



MCoE Industry Day



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Mounted Requirements

COL William Nuckols, Director
Ted Maciuba, Deputy Director



Mounted Requirements



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Mounted Requirements

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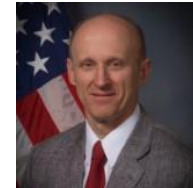


Develop Materiel Capabilities for Combat Vehicles within the Armored, Stryker, and Infantry Brigade Combat Teams, as well as Materiel Integrated onto Combat Vehicles including Weapons, Sensors, Soldier-Machine Interface, and Protection as well as Maneuver Robotics and Autonomous Systems.

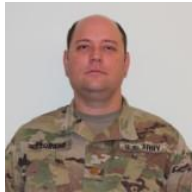
Mounted Requirements

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Heavy Systems



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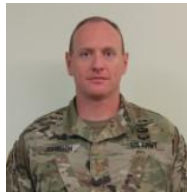


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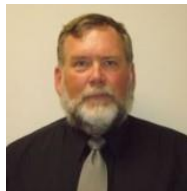


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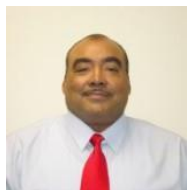
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Mounted Requirements Portfolio



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- Combat Vehicles
 - Next Generation Combat Vehicle (NGCV)
 - Armored Multipurpose Vehicle (AMPV)
 - Abrams
 - Bradley
 - Stryker
 - Mobile Protected Firepower (MPF)
 - Light Reconnaissance Vehicle (LRV)
 - Ground Mobility Vehicle (GMV)
- Vehicle Protection Suite
- Cross Domain Dominance
 - Artificial Intelligence and Autonomy
 - Sensor Fusion
- Large and Medium Caliber Lethality
- Maneuver Robotics and Autonomous Systems (MRAS)
- Tactical Vehicles
 - Mine Resistant Ambush Protected (MRAP)
 - MRAP All Terrain Vehicle (MATV)

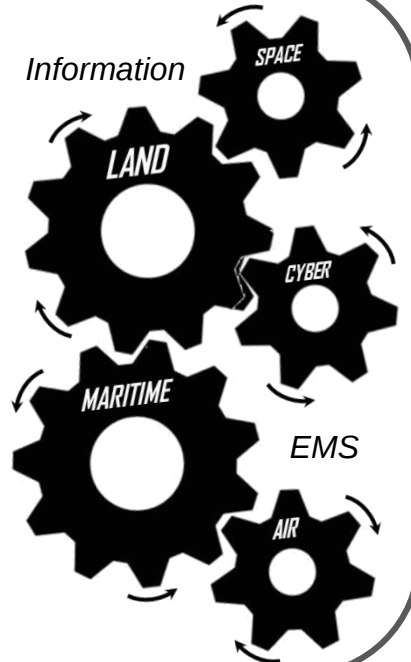
- Combat actions occur in all domains quickly and often times simultaneously
- Communications become degraded for extended periods of time
- Battlefield frameworks and operations assume more nonlinear constructs
- Decision making is either decentralized to allow for rapid adaptation to changes in the OE or opportunities are lost

Big 4 + 1

- Advanced Armor
- Directed Energy / Energetics
- Integrated Vehicle Protection Suite
- Power Generation and Management
- Maneuver Robotics and Autonomous Systems (MRAS)

“Collectors and Effectors”

- Beyond Traditional CV Considerations
 - Mobility
 - Lethality
 - Protection
- Cyber
- Space $\leftrightarrow$ Ground
- Electromagnetic Spectrum





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Light Reconnaissance Vehicle (LRV)



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Description: The Infantry Brigade Combat Team (IBCT) Cavalry Squadron and Infantry Battalion Scout Platoons require a LRV in order to conduct Cross-Domain Reconnaissance and Security missions. The Army will utilize the four-seat JLTV until the development of a six-seat LRV. The LRV will operate in conjunction with the Mobile Protected Firepower (MPF) and Ground Mobility Vehicle (GMV) to significantly improve the reconnaissance and security, lethality, and mobility of the IBCT when executing Cross-Domain combat operations.



