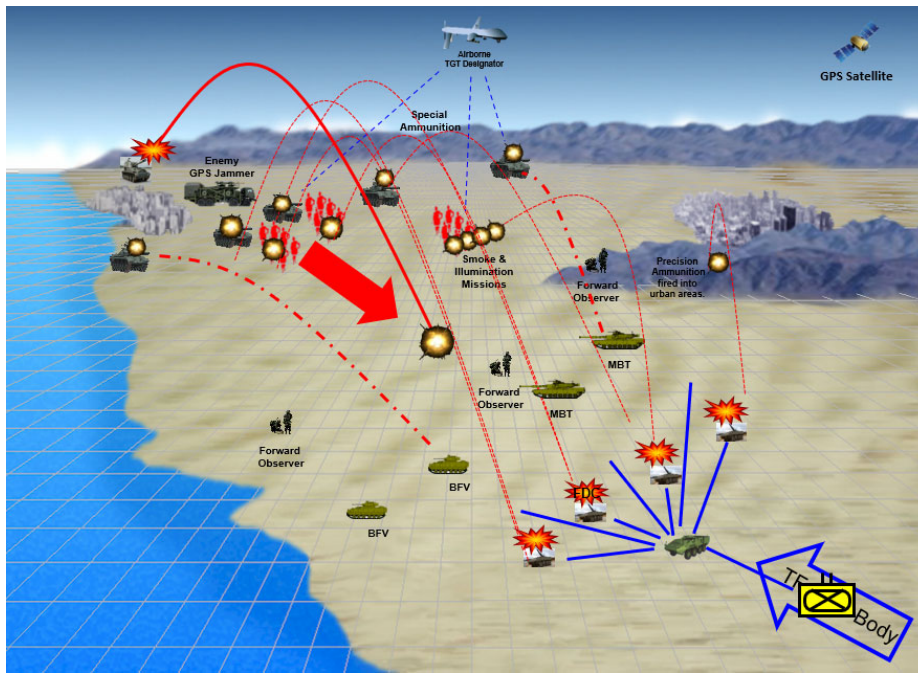
Compete

Penetrate

Dis-Integrate

Exploit

Re-compete

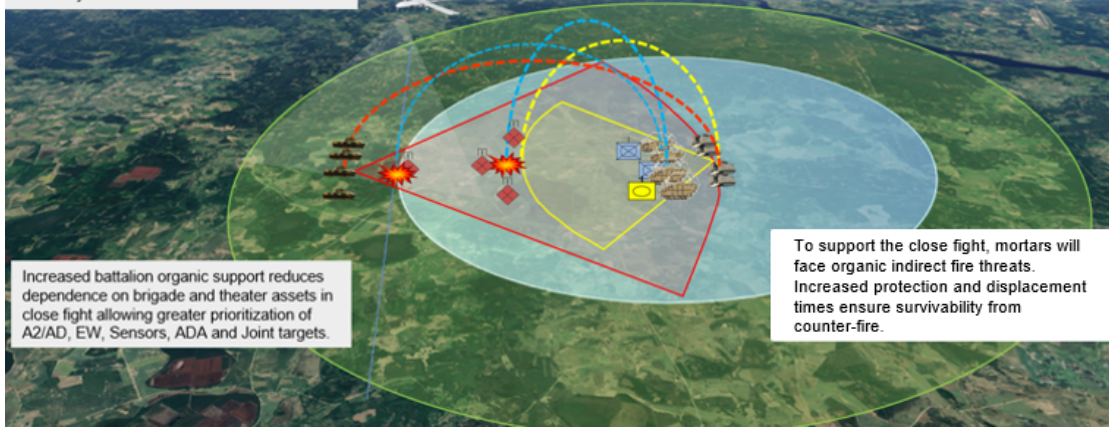


Mortar Turret increases lethality, survivability, and accessibility of organic fires at BN/BCT levels. The capability provides operational advantages in large scale combat operations through the seize and dominate phases of operations by; expanding the Battalion's ability to organically shape operations and exploit freedom of maneuver, expanding the battalion's area of influence, increasing decision space and time to enable freedom of maneuver/action. The end benefit provides increased overall formation lethality, force protection and survivability, and improved enemy suppression.

