

Army Robotic and Autonomous Systems (RAS) Modernization Portfolio

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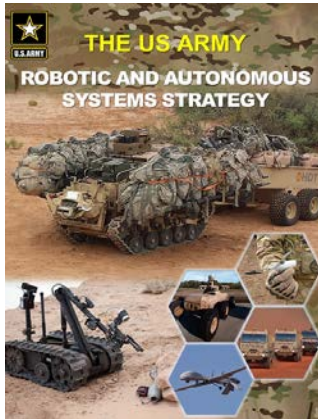
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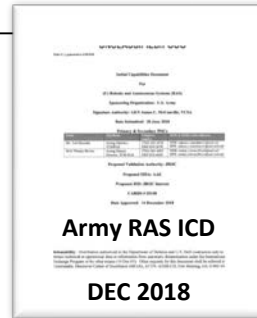
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RAS in Support of Multi-Domain Operations



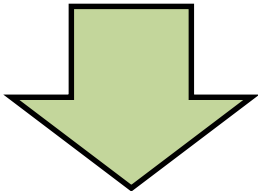
RAS Strategy Priorities:

- Improve **situational awareness** and persistently monitor the environment
- **Lighten** physical and cognitive **workloads**
- **Sustain** with increased distribution, throughput, and efficiency
- Facilitate **movement and maneuver**
- **Protect** the force



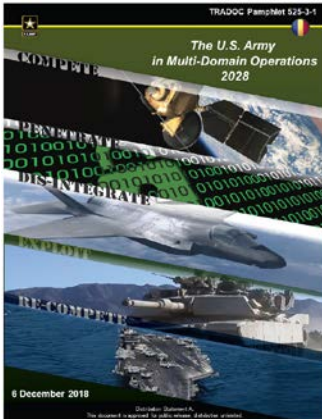
Endstate:

Robotics and Autonomous Systems (RAS), through Manned-Unmanned Teaming (MUM-T), enable Army formations to increase their **endurance, persistence, lethality, protection** and **depth**.



Multi-Domain Operations (MDO) Problems:

- (1) How does the Joint Force **compete** to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, enable a rapid transition to armed conflict?
- (2) How does the Joint Force **penetrate** enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?
- (3) How does the Joint Force **dis-integrate** enemy anti-access and area denial systems in the Deep Areas to enable operational and tactical maneuver?
- (4) How does the Joint Force **exploit** the resulting freedom of maneuver to achieve operational and strategic objectives through the defeat of the enemy in the Close and Deep Maneuver Areas?
- (5) How does the Joint Force **re-compete** to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?



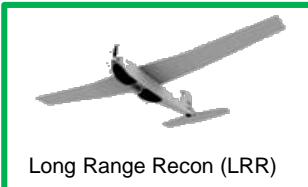


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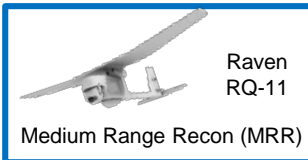
Robotics Portfolio Overview

Family of SUAS

Small Unmanned Aerial Systems



Long Range Recon (LRR)



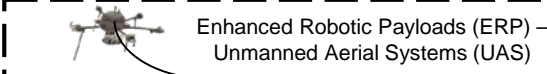
Raven RQ-11
Medium Range Recon (MRR)



Short-Range Recon (SRR)

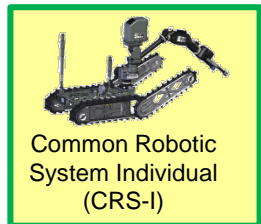


Soldier Borne Sensor (SBS)



Enhanced Robotic Payloads (ERP) - Unmanned Aerial Systems (UAS)

Individual Transportable



Common Robotic System Individual (CRS-I)

Family of Integrated Sensors (FITS)

Enhanced Robotic Payloads (ERP) - Render Safe (RS)

Enhanced Robotic Payloads (ERP) - Unmanned Ground Systems (UGS)

Vehicle Transportable



MTRS INC 2



M160 Light Flail



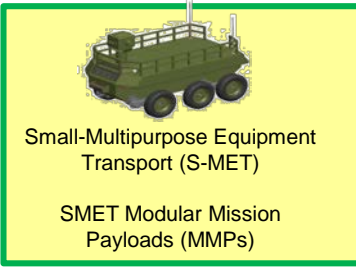
CRS-Heavy

Common Robotic System - Medium (CRS-M)



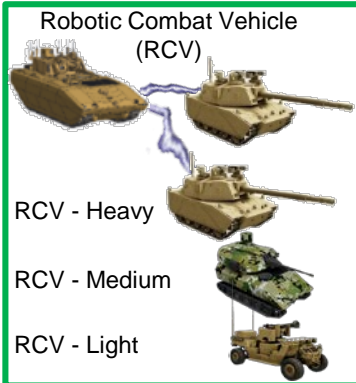
NSE-Robots
MTRS - I
MTRS-RC

Self Transportable



Small-Multipurpose Equipment Transport (S-MET)

SMET Modular Mission Payloads (MMPs)



Robotic Combat Vehicle (RCV)

RCV - Heavy

RCV - Medium

RCV - Light

Robotic Applique



Leader Follower



Exoskeleton



Warrior Exosuit

Photos are notional



Universal Robotic Controller (URC)

