PROJECT MANAGER FORCE PROJECTION

Army Robotics Portfolio:
NDIA Robotics Division
December 2016

Bryan J. McVeigh

PM Force Projection

Framing the Army's Robotics and Autonomous Systems (RAS) Strategy

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*

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.

Near-Term Objectives:

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

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*
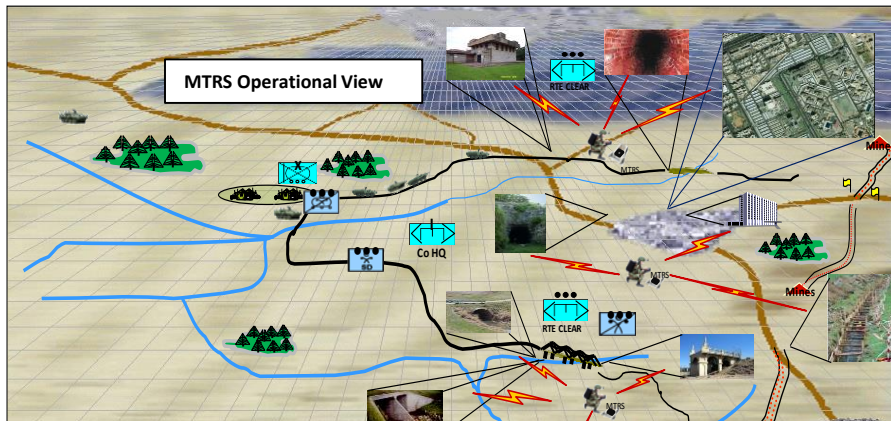
PEO CS&CSS Robotics Portfolio

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

M160 Light Flail

Semi-Autonomous Control
Route Clearance & Interrogation System

Leader/Follower

Robotic Enhancement Program

Man-Transportable Robotics System Increment II

Common Robotic System Individual

Squad Multipurpose Equipment Transport

Automated Convoy Operations

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

Non-Standard Equipment

Common Robotic System Heavy *

EOD Robotics Payload *

Husky Mounted Detections System

* Images are conceptual representations, not endorsements.

MTRS Inc II Program Overview / Update

MTRS Operational View

MTRS Baseline — Common Payloads: Fiber Optic, Manipulator, Optics, Radios

Autonomous Mine Detection System (Payload) — Engineers — PdM Counter Explosive Hazard, (PEO Ammo)

CBRN Payloads (Chemical Units) — JPM Nuclear Biological Chemical (PEO Joint Bio Chem Defense) — CBRN Sensors — FirstDefender RMX

Base Platform — IOP V2.0 Compliant — Notional Design

Robotic Deployment System — PM Assured Mobility Systems

- The Man Transportable Robotic System (MTRS) Inc II is a remotely operated, man-transportable, robotic system

- Provides a standoff capability to interrogate, detect, confirm and neutralize presence across War-fighting functions

- Capability to identify and disposition explosive hazards

- Army's medium sized common platform allowing use of various platform payloads in support of current and future missions