Desired Capabilities:

- Cross-Domain Sensors: Supports primary Scout role of reconnaissance and surveillance beyond traditional EO/IR.
- Communications Network: Ensure sufficient SWaP-C to facilitate the integration of current and future communications organic to an IBCT.
- Capacity: Six Scouts with combat equipment and enablers
- Lethality: Medium caliber weapon system to provide precision “stand-off” lethality against small arms and light armor vehicles.
- Force Protection: Protection from small arms.
- Transportability: CH-47 Sling Load (in combat configuration). Air drop from C130.
- Range: Greater than 300 miles on internal fuel.

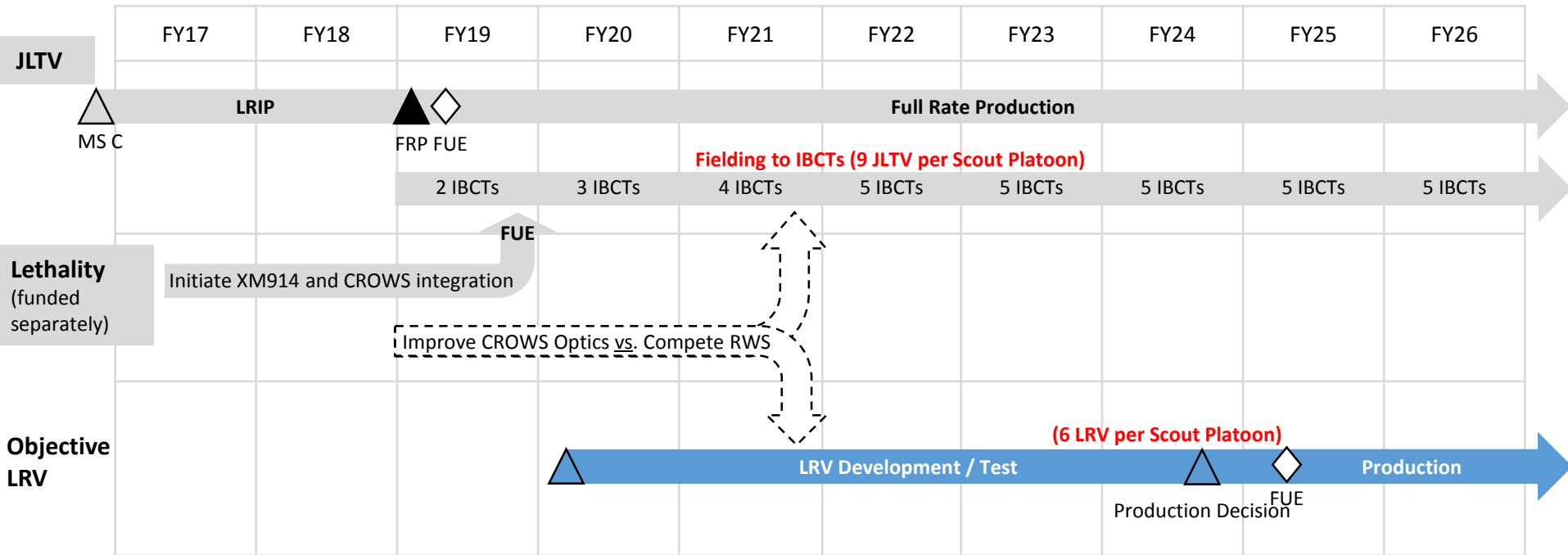




LRV Way Ahead



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Requirement

	BOIP	# of IBCTs	Total
LRV	58	35 IBCTs	2,030

- Develop an LRV Annex
- Capability Based Analysis and/or Limited AoA to support the CPD Annex
- Potential requirements include six seat capacity, integrated remote weapon system with medium caliber cannon and improved scout sensor
- AROC approval of LRV Annex by 1QFY19

Acquisition / Funding

- JLTV fielding begins in FY19 with 2 IBCTs
 - M230LF and modified CROWS begin fielding by the end of FY19
 - **AROC - LRV Annex**
 - ☐ Procure GMV 1.1 vs. Develop 6-seat JLTV as the objective LRV
 - ☐ Improve CROWS optics vs. compete improved RWS capability
- JLTV-RV program begins in FY19 with FUE by early FY22