Other

Robotics Development

Robotics Architecture

Robotics

- 6 Sub Portfolios
- 22 Programs
- 12 Roots

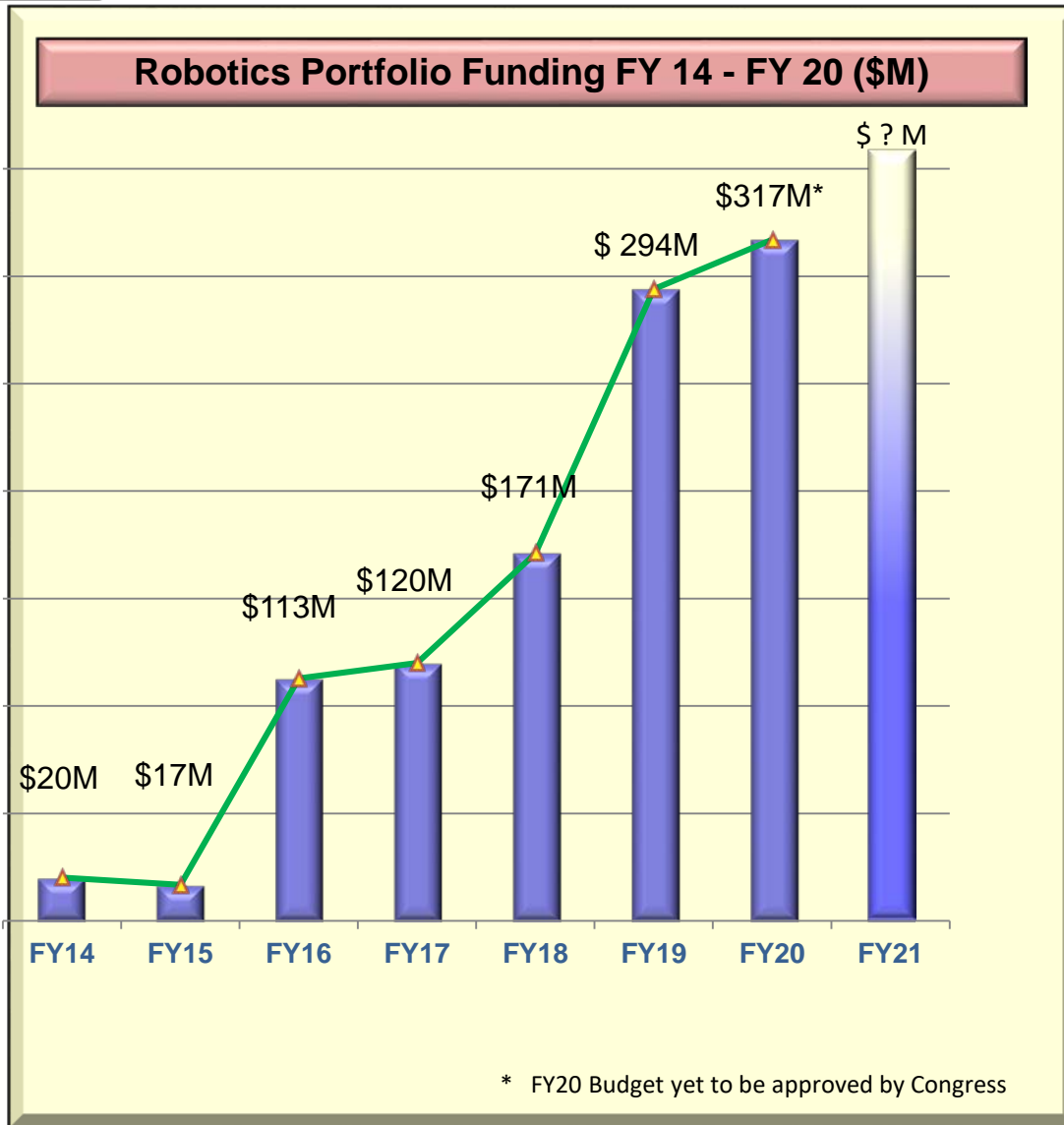
Emerging Programs	7
Actively Managed	13
Programs in Sustainment	2
Total Programs	22





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Robotics Portfolio Resources



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Funding Highlights:

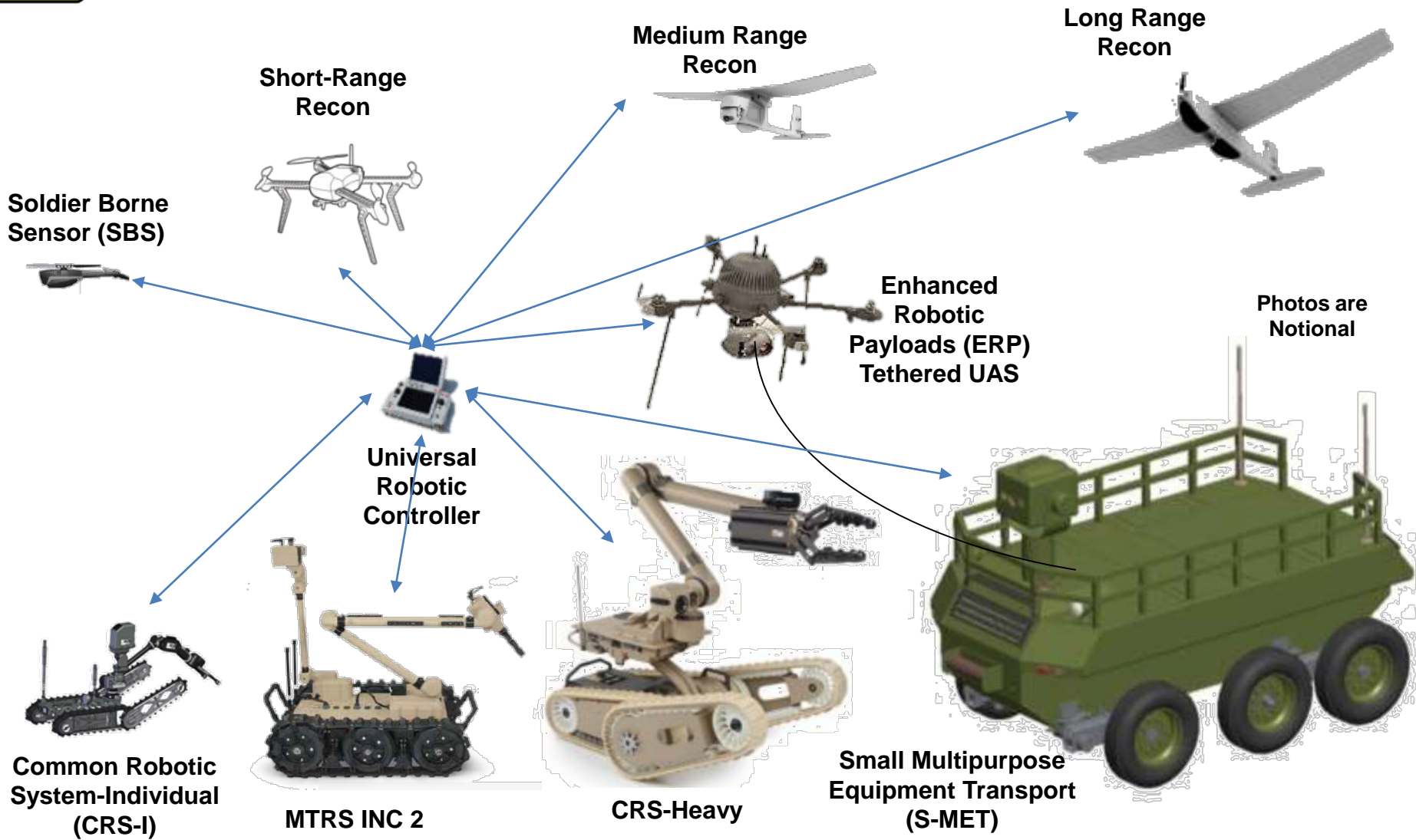
- Six programs in **production** in FY19:
 - Soldier Borne Sensor (**SBS**)
 - Man Transportable Robotic System Inc 2 (**MTRS**)
 - Common Robotic System – Individual (**CRS-I**)
 - Common Robotic System – Heavy (**CRS-H**)
 - Small Multipurpose Equipment Transport (**S-MET**)
 - Short Range Recon UAS (**SRR**)
- S-MET and Leader-Follower **Operational Technology Demonstrations** in FY18-19
- Robotic Combat Vehicles (Light, Medium, and Heavy) **Soldier Experiments** in FY20, 21, and 23