* AAO includes EOD requirement of 587
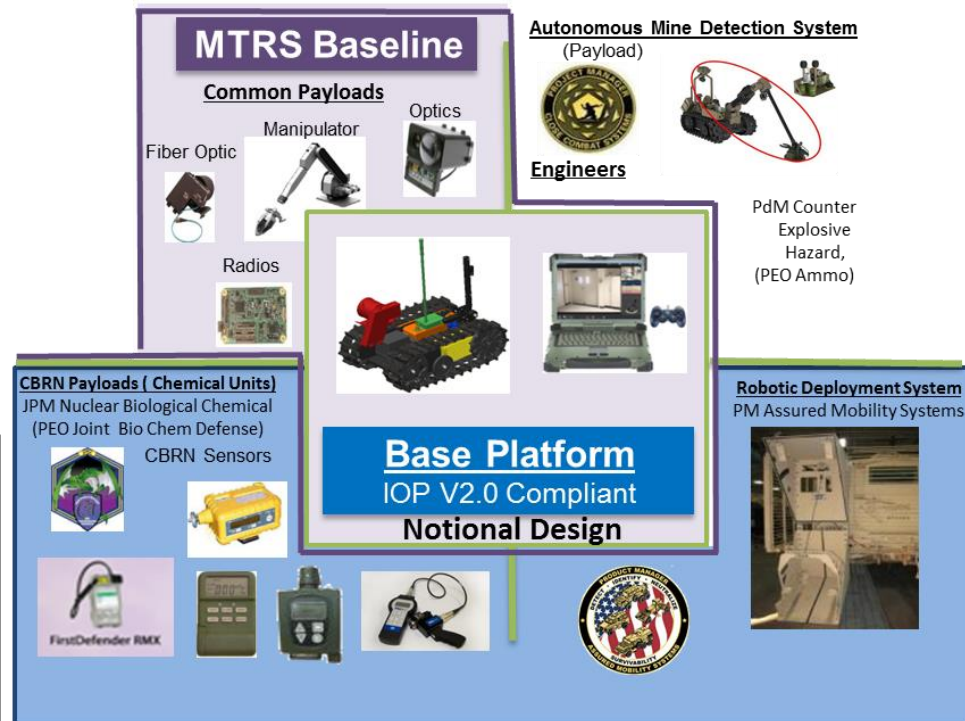
- **CPD: Approved, 15 MAY 2013**
- **RFP Released: 09 NOV 2016**
- **Contract Award: 3QFY17**
- **AAO: 1,210**
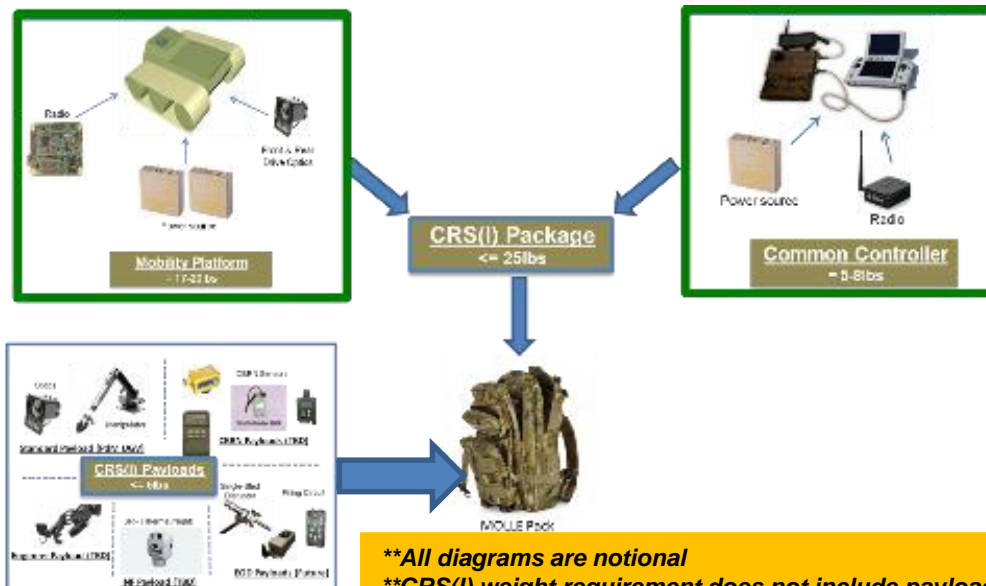- **Users: Engineer, CBRN and EOD**

Common Robotic System (Individual) {CRS(I)}

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)
• Remote Chemical, Biological, Radiological, and Nuclear (CBRN) detection
• Remote Explosive Obstacle Counter Measure (EOCM)
• Remote Explosive Ordnance Disposal (EOD) operations
• Remote clearance of danger areas
Users: INF, CBRN, ENG and EOD (EOD equals ENG payload; no unique requirement)

- **AAO: 3,258 (Does not include Marines)**
- **CDD: Signed 5 JAN 16**
- **Milestone B: 4QFY17**
- **EMD Contract Award: 1QFY18**
- **Milestone C: 4QFY20**
- **IOC: 4QFY22**

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

5
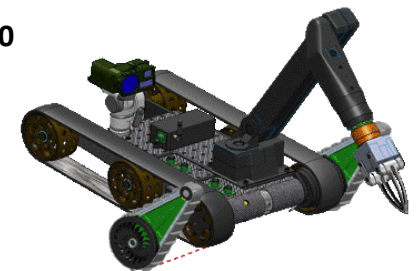
A CRS(I) Special Notice has been released on FedBizOps

Solicitation Number: W56HZV-16-R-CRSI

https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=76fdf5b149e501 8f29aa113d7330e8c1&_cview=0