Improved positioning closer to FLOT, increased protection, range, higher angle of fires, and MRSI mission capability enables battalion organic fire support to have greater effects on adversary maneuver.

Range coverage does not depict vehicle repositioning

Better platform direct fire protection decreases distance to maneuver units producing higher angle fires and mitigating adversary protection measures.



Increased battalion organic support reduces dependence on brigade and theater assets in close fight allowing greater prioritization of A2/AD, EW, Sensors, ADA and Joint targets.

To support the close fight, mortars will face organic indirect fire threats. Increased protection and displacement times ensure survivability from counter-fire.

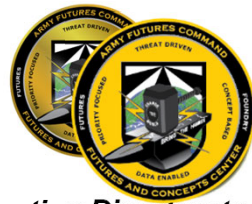
Enable Mission Command

Shaping Fires / Convergence

Exploit Freedom of Maneuver

Re-compete

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# ***Combat Capabilities Branch***

Branch Chief: Mr. Kent Evans

Deputy Branch Chief: Vacant



# Close Combat Missile System-Heavy (CCMS-H)



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## Current Status:

- CCMS-H SIMEXp MAY 21
- AFC CG approved development of A-CDD JUL 21
- CCMS-H AROC approval APR 22
- CCMS-H Industry Day OCT 22
- CCMS-H A-CDD approved NOV 22
- CCMS-H Acquisition Shaping Panel #1 3QFY23 (June)
- CCMS-H Capabilities Demonstration (T) 2QFY26



Acquisition  
Pathway to be  
managed by the  
PM

## Desired capabilities (not all inclusive of the 16 DCs):

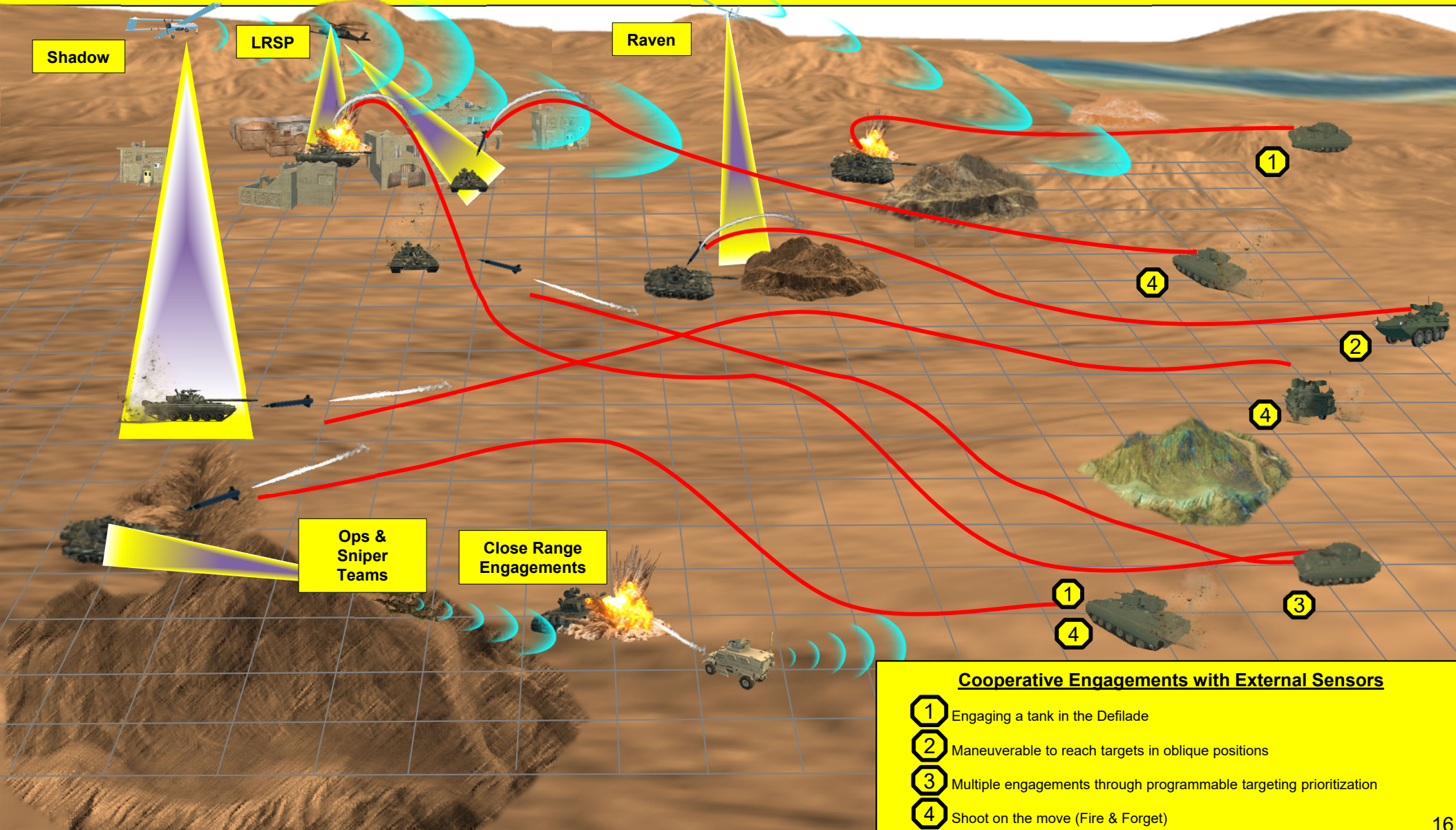
- Operate in Contested Environments
- Defeat Tier 1 Armor
- Form Factor
- Cooperative Engagement
- Multiple Guidance Modes
- Range
- Lethality
  - *Field Fortifications*
  - *Urban Structures*
- Shoot on the Move
- Aided Target Recognition