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Common Chassis, Common Controller, Modular Mission Payloads



~5 lbs	~50 lbs	~300 lbs	~1000 lbs
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Payload:



Army RAS Operational Technology Demonstrations

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- **Small Multipurpose Equipment Transport (S-MET)**
 - Nov 2018 – May 2019
 - 80 systems to two IBCTs
 - **Production Contract Oct 2019 for 624-1200 systems**

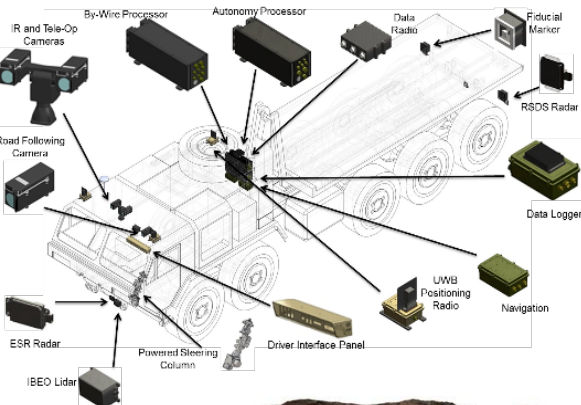
- **Leader – Follower Technology for Tactical Wheeled Vehicles**

- Sep 2019 – Dec 2020
- 60 systems to two PLS Truck Companies
- **New Equipment Training at Ft. Polk, LA Sep 19**

- **Next Generation Combat Vehicles (NGCV) Robotic Combat Vehicle (RCV)**

- Four RCV-Heavy Surrogates in FY20
- Platoon of each RCV-Light/Medium/Heavy in FY21
- Two platoons of RCV-Medium/Heavy in FY23

Photos are notional



Innovation and Better Buying Power 3.0

Rapid prototyping, Operational Evaluation, and Transition to Procurement



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RCV FAMILY OF VEHICLES

- Limited on-board lethality (self defense, ATGM, recoilless weapons); Intelligent network cues appropriate MDO (off-board) strike to provide decisive lethality
- Robust Sensor package to establish enemy COP (UAV integration).
- Attritable system.

- Increased onboard lethality to defeat some Tier I threats (medium cannon / multiple ATGM / recoilless large cannon)
- Sensor package to establish enemy COP for MDO strike for remaining targets
- Durable system.

- On-board direct fire weapon systems defeat all Tier I threats
- Off-board sensor systems develop COP.
- Non-expendable system.

Intelligent Network leverages sensor-data to optimize multi-domain strikes

Increasing on Platform Lethality

Increasing Platform Survivability and Cost

Notional RCV Vehicle max size/weight constraints (Based on limits for different air transportability envelopes)

RCV Light (L)

< 7 Ton GVW
 224 x 88 x 94 in*
 Transport one RCV(L) by
 Rotary Wing

*L x W x H



RCV Medium (M)

~10 Ton GVW
 230 x 107 x 94 in*
 Transport one RCV (M) by
 C-130

*L x W x H



RCV Heavy (H)

~20 Ton GVW
 350 x 144 x 142 in*
 Transport two RCV (H) by C-17

*L x W x H



Notional pictures for representative vehicle characteristics only, not to be considered an endorsement or preference to any specific system or subsystem

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Robotic Combat Vehicle enables a continuum of Decisive Lethality options



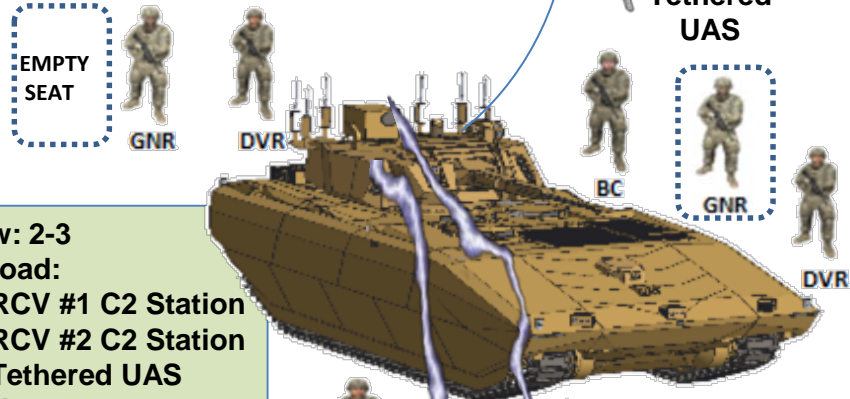
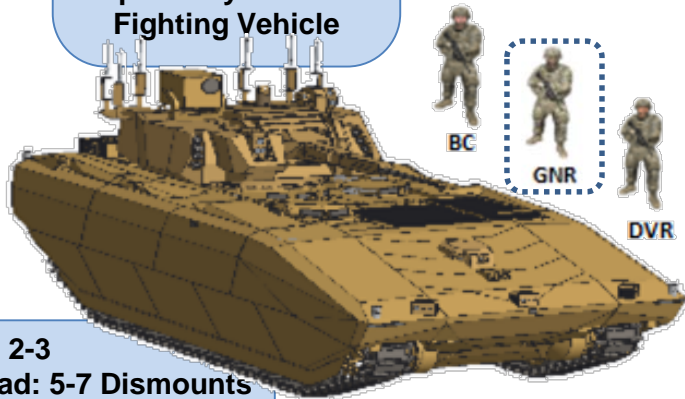
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NGCV Optionally Manned Fighting Vehicle (MFV) and NGCV Robotic Combat Vehicle (RCV) Concept

