PROJECT MANAGER FORCE PROJECTION

NDIA Quarterly Industry
PM Force Projection Portfolio Update
13 July 2017

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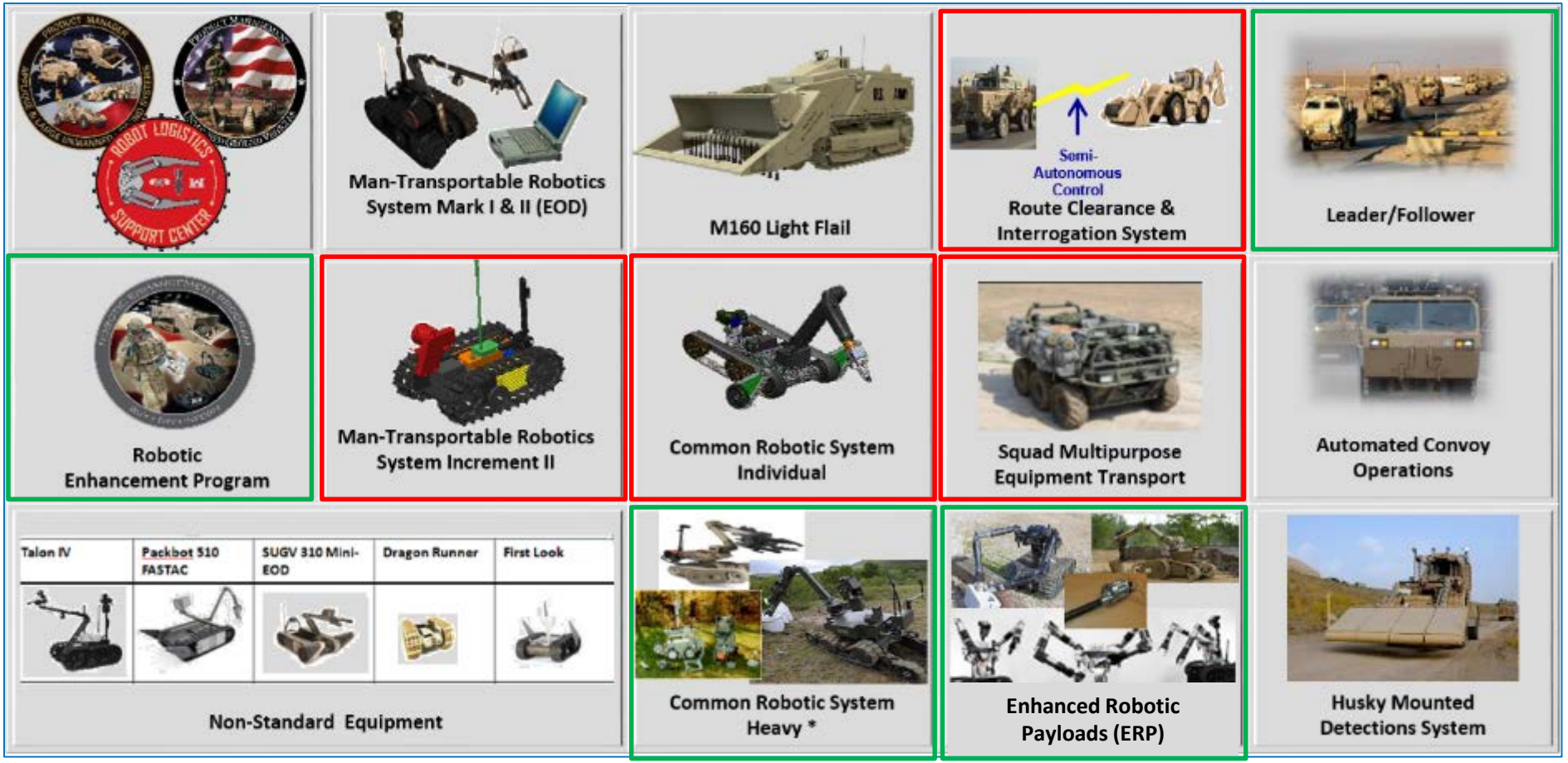
PdM Unmanned Ground Vehicles

