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# Framing the Army's Draft Robotic and Autonomous Systems (RAS) Plan

As the Army articulates RAS integration across multiple Warfighting Functions, this vision must also show **realistic objectives** in the **near-term**, **feasible objectives** in the **mid-term**, and **visionary objectives** for the **far-term**. Beginning with near-term objectives, each successive phase links its objectives to and builds from the achievements of the previous phase.

## Near-Term Vision- Adapt



### Near-Term Objectives:

- Leader-Follower Convoy Technology Employment
- Lighten the Soldier load
- Enhance stand-off from threats and improve situational awareness

## Mid-Term Objectives:

- Technologies improve the **autonomy** of unmanned systems
- Technologies will enable unmanned cargo delivery
- Robots act as "teammates" rather than tools
- Micro autonomous air and ground systems will also enhance Platoon, Squad, and Soldier situational awareness

## Mid-Term Vision (F2025)- Evolve

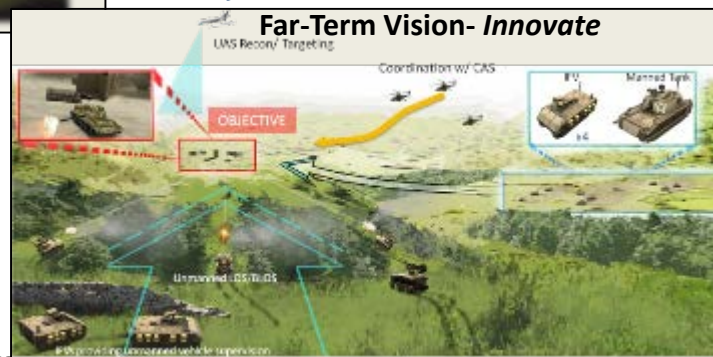


Source for All Listed Objectives:  
TRADOC Pam 525-3-1, Army  
Operating Concept, Appendix C-2.

## Far-Term Objectives:

Technologies will **enable manned and unmanned teaming in both air and ground maneuver** though investments in scalable sensors, scalable teaming, **Soldier-robot communication**, and shared understanding through advancements in machine learning.

## Far-Term Vision- Innovate





# PEO CS&CSS RAS Vision

- Evolutionary approach toward delivering autonomy enabled Warfighter capabilities to reduce operational risk
- Technology (software & hardware) enhancements are seamless & affordable to field standoff capability & intelligence to existing systems
- Deliberate management of program risk
- Affordable & timely programs
- Modular, open architecture design philosophy
- Innovative industrial base & acquisition environment





# PEO CS&CSS Robotics Overview



**Man-Transportable Robotics System Mark I & II (EOD)**



**M160 Light Flail**



**Semi-Autonomous Control  
Route Clearance & Interrogation System**



**Robotic Enhancement Program**



**Man-Transportable Robotics System Increment II**



**Common Robotic System Individual**



**Leader/Follower**



**Husky Mounted Detections System**

Talon IV	Packbot 510 FASTAC	SUGV 310 Mini-EOD	Dragon Runner	First Look

**Non-Standard Equipment**



**Squad Multipurpose Equipment Transport**



**Automated Convoy Operations**



# Man Transportable Robotic System (MTRS) Increment II

**System Description:** Remote controlled <160lbs tracked robot designed to provides stand-off capability for reconnaissance and hazard identification / IED threat.

## **Common Robotic Platform Enabling Payloads to Address the Operational Capabilities Gaps:**

- Standoff short range Intelligence, Surveillance, & Reconnaissance (ISR)
- Remote Chemical, Biological, Radiological, and Nuclear (CBRN) detection
- Explosive Obstacle Counter Measure (EOCM)
- Future Explosive Ordnance Disposal (EOD)
- Future Users: Engineer, CBRN, SOF, EOD



### **Future EOD Payload**

Single-Shot Disrupter



Firing Circuit



### **Base Platform** IOP V2.0 Compliant

### **CBRN Payload**



### **Common Payload**

Fiber Optic



Radios



Optics



Manipulator



- CPD: Approved, 15 MAY 2013
- RFP Release: 4QFY16
- Milestone B/C: 2QFY17
- Contract Award: 2QFY17
- AAO: 566