# Operational Concept

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**Close Combat Missile System-Heavy (CCMS-H):** Provides a mobile & dispersed, networked, for close & extended range capability to BCTs in support of defeating current & future Tier 1 Armored Systems and Field Fortifications. The employment of CCMS-H increases the BCT's lethality, survivability, and maneuverability. The CCMS-H achieves this through capability enhancements to include retaining the current TOW 2B form factor and lethality, multiple guidance modes, cooperative engagement, "Shoot-On-The-Move", reduced time of flight, operate in contested environments, APS defeat capabilities, and maneuverable capability to abort/divert the missile prior to impact.







# Future Advanced Long-range Common Optical/Netted-fires Sensor (FALCONS)



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## Current Status:

- AFC CG approved development of A-CDD Jun 22
- FALCONS Acquisition Shaping Panel 1 completed 2 Feb 2023
- FALCONS AROC approved 17 Mar 23
- FALCONS Acquisition Shaping Panel 2 planned Sept/Oct 2023 (T)
- Soldier Touch Point 2QFY26, 2QFY27 and 4QFY28
- Material •Developer is PM Ground Sensors with industry engagements planned later in FY23 (POC: Ray Hacker, raymond.r.hacker.civ@army.mil)



Acquisition  
Pathway to be  
managed by the  
PM

## Desired capabilities (not all inclusive of the 22 DCs):

- Detection, Recognition, and Identification (DRI)
- Cat 1 Target Location
- Reporting Target Location
- Target Handoff
- Networked/Cooperative Engagement
- Target Designation
- Common GUI
- Power
- Aided Target Detection and Recognition (AiTD/R)
- Physical Interoperability/Capability Insertion
- Dismount SWaP