PM FP Robotics Overview



*** Images are conceptual representations, not endorsements.**

RFP, Source Selection in process – Limited Discussion

Emerging Requirements / Programs

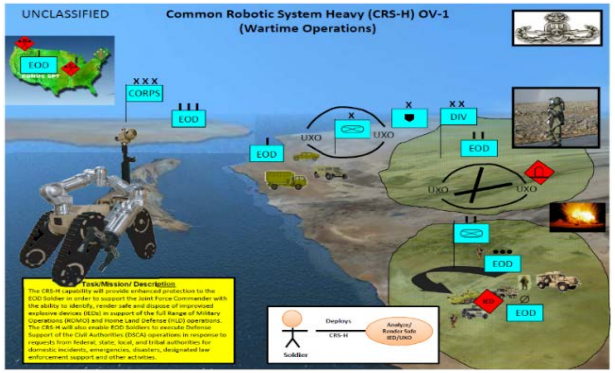
EMERGING REQUIREMENTS / PROGRAMS

Common Robotic System (Heavy) {CRS(H)}

System Description: The CRS(H) is the Army's large sized (<600 lbs), vehicle transportable, common robotic platform capable of accepting various mission payloads enhancing protection to the EOD Soldier by providing increased standoff capability to identify, render safe and dispose of explosive ordnance and improvised explosive devices in support of the Range of Military Operations and Homeland Defense operations.

Capabilities:

- Support collection, evaluation & exploitation of actionable explosive ordnance intelligence information
- Conduct reconnaissance, render safe, & handling of unexploded ordnance
- Conduct EOD operations in a CBRNE environment
- Perform highly dexterous manipulation on explosive ordnance from a safe distance

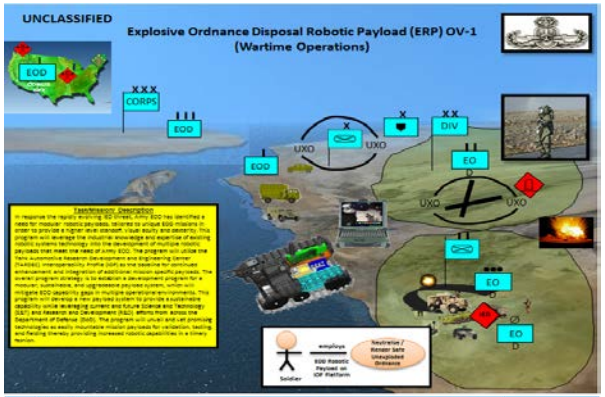


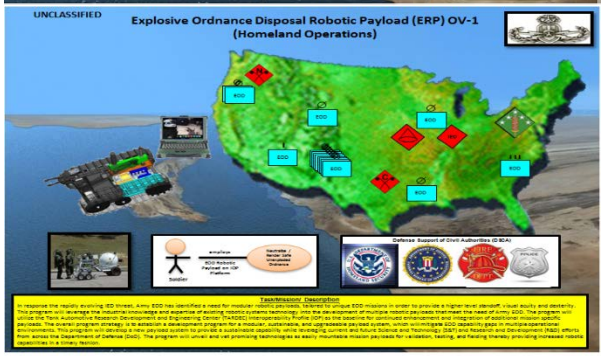
- **CPD: Projected 1QFY19**
- **RFP Released: TBD**
- **Milestone: TBD**

- **AAO: Projected 225**
- **Users: EOD and CBRN**

Enhanced Robotics Payload (ERP)

System Description: The ERP is a suite of modular capabilities designed with open architecture to provide and increased level of standoff, situational awareness, disruption capability and dexterity to respond to current and emergent Engineer, CBRN and EOD requirements. These next generation modular robotic payloads will use open architecture to increase the mission capabilities planned for the Man Transportable Robotic Systems (MTRS) Inc II and Common Robotic System (Heavy) (CRS(H)) platforms.





Performance Capabilities:

- Multi-Shot Disrupter / Fine Precision Aiming Module
- Dual Arm Manipulator
- Multispectral Overlay Camera
- Obstacle Avoidance / Mapping
- Extended Range Radio / Mesh Networking

*Only obstacle avoidance & Mapping and extended range/mesh networking will be fielded to CBRN units (B Kit)

- **CDD:** Staffing 3QFY17
- **RFP** Released: TBD
- **Next Key Event:** Material Develop Decision
- **AAO:** Projected 743 (Total A & B Kits)
- **Users:** Engineer, CBRN and EOD

Multi-Shot Disrupter & Precision Aiming

System Requirement: To provide a disruptor that provides multiple options for remote disruption while on target. The selectable disruptor is compatible with all types of Percussion Actuated Non-electric (PAN) ammunition to include water shot. The selectable disruptor will include a Bore-sight laser for precise aiming. It will quickly provide a complement of remotely accessible options to render safe EO.