The next Special Notice provides details of how CRS(I) RFP may require offerors to perform a self-assessment of the maturity using the following levels of assessment:

1. **Requirement Analysis:** Requirements decomposition complete; Functional baseline complete; Derived requirement development complete; Interfaces assessment complete; Decomposition of System Integration requirements contained within the performance specification complete(Address both Sections 3 and 4 of the performance specification)

2. **Preliminary Design Analysis:** Allocated Baseline complete; Component Analysis / Selection complete; CAD Models complete; Weight Estimate; Interface Designs complete; Modeling and simulation of the system design using LS-Dyna or comparable program complete

3. **System Integration, Testing and Analysis in Lab:** Architectures (OCU, MBP, Radios, and Payloads) complete; Analyze materials – types, weight, cost, availability – for the OCU, Mobility Base Platform (MBP), Radios, Payload Integration components including arm, fiber optic spooler and cameras; System Integration, Testing, and Analysis completed in laboratory environment on the following sub-systems: OCU, MBP, Radios, Payloads to include arm, fiber optic spooler and cameras.

4. **System Integration, Testing and Analysis in Relevant Environment:** Architectures completed for OCU, MBP, Radios, and Payloads. Analyze materials – types, weight, cost, and availability – for the OCU, MBP, and Radios, Payload Integration components including arm, fiber optic spooler and cameras. System Integration, Testing, and Analysis completed in a relevant environment on the following sub-systems: OCU, MBP, Radios, Payloads including arm, fiber optic spooler and cameras.

Note: A higher level assessment is considered as more mature; therefore, represents a lower risk proposal.

The Government will conduct a credibility assessment on test data provided by offerors based on:

1. The article that was tested
2. The degree to which the article that was tested represents the proposed design
3. What entity conducted the test (in order of descending credibility)
   a) Government Conducted Testing
   b) Testing Conducted by an Independent Laboratory or Test Firm
   c) Testing Conducted by the Offeror

Route Clearance & Interrogation System (RCIS)

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.
    - **CPD: Approved, Dec 2012**
    - **Industry Day:** 1-2 Aug 2016
    - **RFP Release:** 2QFY17
    - **Milestone B:** 1QFY18
    - **Contract Award:** 1QFY18
    - **AAO:** 260
- RCIS Type II to follow, leveraging technology and architecture from the RCIS Type 1 program

RCIS TYPE I

MPCV

Type I: HMEE-I

Semi-Autonomous Control

RCIS TYPE II

MMPV

MMPV Type II

Semi-Autonomous Control
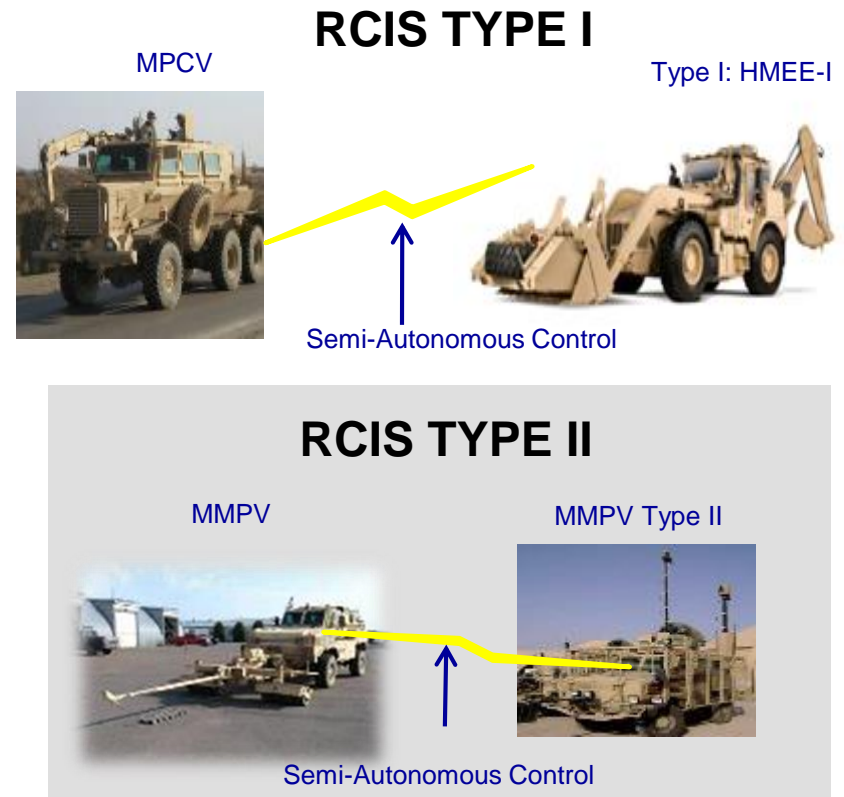
Squad Multipurpose Equipment Transport (SMET)