# MTRS Inc II: Post Industry Day Updates

## Acquisition Approach Update:

- Government has removed the option of using hulls from the Army fleet of medium sized robots as Government Furnished Equipment (GFE)
  - Government intent to provide Government developed standardized medium sized robot technical data package (TDP) remains unchanged from Industry Day release

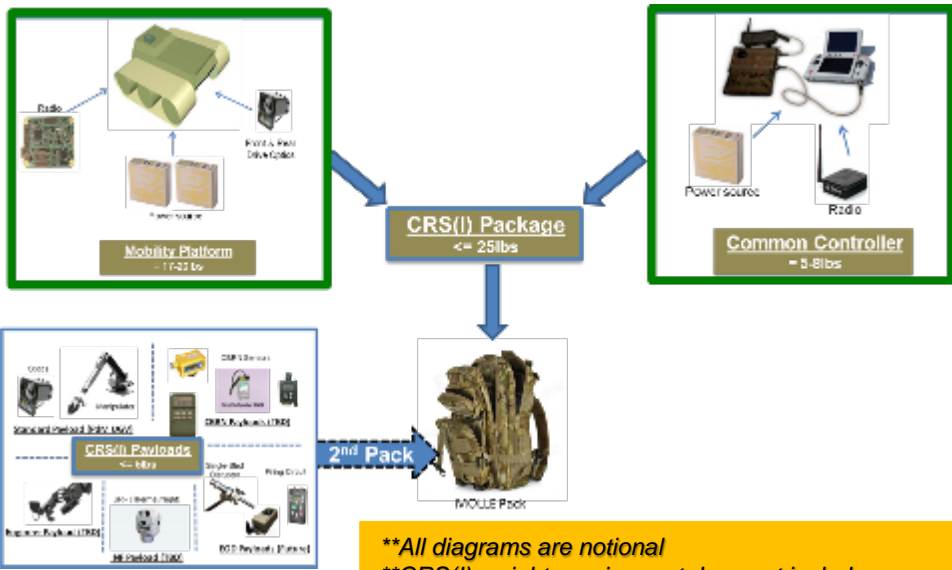
## Under Consideration:

- Revise optional use of Government Operator Control Unit software (i.e. Multi-Operator Control Unit – MOCU) to require the use of Government provided software for proposal consideration
  - Other related considerations: Government level of control and involvement with respect MOCU use: 1) Government controlled to include any and all required modifications, 2) Government provides limited modification control to selected contractor, 3) Contractor responsible for any and all modifications to MOCU

**System Description:** A man-packable (< 25lbs), miniature, highly mobile, unmanned robotic system with advanced sensors and mission modules for dismounted forces. Designed so that operators can quickly reconfigure for various missions by adding/removing modules and/or payloads.

**Common Robotic Platform Enabling Payloads to Address the Operational Capabilities Gaps:**

- Standoff short range Intelligence, Surveillance, & Reconnaissance (ISR)
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- Explosive Ordnance Disposal (EOD)
- Future Users: Engineer, CBRN, INF, EOD



- CDD: Pending G-3/5/7 final signature
- RFP Release: 1QFY17
- Milestone B: 3QFY17
- EMD Contract Award: 3QFY17
- AAO: 4,098