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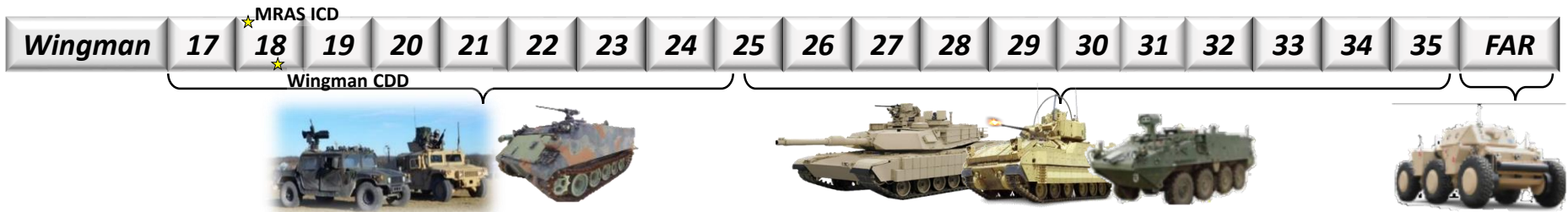
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Maneuver Robotic & Autonomous Systems (MRAS)



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Robotic Wingman

M113 and HMMWV
S&T Development (2017-2023)
Surrogate vehicles at CTCs, user feedback
"More than an armed platform"

Semi-Autonomous Robotic Wingman

Existing vehicles used (M113, M1, M2, Stryker, MPF, JLTV)
Increase in Semi-Autonomous Capabilities (Leader-Follower, Waypoint Navigation, etc.)
Program of record-1 (2023-2035)*

Autonomous Robotic Wingman

Purpose built platforms
Fully autonomous navigation capability
Program of Record-2 (2035-TBD)

Components of the Solution

Near-Term (Current thru FY25)

- Comparable effectiveness with unmanned platforms
- Temporary increase in sustainment burdens
- Applique solutions on M113 FOVs
- Common Control
- RAS Strategy Objectives

Mid-Term (FY25 – FY35)

- Enhanced effectiveness
- Applique solutions on legacy fleets
- Increased autonomy (voice commands, aided cognition)

Far-Term (FY35 and Beyond)

- Large increases in effectiveness (100%)
- Large decrease in sustainment burdens
- Common architecture and interfaces, modular and kitable

← **Cross-Domain Sensors** →

How Industry Can Help

- Inform requirements community on whole system trades AND subsequent formation effects
- Improve autonomous behaviors and algorithms (voice commands, aided cognition, obstacle avoidance)
- Foster trust in off-board lethality solutions

- Improve autonomous behaviors and artificial intelligence
- Inform on refining and defining common architectural framework and interfaces
- Further miniaturization of solutions

- Develop payloads to meet mission requirements

#1 Challenge is Assured Control

Platform requirements/challenges: Autonomous off-road mobility, obstacle detection and avoidance

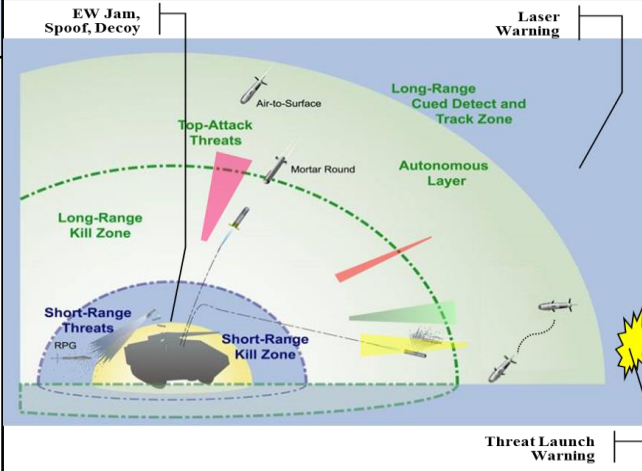
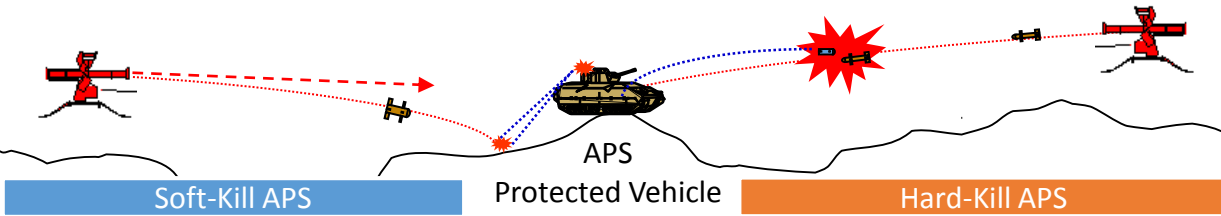
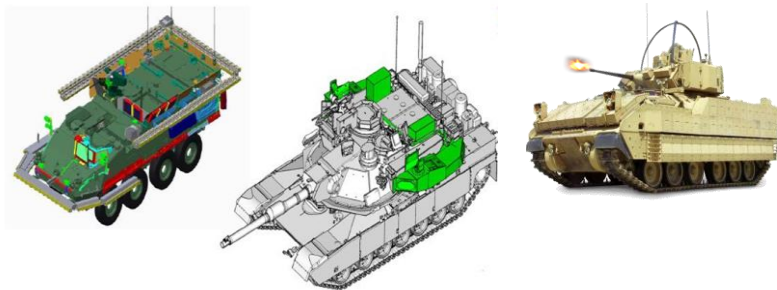
Lethal Payload requirements/challenges: External power, self-reload, switch ammo, greater ammo storage Semi-autonomous weapons station to manage latency and delays