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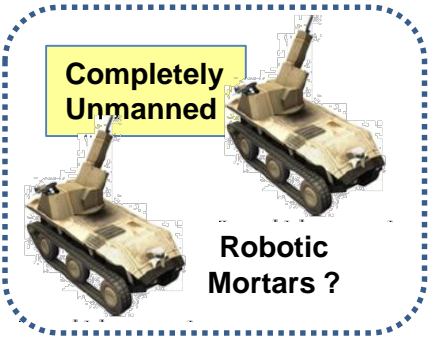
**NGCV
Optionally Manned
Fighting Vehicle**

**NGCV Manned
C2 vehicle
for RCV**



Crew: 2-3
Payload: 5-7 Dismounts
Total: 7-10

Crew: 2-3
Payload:
- RCV #1 C2 Station
- RCV #2 C2 Station
- Tethered UAS
Total: 7-8

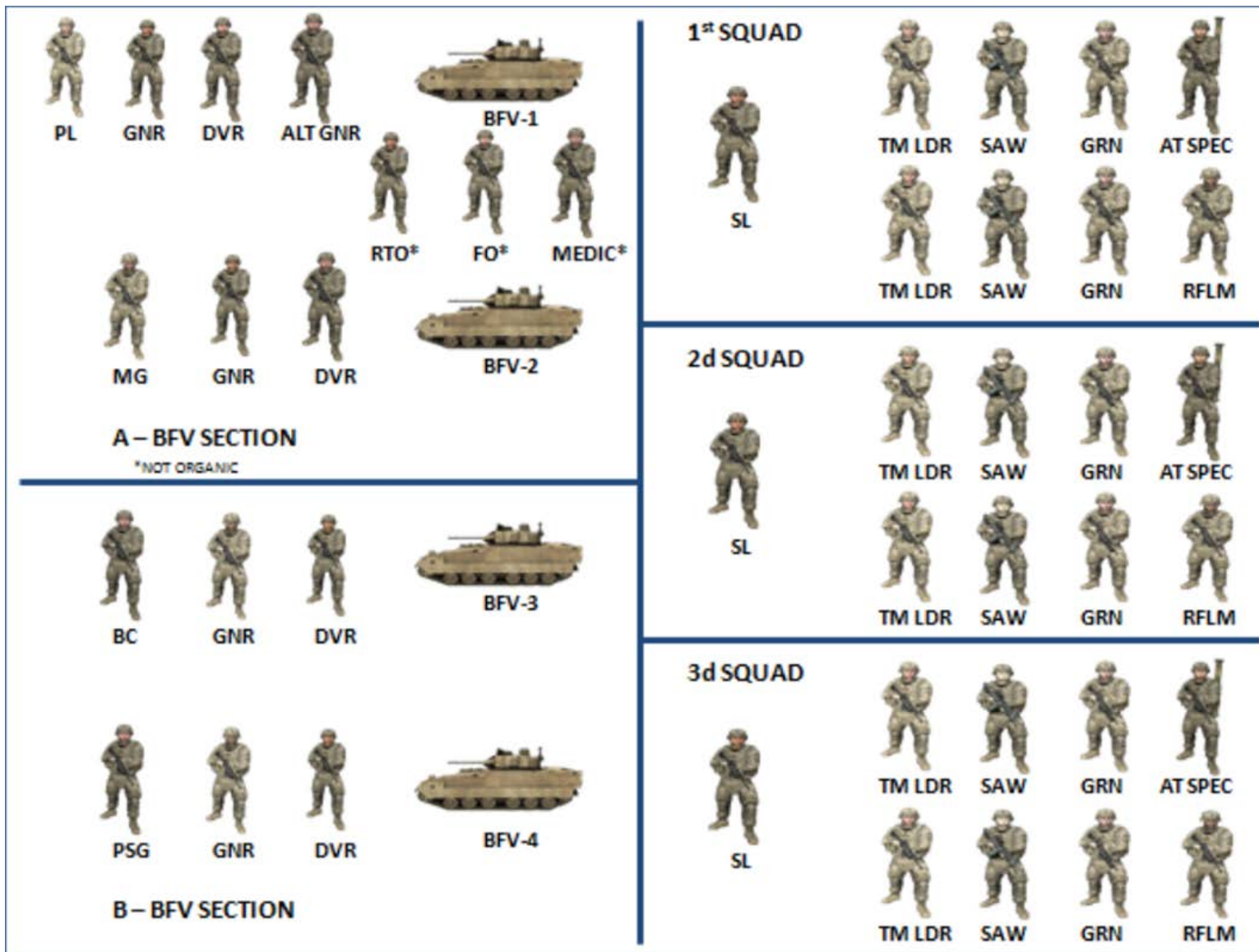




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Bradley Platoon

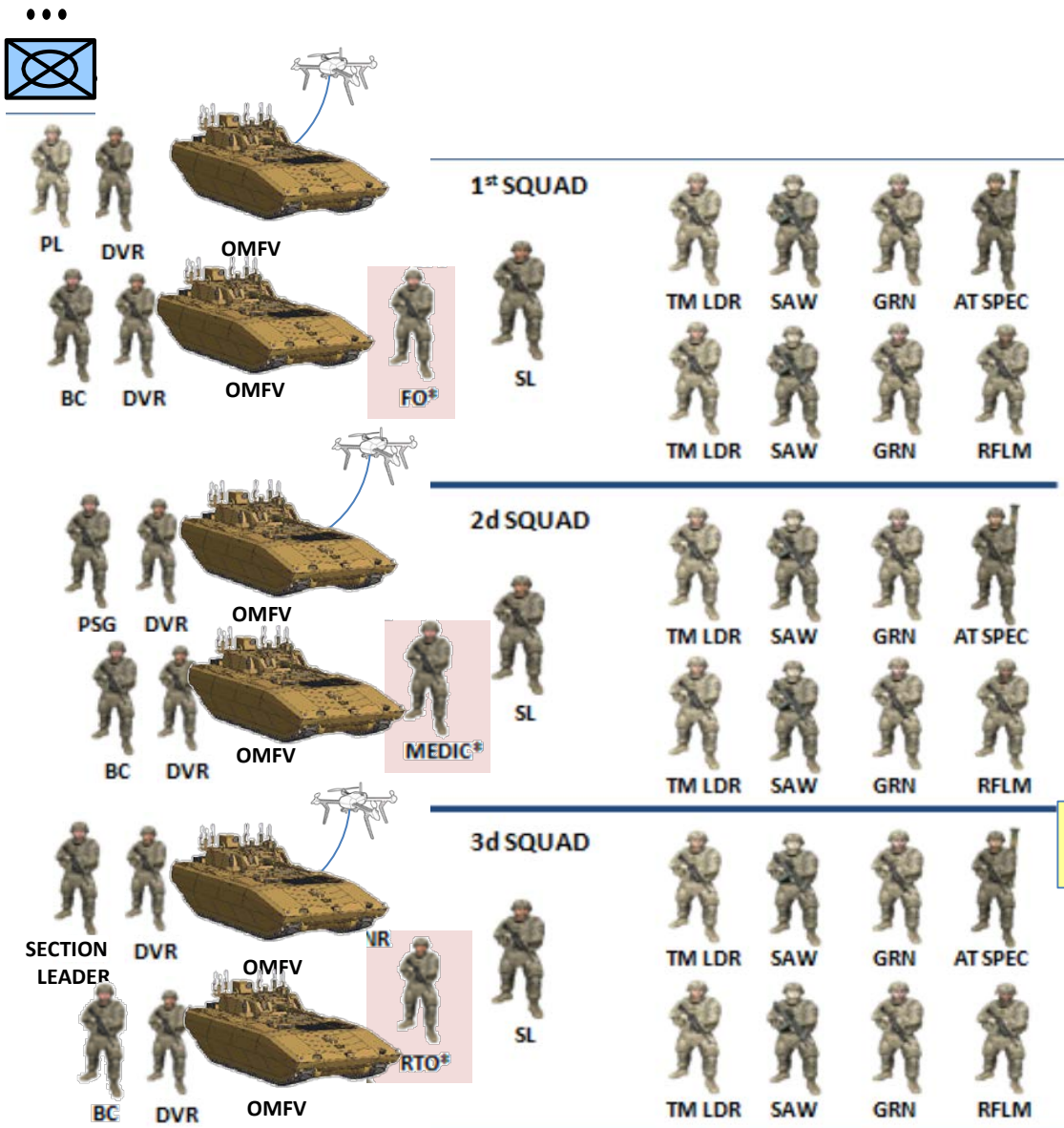