System Description: The SMET will lighten the Warfighter's load and sustain the force during operations. The SMET will maneuver with the dismounted force and enable Warfighters to conduct operations carrying equipment required to conduct dismounted operations.

Potential Capabilities:

- Load Lightening
- *One Size* Platform
- Resupply

- Tele-operate and Automation
- Adaptable to Squad Missions
- Reconnaissance

- *Multiple Payload integration*
- *3KW* Squad Power Source

2017 P-Spec Development

January 2017 AROC CDD Approval

CDD Writers Workshop
 -25-29 Aug ➡ RFI Pending

 -1-3 June ➡ RFI Generated

NIE16.1 OCT15
SMET Surrogates demonstrated reduced Soldier load, commo network extension, non-standard casualty evacuation, and battery charging capability

Robotics 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

MTGR© Range Extending Subterranean

MTGR© Obstacle Negotiating

MTGR© Mapping

Breadcrumbs

HDT © Expeditionary Bridge

Tethered Mast LiveSky ©

RE2 © HDMS

User interface

Note: REP 17.2 Submission Deadline: 09 December, 2016

Interoperability Profiles (IOPs) Status

- ## RAS-Ground IOP Standard
  - IOP V2 published February 2016
  - IOP V3 under development – target publish date December 2017

- ## IOP Instantiations
  - Instantiations included in upcoming RFPs:
    - MTRS Inc II
    - CRS(I)
    - RCIS
  - Upcoming IOP Instantiation developments:
    - SMET
    - Leader Follower
    - CRS(H)
    - EOD Robotic Payload

IOP V3 Priorities

- Define optimal level of interoperability & modularity for SMET & ground vehicle applique autonomy strategy
  - Enable evolutionary upgrade of autonomy kit to support continued advancement
  - Do not compromise industry's ability to innovate
  - Focus on SMET & Heavy Tactical Vehicles
  - Resolve concerns over safety criticality (JAUS/Ethernet vs. J1939/CAN vs. others)

Collaboration Opportunities

- PM FP is working with the National Advanced Mobility Consortium (NAMC) on the following initiatives:
  - Open architecture & reference implementations for Universal Controller software
    - ✓ AUG 16: Controller Hardware with Simulated Robot
    - ✓ SEP 16: Active/Passive UGV with Passive UAV Control (Simulated Flight) in Controlled Environment (Warren, MI)
    - FEB 17: Full Active/Passive control of UAV and UGVs in Operationally Relevant Environment (Ft. Benning)
  - Interoperability Profile (IOP) promulgation
    - Supporting development of IOP V3 (SMET; Leader/Follower; ACO)
    - Creating prototype/surrogate IOP Instantiations (generic small robot, generic medium robot, SMET-surrogate)
  - Performance Specs: Establishing collaborative roundtable sessions with industry (Pilot: SMET)
- Logistics: Video Technical Manuals (Target Programs: Load Banks, MTRS Inc II, CRS-I)

SMET P-Spec Initiative

- Collaborative, front-end effort between NAMC & Government to inform development of the performance specification for the SMET program of record

- Stage 1 (RFI Process): *Now through February 2017*
  - Solicit written input from NAMC members on initial draft p-spec
    - Technological feasibility, ROM cost, proposed evaluation criteria, etc.
  - Use input to determine key, residual issues requiring further consideration

- Stage 2 (Task Request Process): *January through July 2017*
  - Organize and conduct roundtable sessions* to address key, residual issues in four anticipated focus areas:
    - Mobility/Automotive, Autonomy, Survivability, Cyber/Radio
  - Consolidate feedback into a final report to Government

- Stage 3: *Late 2017*
  - Government prepares & publishes final draft p-spec for final public comment
  - Government considers final public input and finalizes the p-spec

* Three or more participating companies per session has been deemed sufficient to mitigate potential COI