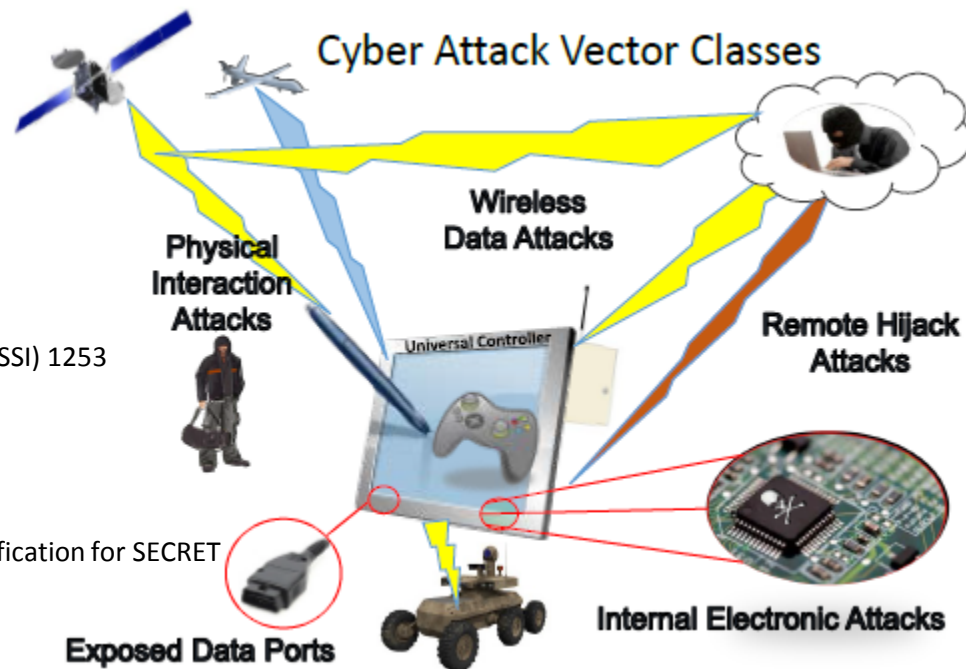
**\*\*All diagrams are notional**  
**\*\*CRS(I) weight requirement does not include payloads or manipulator (included in standard payload)**

- MDD revised from early to late 1QFY16
- RFP release revised from 4QFY16 to 1QFY17
- Milestone B and Contract Award revised from 2QFY17 to 3QFY17
- PDR moves from 4QFY17 to 1QFY18
- CDR moves from 1QFY18 to 2QFY18





# Top Level Cybersecurity Strategy for Controller



- **Characterize Cyber Risk**
  - IAW:
    - DoDI 8510.01 – Risk Management Framework (RMF)
    - Committee on National Security Systems Instruction (CNSSI) 1253
    - Federal Information Processing Standards (FIPS) 199
    - NIST SP 800-60, Volume I
- **Evaluate Necessary Cyber Controls**
  - Sampling of Candidates:
    - Wireless encryption IAW FIPS 140-2 for FOUO, NSA certification for SECRET
    - User authentication & login processes
    - Biometrics
    - Penetration tests during development process
- **Develop Acquisition/Programmatic Approach to Cyber**
  - IAW DoDI 8500.01 (Cybersecurity), AR 25-2
  - Cyber controls will be addressed in Systems Engineering Plan (SEP), Test & Evaluation Master Plan (TEMP), Program Protection Plan (PPP)
  - Envision cyber penetration testing during Developmental Testing (DT)
  - Potentially envisioning “cyber growth plan”, with initial fieldings addressing ground robots and other domains being added through system upgrades

Cybersecurity RFI for Controller in ~Feb 2016



# Route Clearance & Interrogation System Capability Overview

- Route Clearance & Interrogation System (RCIS) CPD consists of two capabilities that are unmanned, semi-autonomously controlled, highly mobile platforms to support Route Clearance Platoons and the BCTs.

- RCIS Type I:

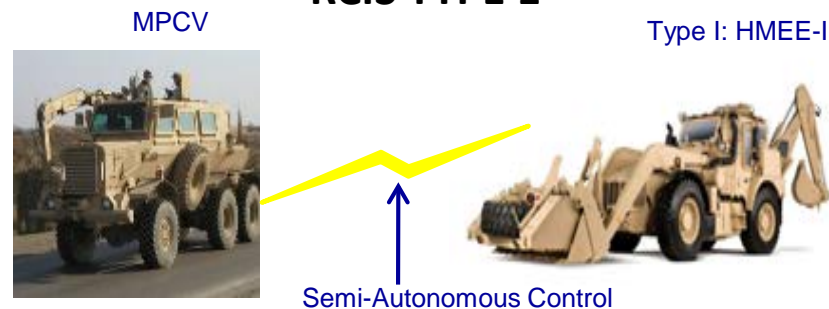
- Optionally manned or unmanned
- High Mobility Engineering Excavator (HMEE) capable of enabling Soldiers to semi-autonomously interrogate, excavate, and classify deep buried explosive hazards, IEDs, and caches.