Key Performance Parameters and Attributes:

- Compatible with PAN ammunition
- Provides five disruption options including one water shot
- Provides ability to remotely align and aim with a bore-site laser.
- Aiming at and hitting a standard 9v battery at 10 feet with a 90% success rate
- Moving on desired target within 30 seconds at 60-degree offset
- Capable of reducing the maximum impulse load of all PAN ammunition down to 500 lbs.

User(s):

- EOD

Research Level / Initiatives:

- Research Conducted through a Small Business Innovative Research
- Working Prototype with live fire demo
- Multi-Shot Disruptor: TRL5
- ARDEC has created a design/prototype for Precision Aiming; technology is mature

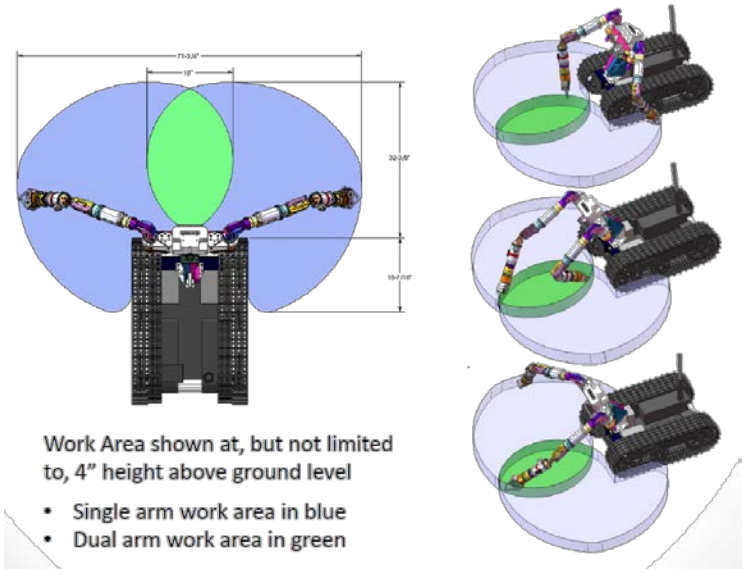
Dual Arm Manipulator

System Requirement: To provide a dexterous dual-arm heavy-lifting robotic manipulator for next generation robotic arms.

Key Performance Parameters and Attributes:
- Capable of remotely opening a zipped backpack within 30 minutes.
- Capable of picking up 90-300 pounds.
- Capable of picking up 12 pounds at full extension.

User(s):
- EOD
- CBRN
- Engineers

Research Level / Initiatives:
- REP 16.2 Limited Objective Experiment (June 17): Working Prototype on a Standardized Talon
- TRL5



Multi Spectral Overlay Camera

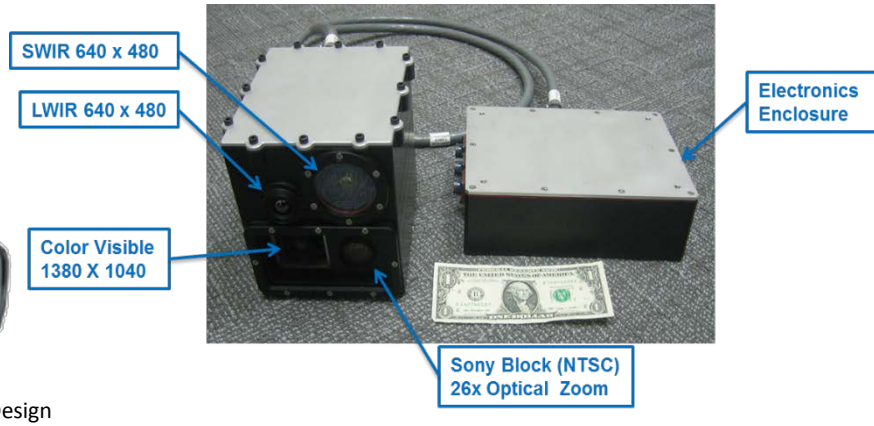
System Requirement: Superior situational awareness allowing the operator to spot surface anomalies and explosive ordnance indicators that are not visible when viewed in a single light spectrum. The system will fuse multiple video feeds from Shortwave Infrared (SWIR), Longwave Infrared (LWIR), and visible light cameras to produce a multispectral image in real time. Visual identification will be evaluated on dirt, paved and gravel roads.