SMET P-Spec Initiative – Provisional Timeline

FY17									
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul

RFI Process

▲ Submit RFI to ACC-NJ for Approval (1-Nov)

▲ Publish Intent to Issue RFI to NAMC in FedBizOps (15-Dec)

▲ Issue RFI & Publish Initial Draft p-Spec to NAMC Members (2-Jan)

▲ Written Feedback on Initial Draft p-Spec Due to Gov't (3-Feb)

Timeline keys off the date that the Initial Draft p-Spec can be published to the NAMC Membership

◆— NAMC Members Prepare Written Comments (2-Jan – 3-Feb) —◆

Schedule may be accelerated

Task Request Process

NAMC / Gov't Review & Consolidate P-Spec Input, Identify Key Issues, & Document Findings (3-Feb – 31-Mar)

NAMC / Government Plan & Organize Roundtable Sessions Logistics (1-Apr – 31-May)

▲ Submit Task Request SOW to ACC-NJ for Approval (15-Nov)

▲ Release Solicitation to NAMC Members for SME Leads (15-Feb)

▲ Proposals to Serve as SME Leads Due (28-Feb)

▲ Publish Consolidated p-Spec Feedback & Key Issues List (31-Mar)

▲ NAMC Delivers Final Report (31-Jul)

Timeline shows holding off on soliciting SMEs until initial written feedback can be reviewed to confirm the areas of focus

NAMC/ Gov't Review Proposals & Select SMEs (1-Mar – 31-Mar)

SMEs / Government Conduct any Required Technological Investigations & Prepare for Roundtable Sessions (1-Apr – 31-May)

NAMC/SMES/Gov't Conduct Roundtable Sessions with NAMC Members (1-Jun – 30-Jun)

SMEs Prepare Final Report Documenting All Findings (1-Jul – 31-Jul)

Video TM Concept

Supplement existing commercial manuals with video instructions to mirror private sector sustainability for COTS and NDI equipment.

Current Robotic Commercial TM

Commercial Manual $+$ RPSTL Data $+$ Warnings and Cautions $+$ Video Supplements $=$ Video TM Concept

Path Forward (Pilot Program – Load Banks)

Decide on Pilot Program → Obtain COTS Manual → Video Production Cost Estimate → Storyboard and Record Videos → Video Storage Solutions → Live Demo with Videos and Soldiers