- Draft RFP: Feb 2016
- Pre-Solicitation Conference: March 2016
- Issuance of RFP: June 2016
- MS B: 2QFY17
- Contract Award: 2QFY17
- AAO: ~260

- RCIS Type II to follow, leveraging technology and architecture from the RCIS Type I program

- RG31/MMPV unmanned capability
- Mine Roller & Blower route clearance operations

## RCIS TYPE 1



## RCIS TYPE 2 (Future Effort)





# Emerging Requirements





# Leader Follower

## Palletized Load System (PLS) A1

**System Description:** Appliqué System linking unmanned Follower PLSs to a soldier-operated Leader PLS vehicle for increased throughput and Soldier protection both on the road and off road. Calculates separation distances, provides status, and receives input from leader/followers.

Drive by Wire  
and Active  
Safety

Steering  
Braking  
Dashboard  
Data Buses (I/O)  
In-cab Camera  
Temperature Sensor  
Rain Sensor  
GPS and base maps

Rear and Side Radars  
Wheel Encoders  
Forward Radar  
Display

CDD  
(FY 16-17)

POM  
(FY 18-22)

EMD  
(FY18-20)

Leader Follower

LIDAR  
Tactical Radio  
Navigation Solution  
Cameras  
UWB Radios  
Fiducial Markers  
Computers



Provides Leader Follower Unmanned Capability to the PLS A1 Vehicle





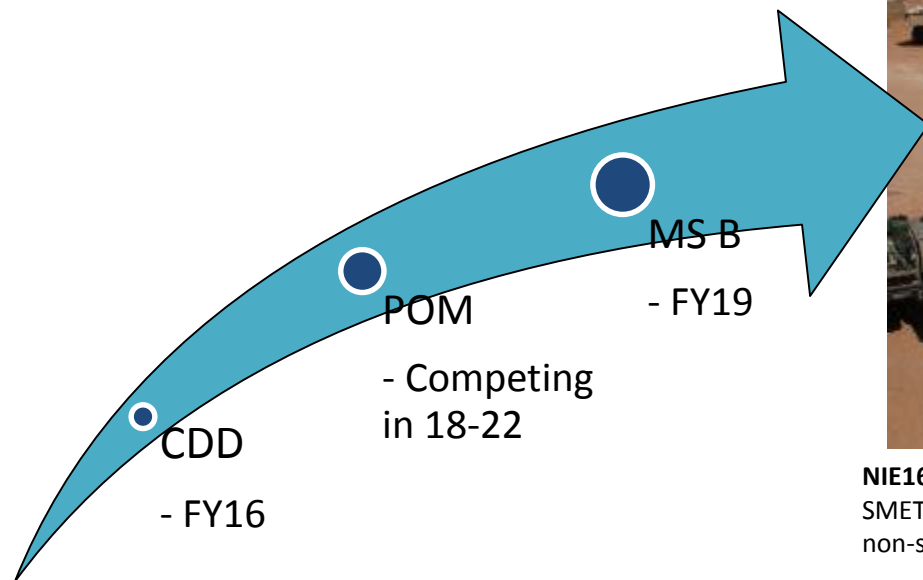
# Squad-Multipurpose Equipment Transport (S-MET)

## System Description

The S-MET will lighten Warfighter's load and sustain the force during ops. The S-MET will maneuver with the dismounted force and enable Warfighters to conduct operations carrying equipment required to conduct dismounted operations.