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Next Generation Combat Vehicle (NGCV) Mech Platoon Organizational Conc

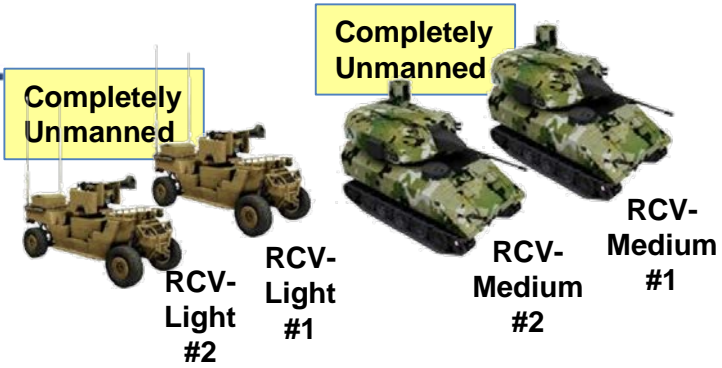
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	Bradley Platoon	NGCV Platoon	Delta
Personnel (w/ attachments)	40 (43)	39 (42)	- 1
Manned Veh	4	6	+ 2
Unmanned Veh	0	0	0

Two additional MFVs required to accommodate all three squads

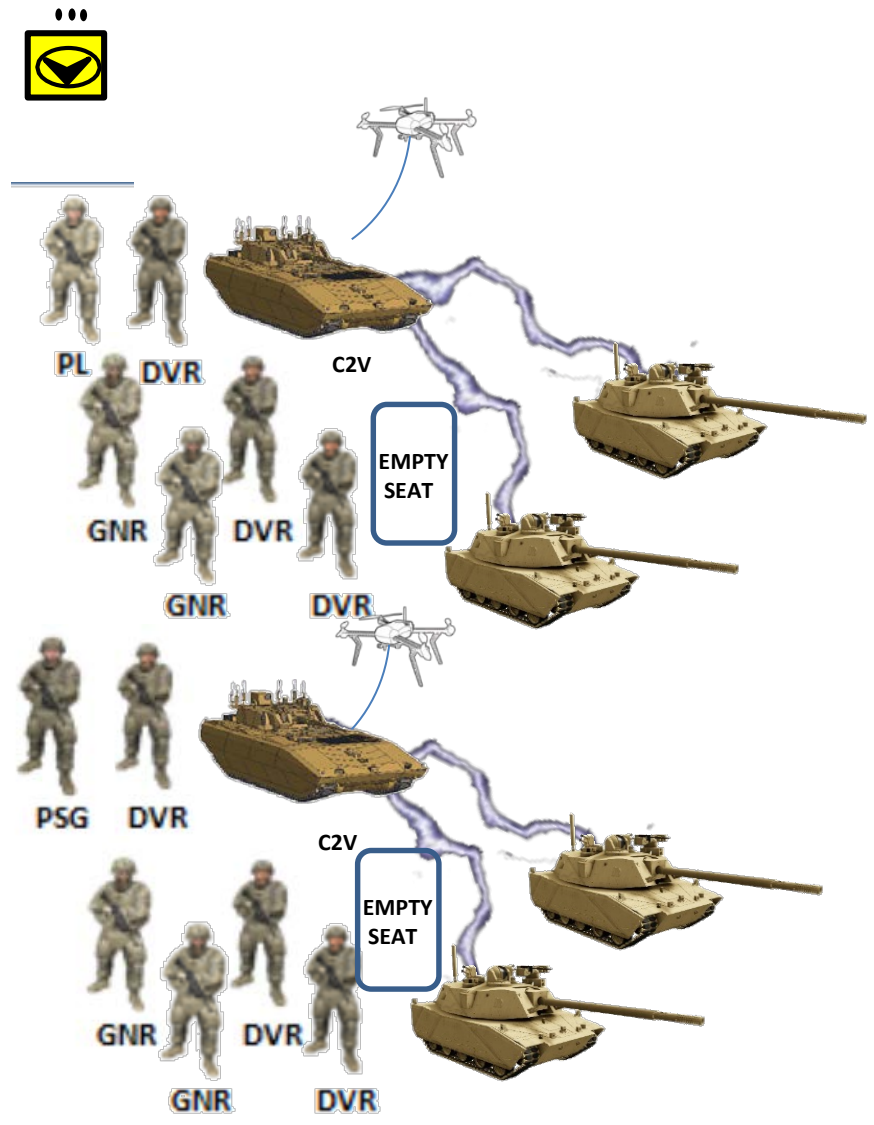
No room for additional growth or attachments