# FALCONS Concept of Employment



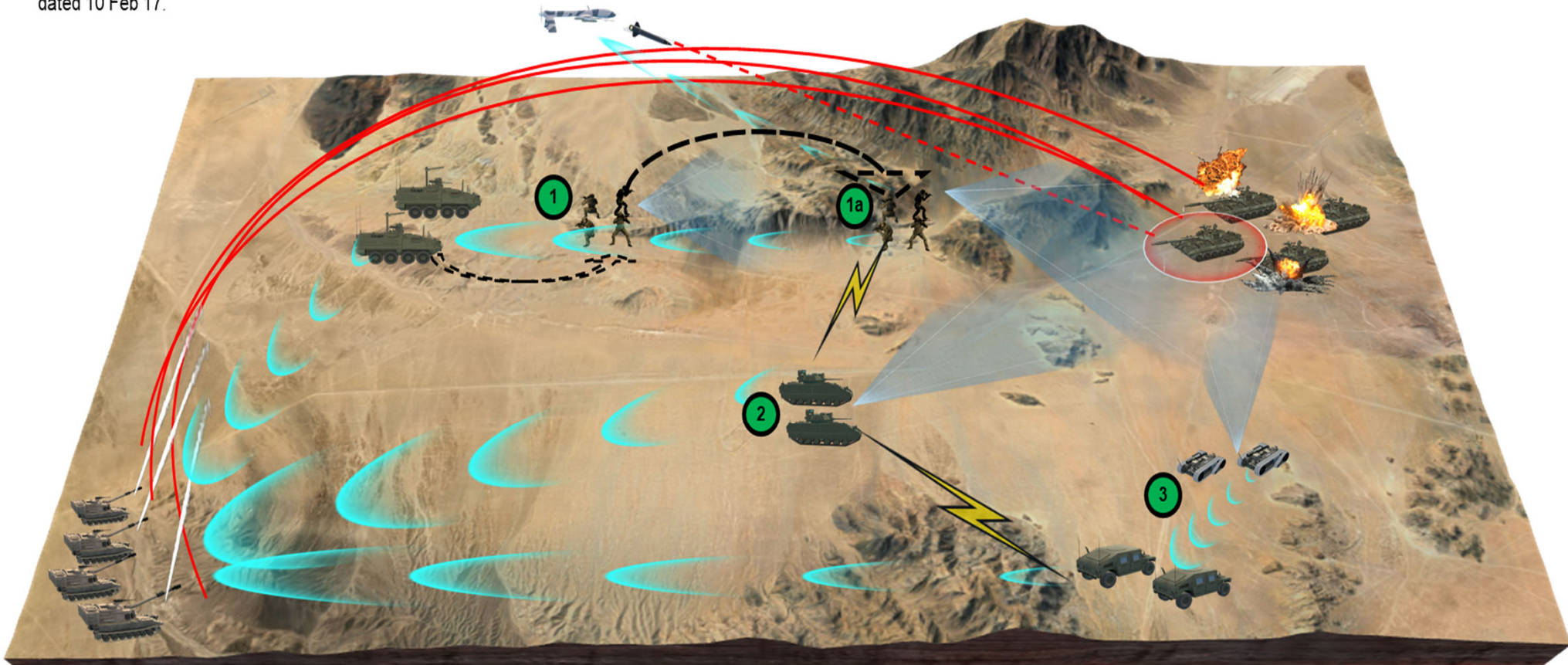
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**1** FALCONS enables Reconnaissance & Surveillance forces the ability to clear terrain in support of maneuver; bounding into successive positions to gain and maintain contact with enemy forces outside threat engagement ranges.

**1a** Upon Identification of Enemy, FALCONS supports persistent Cross Domain reconnaissance in all-weather to develop real-time actionable information (RC 9). FALCONS improves Detect, Recognize, Identify (DRI) to meet reconnaissance operational requirements IAW Standard Scout Platoon Operational and Organizational Concept (SM 3-20.96) dated 10 Feb 17.

**2** FALCONS enables fire supporters' interoperability among ground platforms and dismounted personnel through a Common Operating Picture (COP) of the battlefield and interchangeable components to conduct dispersed operations at maximum supporting range (RC 12). The enhanced capabilities of FALCONS provides the ability to detect threats at greater distances under a full spectrum of conflict, terrain and weather conditions (RC 9) with greater image resolution to develop civil considerations in the operational and tactical environments maintaining overmatch.

**3** Utilizing both organic and non-organic sensors, FALCONS provides the capability to acquire and deliver lethal and non-lethal fires to targets in all domains (RC 21 & 15), electromagnetic spectrum (EMS) contested environments with accuracy and speed at extended ranges, providing fire control quality data to engage moving, displaced, and stationary targets IAW AFC Pam 71-20-6 Army Future Command Concept for Fires 2028 (paragraph 3-5.b, 3-5.c, 3-5.d).