$10,000

Current Status
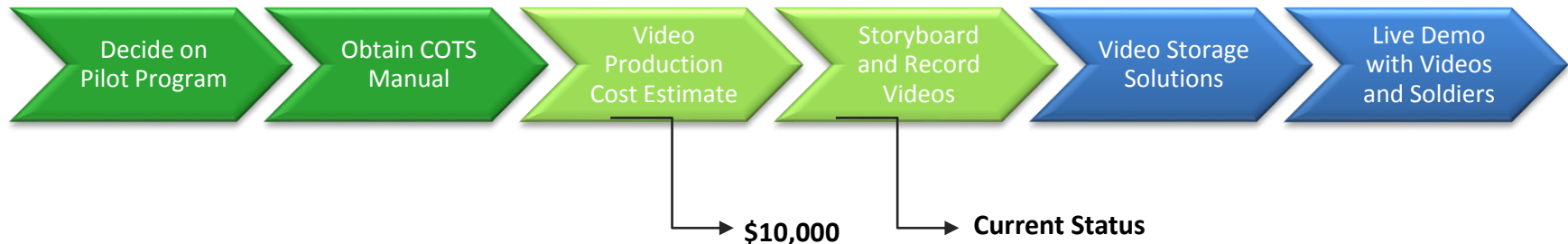
Discussion

Back Up

Bryan J. McVeigh
PM Force Projection

Program Description

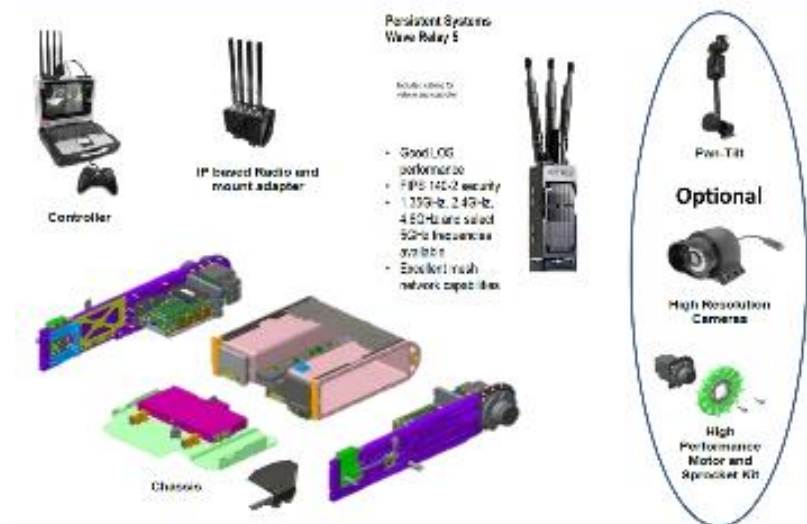- Recapitalize 478 MTRS MKII to the Talon 5A configuration utilizing a return/retrofit/field strategy
  - Fielding starts APR 2017 for 5 years
- Qinetiq conversion kit includes:
  - Talon V Chassis Upgrade
  - Q-Tray- longer battery life per vehicle mission
  - Wave Relay 5 Radio, IOP compliant (same as NGB CBRNe)
 - Laptop Control Unit

Talon 5A

Talon V Upgrade Components

Universal Controller Strategy

Vision: Controller(s) which meets or exceeds CRS(I) threshold while leveraging Better Buying Power emphasis areas:

- Provide draft technical requirements to industry early and involve industry in funded concept definition
- Modular Open Systems Architecture
- Interoperability
- Organic engineering capabilities
- Extensibility & Commonality
- Cybersecurity
- Commercial Technology
- Supportability & Maintainability

| Programs of Record |
| RAS* Identified PORS |
| Architecture Supported |
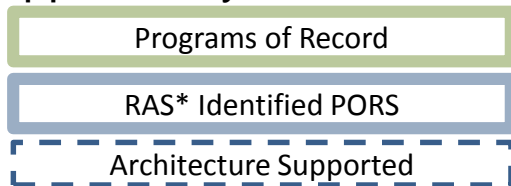
*RAS – Robotic and Autonomous Systems
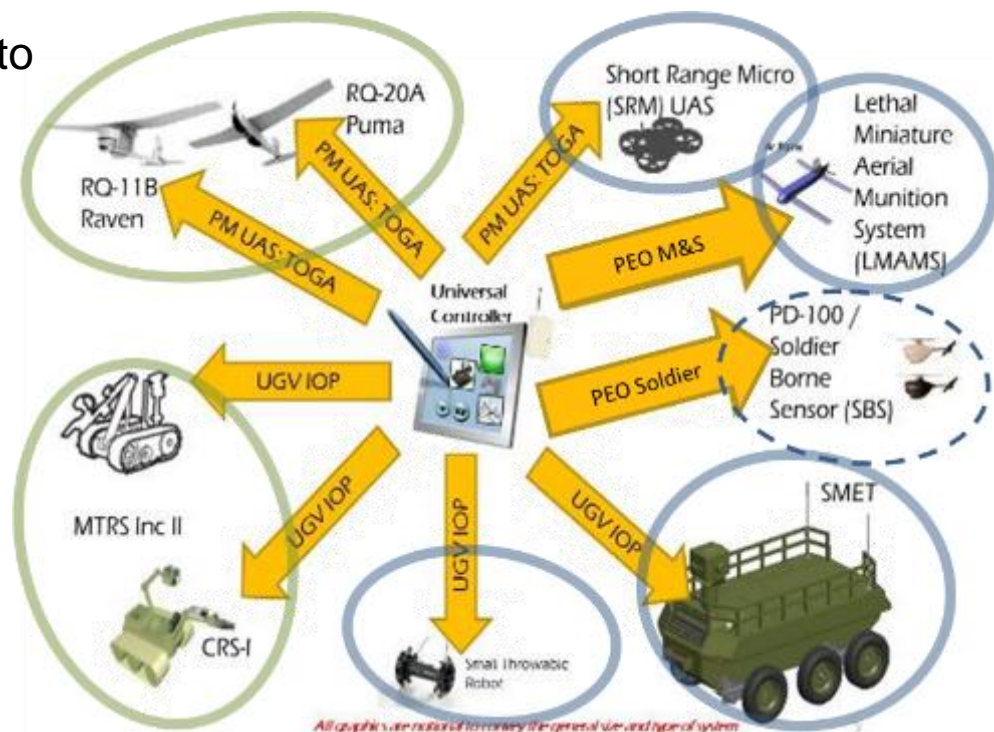
Risk Mitigation:
- Controller and Software demonstrations (Sept 16 and Jan 17) to mature MOCU4 software to handoff/operate on multiple controllers controlling multiple platforms
- Robotic Enhancement Program (REP) authorized purchase of Bokam, TRC-Lite controllers and UAS controller (TOGA H-GCS)