Next Generation Combat Vehicle (NGCV) Tank Platoon Organizational Concept

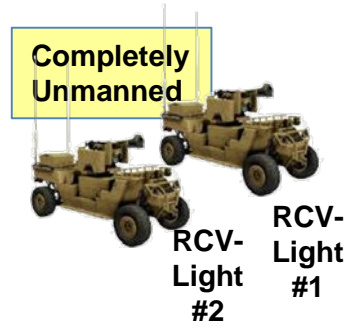
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	Abrams Platoon	NGCV Platoon	Delta
Personnel (w/ attachments)	16 (0)	12 (0)	- 4
Manned Veh	4	2	+ 2
Unmanned Veh	0	4	+ 4

Opportunity to add attachments
 Forward Observer, Medic, UAV operator, etc.

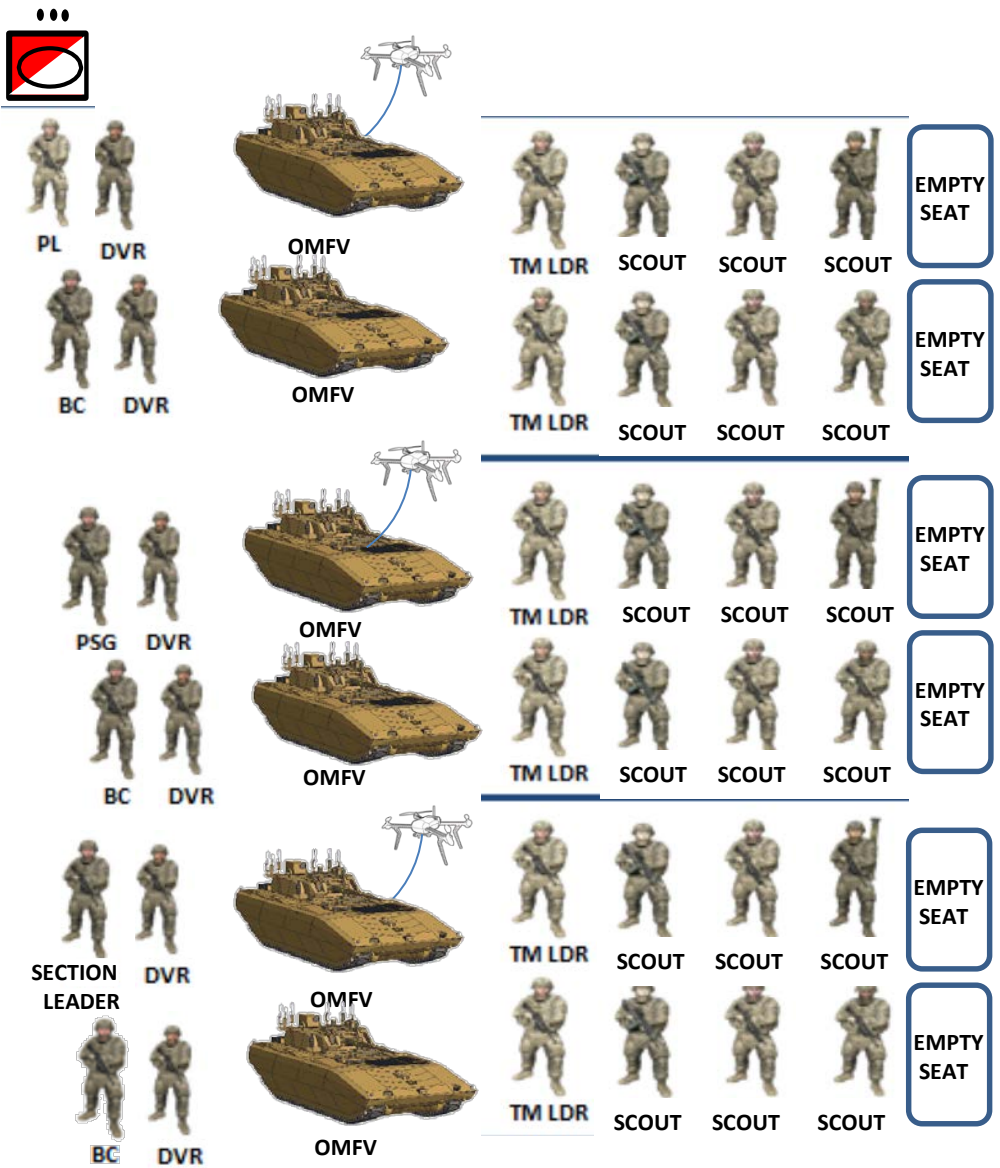
Does the Platoon Leader require an additional MFV for mobility not tied to RCVs?