**Maintain the battlefield primacy of our Soldiers and the formations in which they fight!**



# Future Activity

## Layered Formation Protection



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### Current Status:

- VPS is the umbrella program for vehicle protection
- SIMEX VPS Spiral A study 2017
- VPS CDD AROC approved Nov 2020.
- MITRE Study Cooperative Protection 2021
- SIMEX Cooperative Protection 2022
- VPS Governance Board 2021 & 2022 continue analysis of cooperative protection
- GVSC Maneuver Operations Protection Concept 2022



ICD  
Development

### ICD Layered Formation Protection Capabilities

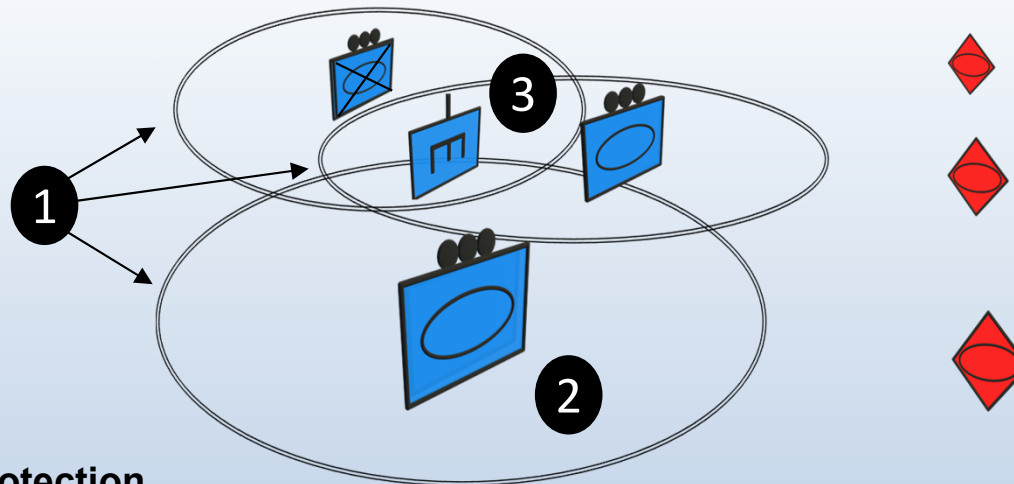
- Seek ICD Approval
  - Sensor Requirements
  - Network Requirements
  - Artificial Intelligence
  - Advanced Countermeasures
- What don't we know???
  - Manned/ Unmanned teaming
  - Technology Mix to achieve desired effects



# Operational Concept

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1. Figure below shows graphical depiction of platoons working collaboratively while enabled with a protection layer of VPS Technologies (**Cooperative Protection**).
2. Within each dome platforms equipped with VPS Technologies work together to protect adjacent platforms (**Collaborative Protection**).
3. When multiple domes of protection work collaboratively and cooperatively, platforms/areas without VPS capabilities are protected (**Covered Protection**).



## ➤ Stage 1 – Cooperative Protection

- “We share data, but I protect me, and you protect you”
- Formation – Individual VPS Equipped platforms

## ➤ Stage 2 – Collaborative Protection

- “We share data and use it to protect each other to optimize the performance of the group”
- Adjacent VPS Equipped Platforms (usually Platoons)

## ➤ Stage 3 – Covered Protection

- “Protection is provided by assets placed in strategic positions with assigned areas of responsibility”
- Formation: Companies, Platoons, Non-VPS Equipped Assets

*Maintain the battlefield primacy of our Soldiers and the formations in which they fight!*