## Potential Capabilities

- Load Lightening
- 2-3 Sizes
- Tele-operate and Autonomy
- Adaptable to Squad Missions
- Resupply
- Extend Communications
- Reconnaissance
- Battlefield Sensors
- Squad Power Source

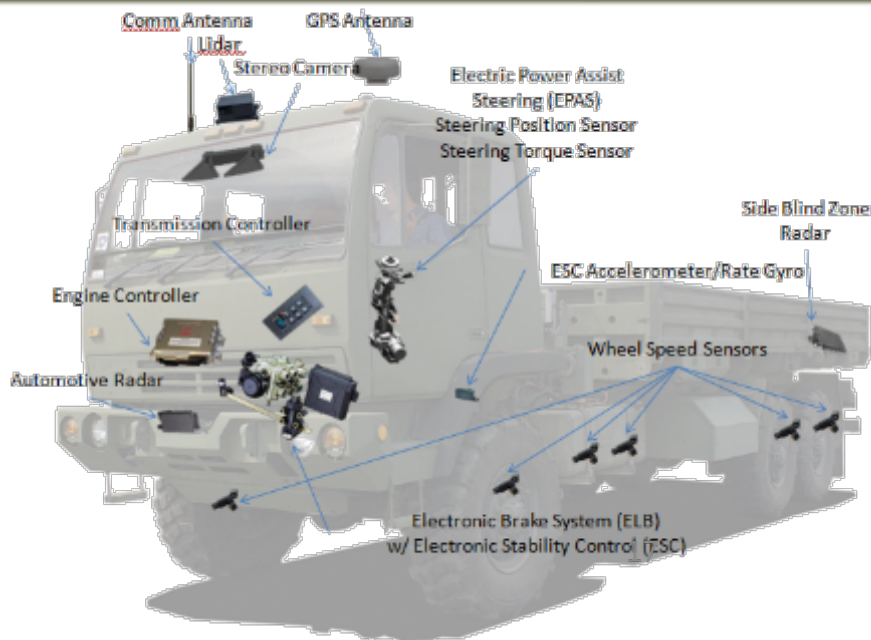


NIE16.1 OCT15

SMET Surrogates demonstrated reduced Soldier load, comms network extension, non-standard casualty evacuation, and battery charging capability



# Automated Convoy Operations



## Appliqué Kit



A-Kit  
Universal Brain



B-Kit  
Vehicle Specific  
Connectors



C-Kit  
Modular Sensors

Provides *optional* unmanned capability to *any* manned vehicle;  
from driver assist to automated driving and navigation



# Additional Strategic Initiatives

- Universal Controller
  - Architecture:
    - Working with NAMC to evaluate the use of the OSD Unmanned Control Segment (UCS) and SPAWAR Modular Operator Control Unity (MOCU)
  - Cybersecurity
    - Directed by Ms. Shyu to evaluate the cybersecurity posture of the system
- Interoperability Profile (IOP)
  - IOP V2 in final OPSEC review for official publish this month



# POCs

## PM Force Projection (FP)

Mr. Bryan McVeigh

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## PdM Unmanned Ground Vehicles (UGV)

Mr. Lou Anulare

[louis.a.anulare.civ@mail.mil](mailto:louis.a.anulare.civ@mail.mil)

## PdM Applique & Large Unmanned Ground Systems (ALUGS)

LTC Cory Berg

[cory.n.berg.mil@mail.mil](mailto:cory.n.berg.mil@mail.mil)

## Robotic Enhancement Program (REP)

Mr. Jim Muldoon

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## UGV IOP

Mr. Mark Mazzara

[mark.a.mazzara.civ@mail.mil](mailto:mark.a.mazzara.civ@mail.mil)





# Discussion





# M160 Robotic Mine Flail

## Program Description:

- Tele-operated Robotic system designed to protect Soldiers as they clear a minefield from a stand off distance.
- Rotating chain and hammer flail detonate or destroy antipersonnel mines in a 68-inch wide path.
- AAO is 72

## Program Status:

- Retrograde and Reset FY14-16
- ECP Production Contract: Feb 16
- First Unit Equip: Mar 17
- Fielding: FY17-19