Key Performance Parameters and Attributes:
- Visual Awareness: LWIR, SWIR, and visible light cameras
- Near/Far Visual Recognition
- Surface Anomaly Detection (detect recently disturbed earth)

User(s):
- CBRN
- Engineers
- EOD

Research Level / Initiatives:
- COTS technology currently very mature
- ARDEC initiatives indicate it can be developed for use quickly

*Conceptual Design



Obstacle Avoidance and Mapping

System Requirement: To provide autonomous/semi-autonomous obstacle avoidance with three-dimensional digital modeling that permits data from sensors to plot a path, indicate hazards as identified by sensors and track location.

Key Performance Parameters and Attributes:

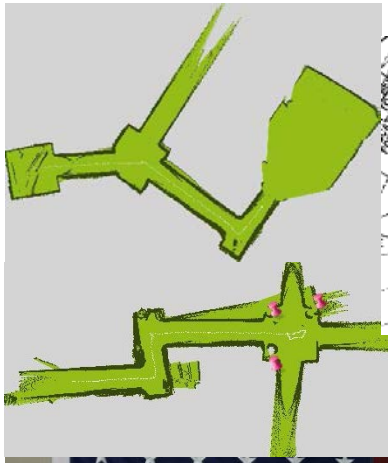
- Sufficient to digitally model the immediate area around the platform to a distance of 25-40 meters which enables walls and obstacles to be displayed
- Capable of automated return and obstacle avoidance when communication with OCU is lost
- Obstacle avoidance will be capable of being overridden or disabled and re-engaged w/o resting system

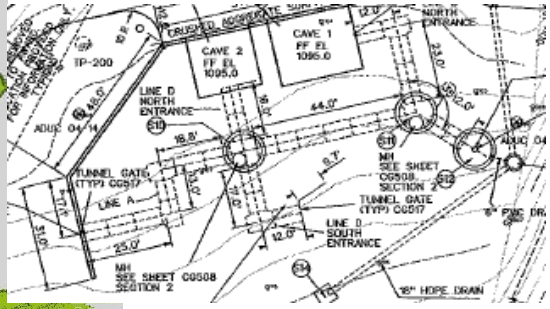
User(s):

- EOD
- CBRN
- Engineers

Research Level / Initiatives:

- REP 16.2 Limited Objective Experiment (Sep 16)
- Tech proven on flat ground; needs development for rough terrain
- Proved mapping capability, need development for improved maps and data reduction





Extended Radio Range and Mesh Networking

System Requirement: Provides dynamic high-bandwidth mesh networking capability that allows multiple robotic systems and repeater nodes to communicate and act as mobile self-healing networks.

Key Performance Parameters and Attributes:

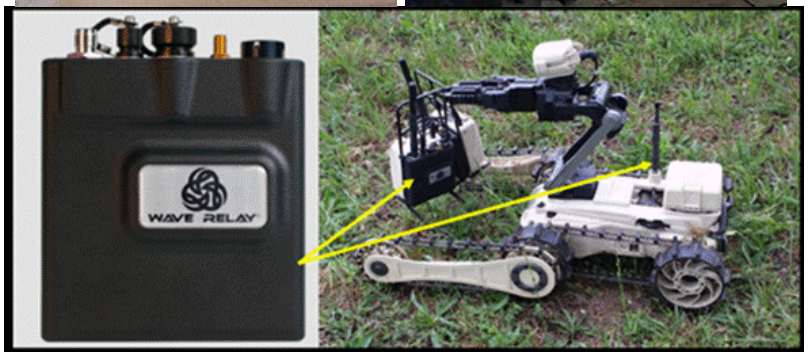
- Vehicle Kit that enables operation from within an armored vehicle
- Remotely deployable repeater nodes “Bread Crumbs” for Non-Line of Site (NLOS) subterranean operations.
- Obstacle avoidance will be capable of being overridden or disabled and re-engaged w/o resting system
- UAV and UAV repeater node with the ability to operate tethered and untethered with loiter ops between 0’-400’ (T).