# ***Mounted Mission Command Branch***

Branch Chief: LTC Angela Smoot

Deputy Branch Chief: MAJ Jesse Alcock



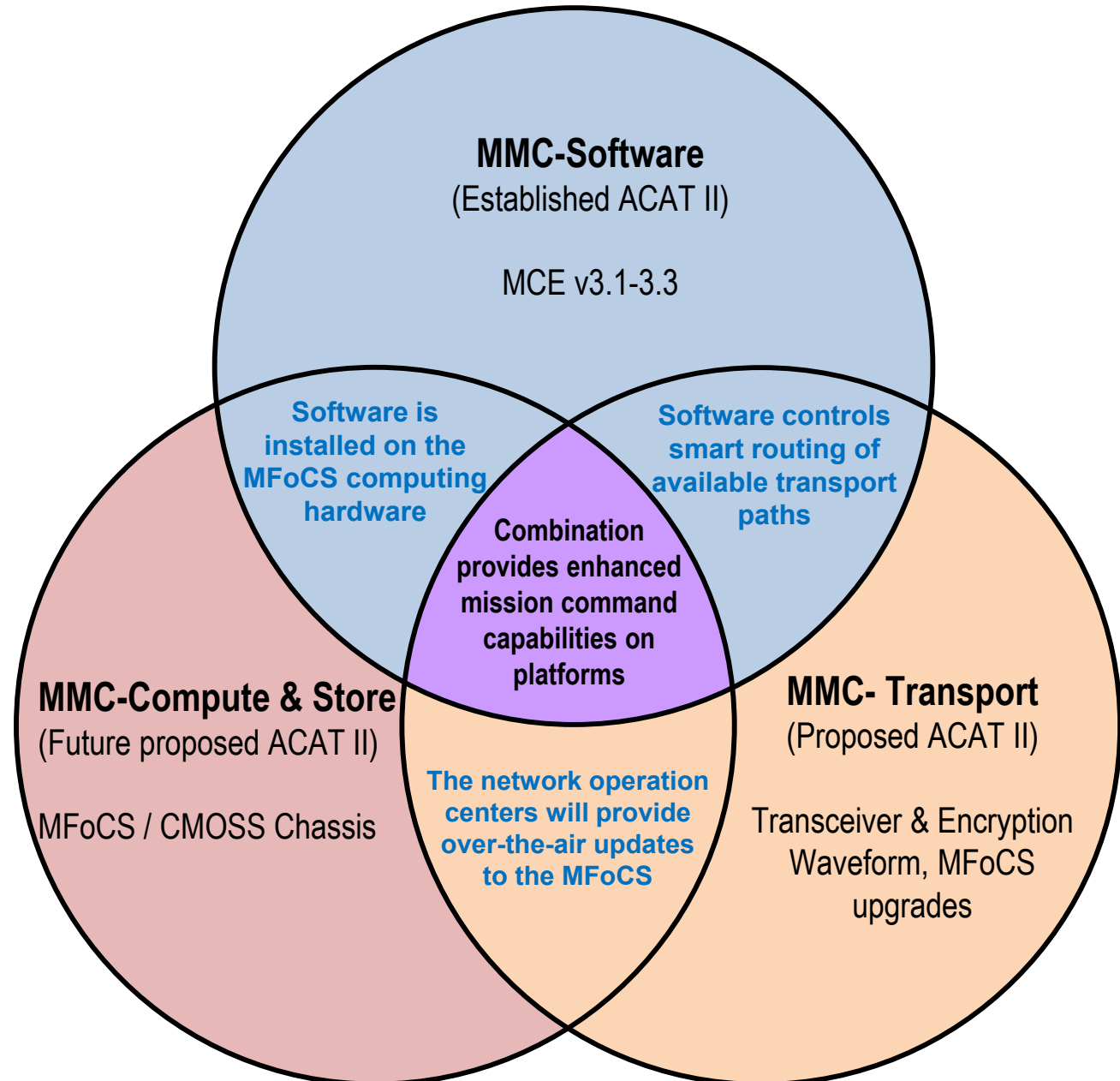
# Mounted Mission Command (MMC) Family of Systems (FoS)



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MMC is Army's approach to a Mounted Computing Environment (MCE) in the Common Operating Environment (COE):

- Aligned with Network CFT signature modernization efforts
- Provides enhanced MCOTM capabilities to commanders and leaders
- Enables communications and information sharing in **highly contested, congested, degraded, disrupted, and denied** environments
- Replaces Joint Battle Command – Platform (JBC-P) in manned platforms and TOCs



## Strategic Approach:

- Injects flexibility to phase in maturing technologies independent of each other
- Each program at different points in acquisition cycle- syncs resources with capability needs
- Offer benefits beyond current JBC-P and BFT capabilities