PLS Leader Follower

System Description: Appliqué System linking unmanned Follower Palletized Load Systems (PLS) 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

- Steering
- Braking
- 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 17)

Competing in POM (FY 19-23)

EMD (FY19-21)

Leader Follower

- LIDAR
- Tactical Radio
- Navigation Solution
- Cameras
- UWB Radios
- Fiducial Markers
- Computers

Provides Leader Follower Unmanned Capability to the PLS A1 Vehicle

Industry Interaction

- Industry feedback on RFIs and other matters is critical to PM FP for optimizing program strategy & managing risk

- Recent RFPs improved based on RFI feedback:
  - MTRS Inc II
  - CRS(I)
  - RCIS

Recent updates based on CRS(I) RFI:

- Government continues to invest in TOGA, UCS and MOCU4 as baseline

- Updated PSpec to include Salt Water and Sewer Content

- 24" reach updated: Measured from mounting point on Robot to mass requiring manipulation

- Manipulator must rotate continuous thru 360° but doesn't have to rotate twice

- Secondary attachable/detachable display is part of Engineer and EOD Payloads plus OCU Payload Weight (<10lbs) but not part of base platform (i.e. not part of 25lbs) nor Hand Controller (<2.5lbs)

- Non-Line of Sight capability (i.e. tether, repeaters, etc) part of Standard Payload

- Subterranean Operations: a 3-hour duty cycle includes traversing 6" of water/sewer but not the entire for the duration

Acronyms:
TOGA – Tactical Open Source Government owned Architecture
UCS – UxS Control Segment
MOCU – Multi-robot Operator Control Unit

RAS-G Interoperability Profile (IOP)

Note: While IOP supports the capabilities, there are no plans at this time for the systems themselves to be converted to IOP compliance.
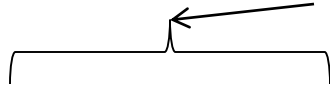
IOP Version	Fielded NSE	M160	MTRS Inc II	CRS-I	AMDS (PEO Ammo)	RCIS	HMDS	SMET	TWV Leader Follower	ACO
V0 (2011)	✓	✓								
V1 (2013)	✓	✓	✓	✓	✓					
V2 (2016)	✓	✓	✓	✓	✓	✓	✓			
V3 (Dec 2017)	✓	✓	✓	✓	✓	✓	✓	✓	✓	
V4 (2019)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- Current focus of IOP V3 development is SMET & Leader Follower
  - IOP Gov't/Industry Working Groups currently developing interfaces
  - Heavily leveraging TARDEC Autonomous Ground Resupply (AGR) STO for Leader Follower

Robotics Enhancement Program (REP) Update

REP Iterations 16.1 - Awaiting FINAL Reports

- 56 Proposals submitted
- 06 Proposals selected by CoCs
  - **Initiative #1:** Obstacle Avoidance & Mapping (OA&M) Capability (Roboteam/Silvus/Neya)
  - **Initiative #2:** Extending the Range of the Platform and Payload Capability (Roboteam/Silvus)
- 2 Initiatives Conducted within 12 months of CoCs
- Experiments completed in four different geographic locations

REP Iterations 16.2 – On Schedule

- 32 Proposals submitted
- 11 Proposals selected by CoCs
  - **Initiative #1:** Inform RONS Replacement CDD (Endeavor/Remotec)
  - **Initiative #2:** Offset Drop Zone, Autonomous Transport (TARDEC)
  - **Initiative #3:** Highly Dexterous Manipulation System (RE2)
  - **Initiative #4:** SMET Expeditionary Bridge Payload (HDT) Completed JUL16 @ PACMAN in HAWAII
- Remaining experiments scheduled for 1QFY17 thru 2QFY17