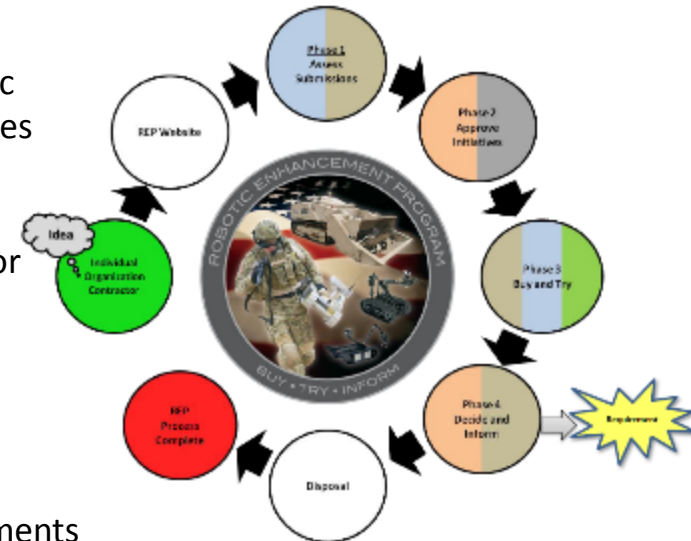
# Robotic Enhancement Program (REP)

**Problem:** Robotic technology is rapidly evolving. The standard requirements/acquisition timeline of 3 to 7 years increases the risk that robotic systems will be obsolete before it is fielded or more likely, before it even reaches Initial Operational Capability (IOC).

**Mitigation:** Evaluate small quantities of state-of-the-art robotic systems and/or payloads to inform the requirement and acquisition process.

## Concept:

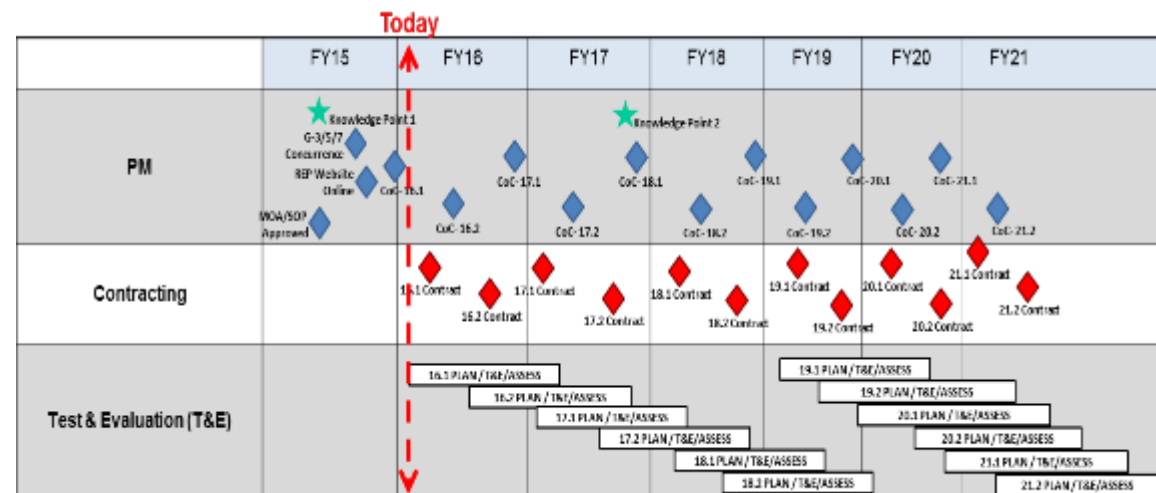
- Concept based off of Solider Enhancement Program
- REP is a special project (not a full life cycle acquisition program)
- Uses a “buy-try-inform” methodology to better inform future Army requirements



## Experiment Focus:

- Protect the Force
- Reduce Warfighters’ Workload
- Enable Situational Awareness
- Sustain the Force
- Enable Lethal/Non-lethal Engagements
- Reduce Cost

<http://www.peocscss.army.mil/rep.html>



Note: REP Counsel of Colonels (CoC) 16.2 Submission Deadline: 31 December 2015