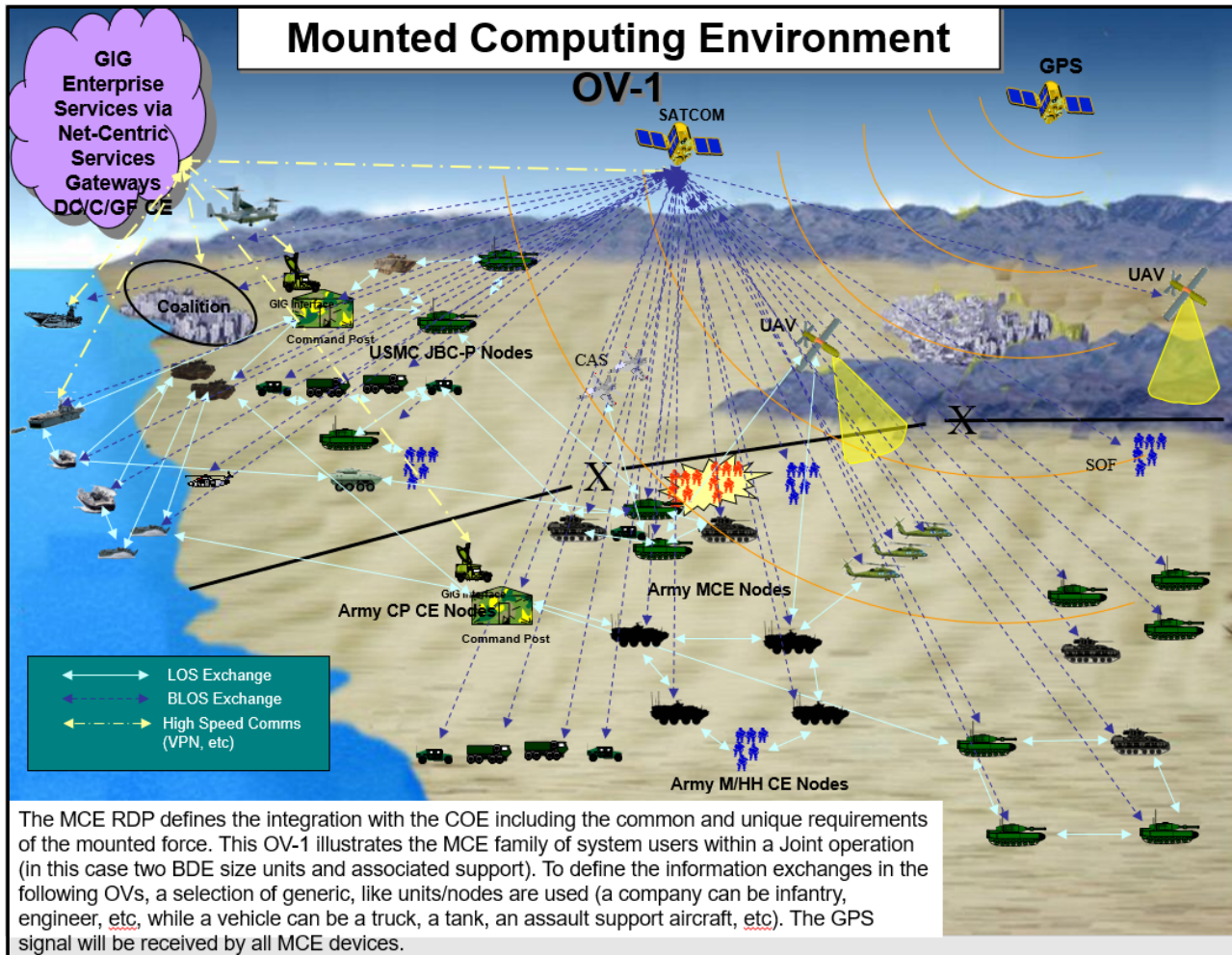
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# MMC Way Forward



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## Key Development Highlights

1. Aviation Transceiver/Encryption device Prototyping will begin FY25.
2. CMFF Path Forward and Compute & Store beyond 2030 for next generation MFC Block III
3. MCE RDP 3 FY30-35 Upgrades in software are needed for Cyber threats

**Maintain the battlefield primacy of our Soldiers and the formations in which they fight!**



# *Discussion*



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