Vehicle Protection Suite (VPS)



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STATUS		
- Vehicle protection Suite ICD: AROC Fall/Winter 2017 - MAPS Soft Kill Demo 4th QTR FY 17 - MAPS Hard Kill Demo 1st QTR 19 		
PURPOSE	ATTRIBUTES	
Provides modular, kitable protection utilizing an active, reactive, passive (or combination) defeat mechanism	- VPS includes full frontal, side, top, and rear protection capabilities and minimizes hazards to personnel and equipment in close proximity to the vehicle. - VPS should operate in the same operational and environmental conditions as the host vehicle platform. - VPS should be mountable and dismountable by any Soldier utilizing BCT organic equipment; however, capabilities may require installation, alignment and calibration using specialized tools, systems, and Material Handling Equipment (MHE).	- The planned Army Program of Record to address protection requirements across the Army fleet - Initial Capability Document Pending AROC - The Expedited Active Protection System NDI effort will inform the VPS Analysis of Alternatives - The Modular Active Protection System will support VPS 
FUNCTIONS		- Detects the incoming threat - Quantifies nature of the threat - Engages the threat - Minimizes hazards to personnel and equipment in close proximity of vehicle <i>Automation as Objective</i>



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Next Generation Combat Vehicles (NGCV)



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- Focused on the 2035 Operational Environment, NGCV will evaluate the requirement for a new Infantry Fighting Vehicle (IFV) and a new Main Battle Tank (MBT).
- The lessons learned from FCS, GCV and aviation's Future Vertical Lift technology inform the development of the NGCV.
- The current focus of the NGCV effort is to conduct foundational analysis and address capabilities required to enable the Army Functional Concept for Movement and Maneuver including semi-independent operations of the Brigade Combat Team (BCT).
- NGCV will leverage the MCoE Science and Technology priorities:
 - 1) DE and energetics;
 - 2) Power generation;
 - 3) Vehicle Protective System
 - 4) Advanced Armor
 - 5) Maneuver Robotics and Autonomous Systems
- Targeted funding of these priorities will help ensure that there is sufficient maturation of technologies for inclusion into vehicle requirements and that technologies are economically feasible for mass manufacturing.
- A near term objective is a functional NGCV prototype in a relevant operational environment that will enable Soldier feedback.



Next Generation Combat Vehicle

FUE ~ 2035



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Foundational Analysis

- Operational Environment 2035
- Formation Concept
- Functional Concept
- Capabilities Analysis
- Technology Assessment
- Modeling and Simulation



Integration & Prototyping

- Evaluation of Technology Readiness Level
- Evaluation of Manufacturing Readiness Level
- Subsystem development and integration
- Industry Feedback
- Combat Vehicle Prototype
- Fully Integrated Tech Demonstrator

NGCV Attributes

MCoE S&T priorities (Big“4+1”)

- Directed Energy & Energetics
- Power Generation & Management
- Integrated Vehicle Protection Suite (VPS)
- Advanced Armor
- Maneuver Robotics and Autonomous Systems (MRAS)

Other Primary Attributes

- Lethality
- Enhanced Mobility and Survivability
- Availability(Maintainability/ Reliability)
- C5ISR
- Transportability/ Force Development
- Commonality
- TRL/MRL



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Discussion