User(s):

- EOD
- CBRN
- Engineers

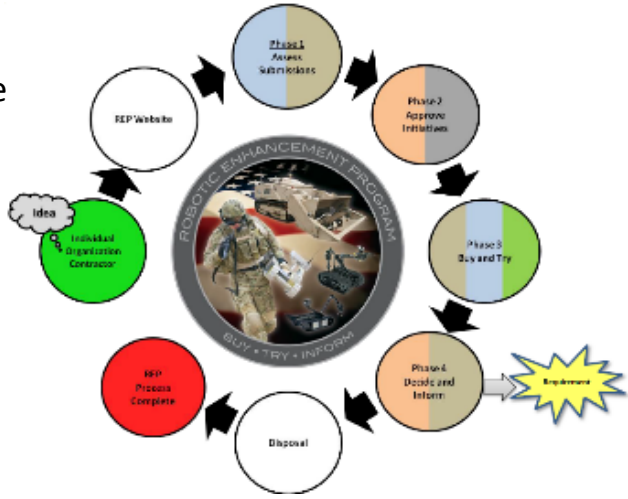
Research Level / Initiatives:

- REP 16.1 Limited Objective Experiment (Sep 16)
- Validated the concept that employing mobile tactical radio relay NLOS communications environments such as urban terrain on flat terrain only. More development needed for tactical environments.
- REP 17.2 Limited Objective Experiment (IPC-April 17)



Robotic Enhancement Program (REP)

Program Description: The Robotics Enhanced Program (REP) uses a "buy, try, and inform" methodology to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) material solutions that have the potential to enhance Soldier combat effectiveness. Operational user feedback and evaluation results obtained through REP is used to inform emerging capabilities and requirements documents to support future Army decision making.

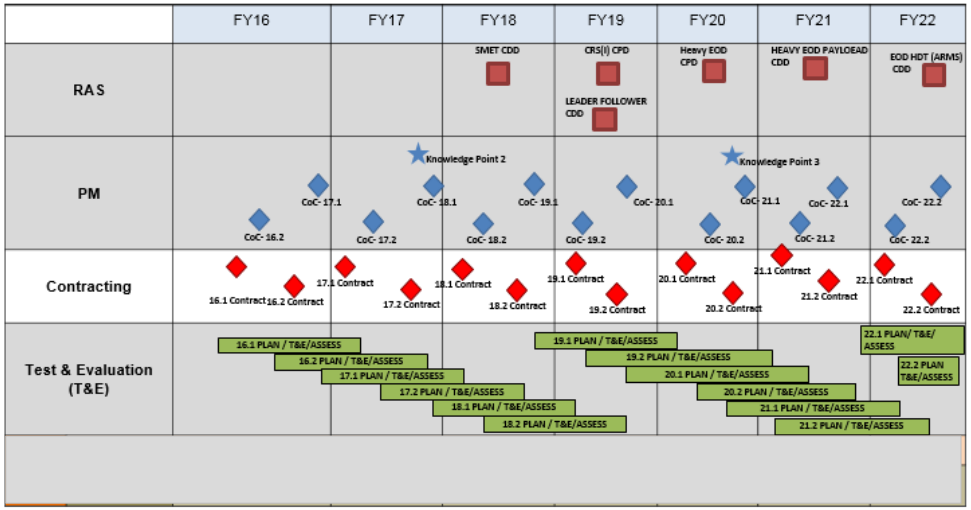


Concept:

- Concept based off of the Army Solider Enhancement Program (SEP)
- Evaluation tool to inform ongoing technology development or transition those capabilities to a Program of Record
- Uses a "buy-try-inform" methodology to better inform future Army requirements

Experiment Focus: 2017 RAS

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



REP Cycle 18.1 Initiatives – Under Development
REP Cycle 18.2 cycle closes in November 2017

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

REP Initiatives To Date

Complete

CoC 16.1

16.1 Submissions window closed 09/15

- REP begins with 16.1 submissions

Two REP Initiatives approved:

- Obstacle Avoidance and Mapping
- Extending Range

CoC 16.2

16.1 Submissions window closed 12/15

- Proposals pulled from 16.1 and 16.2 submissions

Four REP Initiatives approved:

- Heavy EOD CDD
- Offset Drop Zone (sensor)
- HDMS (Dual Robotic Arms)
- PACMAN SMET Expeditionary Bridge

In-Process

CoC 17.1

17.1 submission window closed 06/16

- Proposals taken from 16.1, 16.2 and 17.1 submissions

Four REP Initiatives approved:

- Universal Controller
- Sensor package
- SMET Directed Requirement Runoff

- Experiments expected to complete by 3QFY18

CoC 17.2

17.2 submission window closed 12/16

- Proposals pulled from 16.1, 16.2, 17.1 and 17.2 submissions

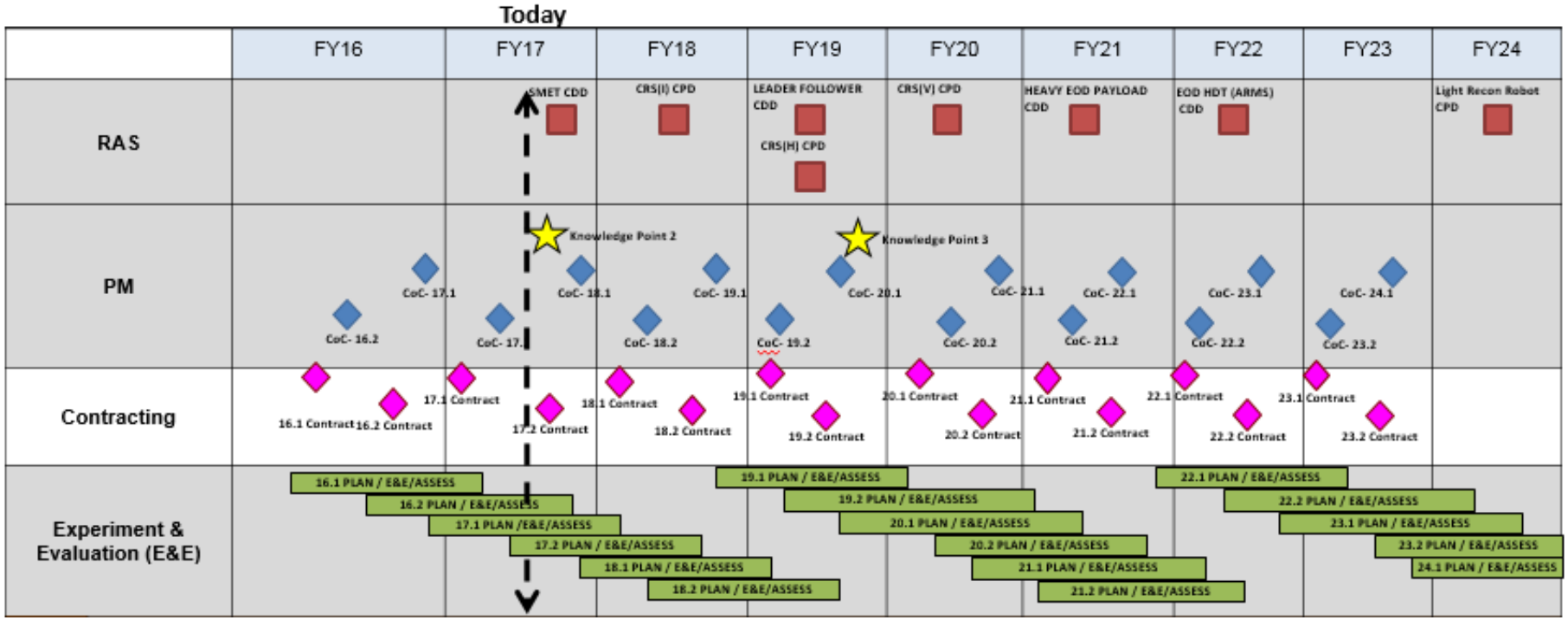
Four REP Initiatives approved:

- Light Reconnaissance Robot
- Render Safe – Sets, Kits & Outfits
- Wingman LoE
- Cyber Interrogation Capability

- Experiments expected to complete by 2QFY18

REP Evaluations Informing New Requirements

REP Schedule



Upcoming Key Events:

- **Council of Colonels (CoC) 18.1** is scheduled for August and will be co-chaired by the Director of Soldier Division and Project Manager Force Projection (PM FP) who are also advised by a REP Advisory Council consisting of the Centers of Excellence (CoE). The CoC will determine which REP submission will receive further testing and evaluation to inform requirments.
- **Knowledge Point 2 (KP2)** is an overall REP effectiveness assessment and will be used to determine if the program should continue, be modified, or terminated.

Discussion