Next Generation Combat Vehicle (NGCV) Scout Platoon Organizational Conc

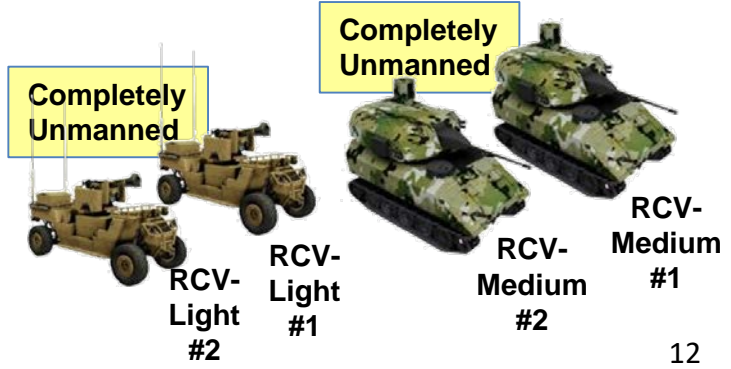
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	Bradley Scout Platoon	NGCV Scout Platoon	Delta
Personnel (w/ attachments)	36 (0)	36 (0)	0
Manned Veh	6	6	0
Unmanned Veh	0	0	0

Gunner position converted to Scout Team Leader increases dismounts from 18 to 24.

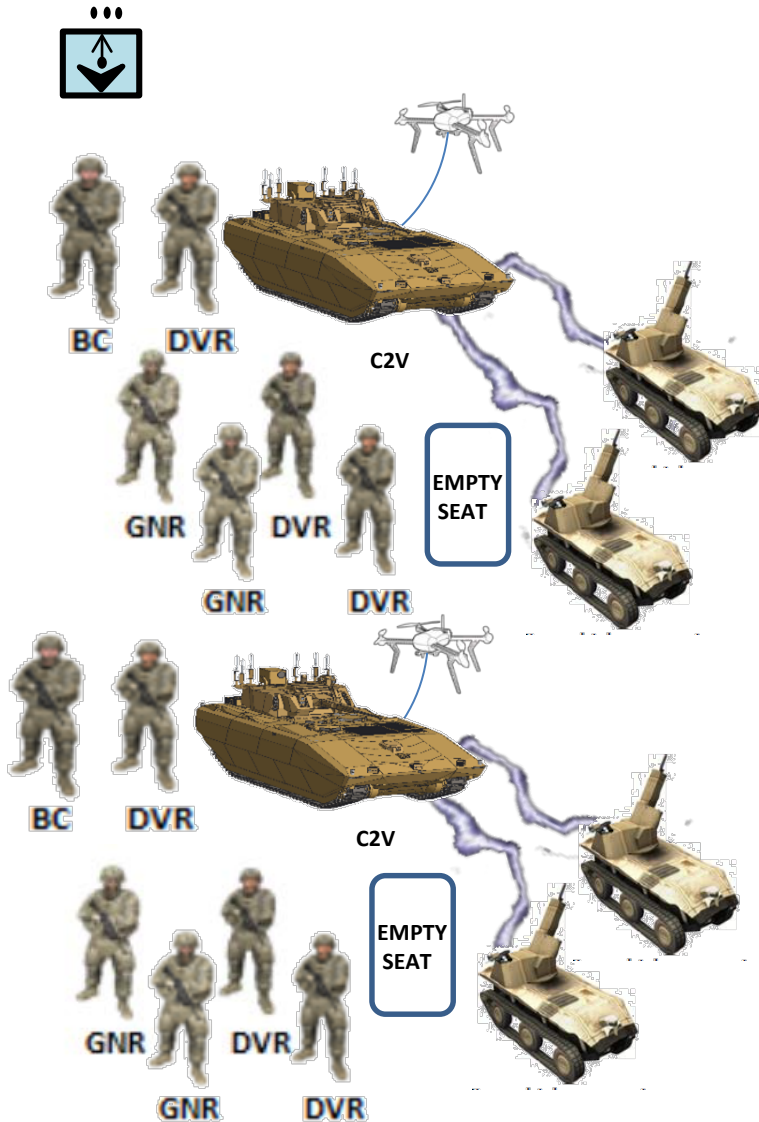
Opportunity to add attachments Forward Observer, Medic, UAV operator, etc.





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Next Generation Combat Vehicle (NGCV) Battalion Mortar Platoon Organizational Concept



	M113 Mortar Platoon	NGCV Mortar Platoon	Delta
Personnel (w/ attachments)	24 (0)	16 (0)	-8
Manned Veh	7	4	-3
Unmanned Veh	0	4	+4

FOR DISCUSSION
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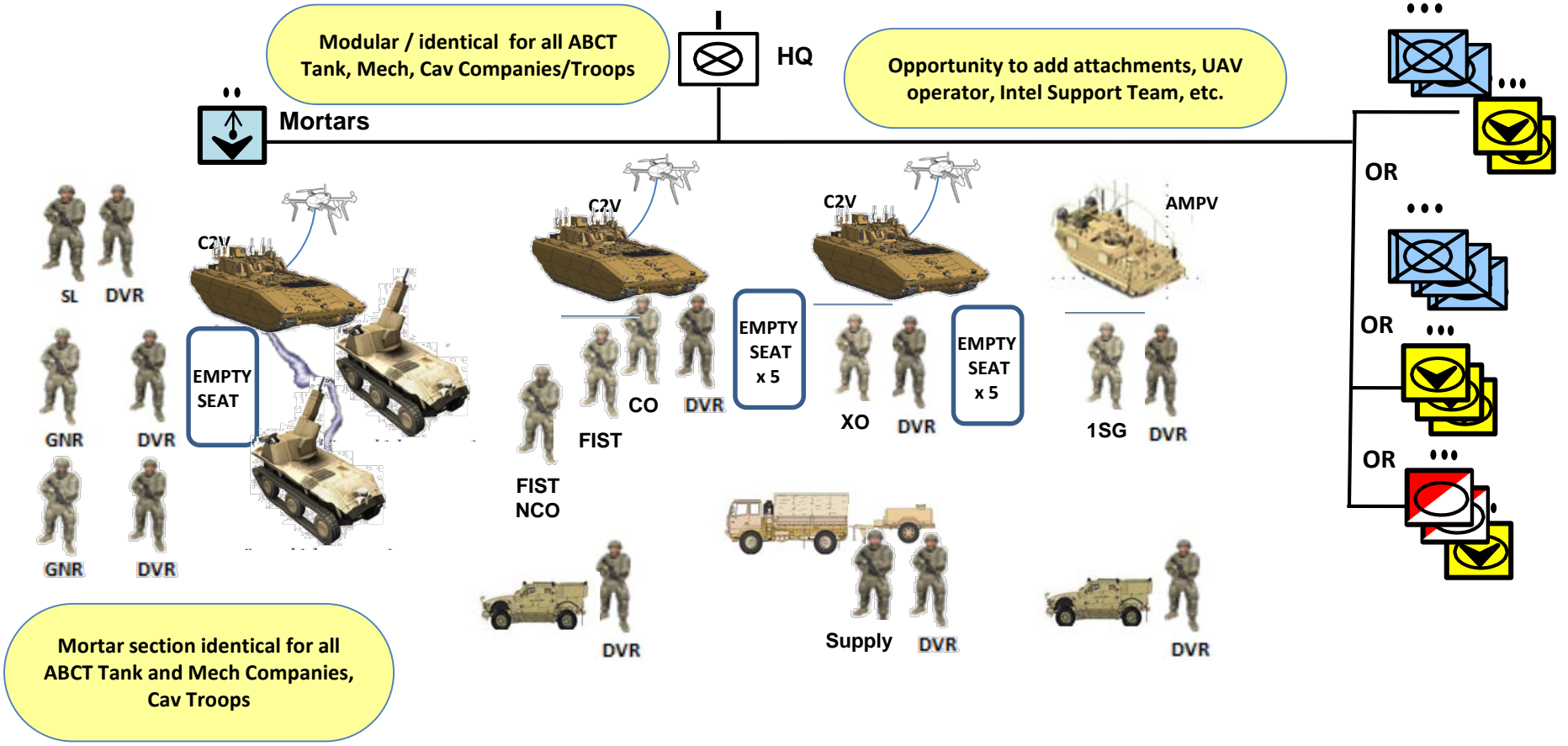
Opportunity to add Fire Direction Team, Medic, UAV operator, etc.





Next Generation Combat Vehicle (NGCV) Modular Company HQ Organizational Concept

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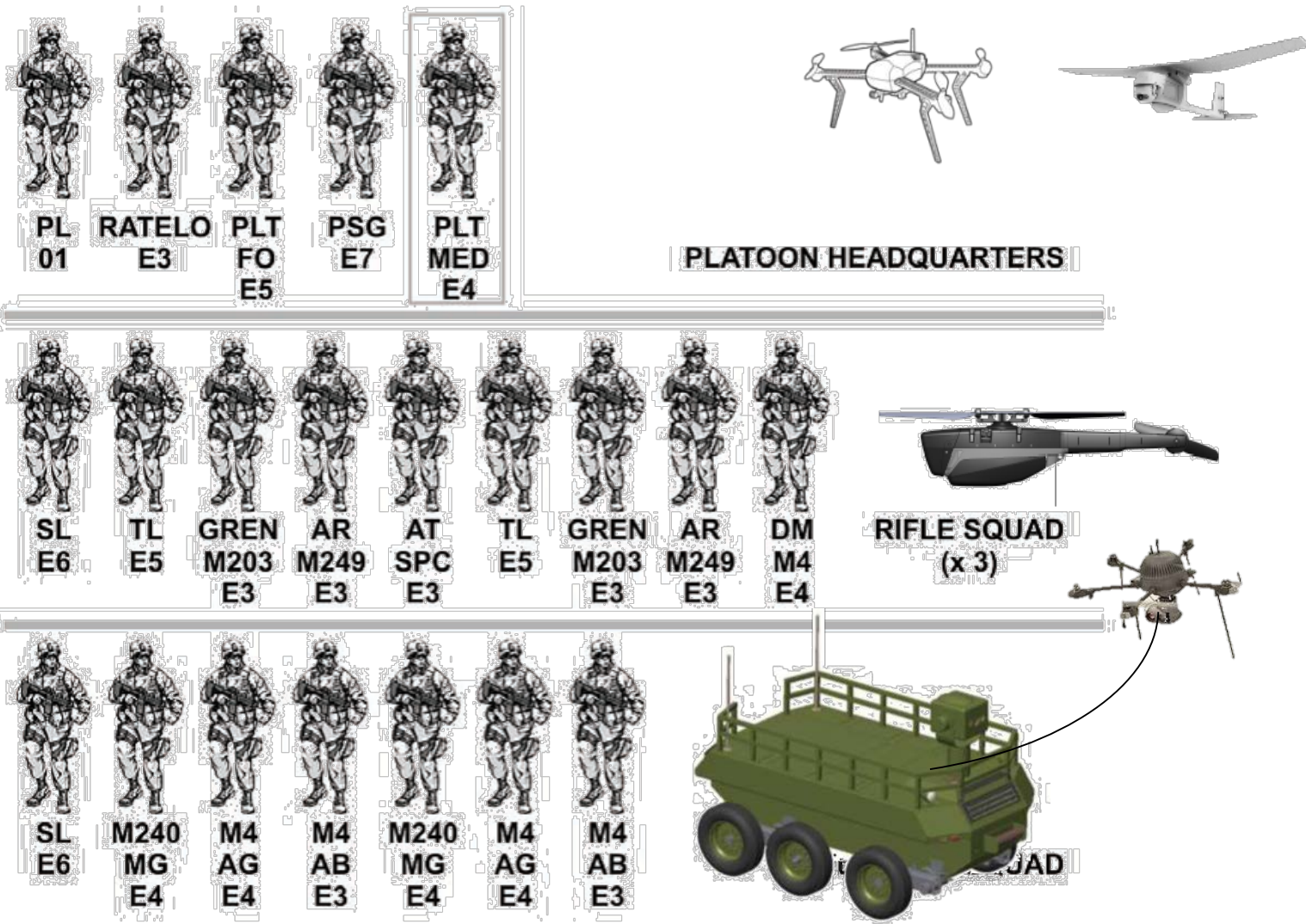




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Infantry Platoon

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Questions?