REP Iterations 17.1 - CoCs conducted 17 AUG 2016

- 22 Proposals submitted
- 12 Proposals selected by CoCs
  - **Initiative #1:** Universal Controller Package (Dynetics, Advanced Anti-Terror Tech, QinetiQ, Bokam Engineering Inc, Stark Aerospace)
  - **Initiative #2:** Sensor Package (Trillium Engineering, Stark Aerospace)
  - **Initiative #4B:** SMET Expeditionary Bridge Payload @ Fort Leonard Wood (HDT)
  - **Initiative #5:** SMET Surrogate Platforms (Mesa-Tech, Lockheed, GDLS, QINETIQ)
- Remaining experiments templated for 2QFY17 thru 3QFY17

MTGR© Range Extending Subterranean

MTGR© Obstacle Negotiating

MTGR© Mapping

Breadcrumbs

HDT © Expeditionary Bridge

Tethered Mast LiveSky ©

RE2 © HDMS

User interface

REP Concept of Operations

Phase I: Assess Submissions

- **1** REP Submission
- **2** Pass Screening Criteria? — Yes / No
- **3** Add to REP Submission No Go List
- **3.a** Comments back to submitter
- **4.a** Proposal Charts
- **4.b** Analyze Proposal for feasibility & complete Charts
- **4.C** Current Initiatives Update Chart

17.2

Phase II: Approve Initiatives

- **5** REP Council of Colonels — Yes / Deferred / No
- **5.a** Add to REP Proposal No Go List
- **5.b** Gather Additional Info
- **5.c** Out of Cycle Decision — Yes / No
- **6** REP Initiatives Approval Memo
- **7** G-3/5/7 Initiative Validation
- **8** Allocate Funds
- **9** REP WG, Proponent & PdM initial Meeting
- **10** Finalize Evaluation Plan & Initiative Chart

17.1

Phase III: Buy & Try

- **11** Transfer Funds
- **12** Purchase Items
- **13** Safety Release
- **14.a** Technical Experiment
- **14.b** Limited User Evaluation
- **14.c** Operational Evaluation
- **15** Prepare Evaluation Report

16.2

Phase IV: Decide / Inform

- **16** Analyze Evaluation Results
- **17** Stakeholder Recommendation
- **18** RDECOM Disposal
- **19** Council of Colonels Informed

16.1

20 End

LEGEND
- G-3/5/7
- REP CoC
- MCoE
- ATEC
- PdM UGV (PM FP)
- REP Working Group
- Assigned PdM

REP Cycle 16.2 Initiatives

➤ <u>Inform Remote Ordnance Neutralizer System (RONS) Replacement CDD</u>

 ✓ 16.2-5 iRobot 710 Kobra Multi-Mission Platform
 (Surpassing current large/RONS vehicles in mobility, lift capacity, transportability, runtime, and supportability, iRobot's powerful (550lbs) 710 Kobra platform is ready now to serve Army's EOD Technicians and the infantry as the next-generation robotic asset.)

 ✓ 16.2-10: Andros FX
 (Andros FX is a heavy duty (850lbs), multi mission 850 pound unmanned ground vehicle designed primarily for Vehicle Borne IED defeat and military base support operations. It has a 9 DOF manipulator with high dexterity, including fly the gripper for reducing mission time and increasing user capabilities and heavy lift capabilities.)

 ✓ 16.2-7: iRobot uPoint Multi-Robot Control (MRC)
 (iRobot developed the uPoint Multi-Robot Control (MRC) System to standardize the control of every robot within the iRobot family of systems to include the 110 FirstLook, 310 SUGV, 510 PackBot, and 710 Kobra.)

➤ <u>Safe Warfighter Movement & Detection of Targets Capability</u>
 ✓ 16.1-34: Offset Drop Zone Polaris MRZR
 (The use of a MRZR Dismounted Soldier Autonomy Tools (DSAT) robotic kit will allow the Soldiers to drive the vehicle from the off-set drop zone to the objective and drop off all Soldiers – with the vehicle returning to the off-set drop zone robotically (unmanned).)

➤ <u>Highly Dexterous Manipulation System</u>
 ✓ 16.1-29: The Highly Dexterous Manipulation System (HDMS)
 (The Highly Dexterous Manipulation System (HDMS) offers unprecedented, human-like manipulation capability, featuring two dexterous arms and a torso. Each arm has five axes of control. The two arms are connected by a torso which is able to pitch forward and back. The default end-effectors for HDMS are two two-finger hands that offer another axis of control each.)

➤ <u>SMET Expeditionary Bridging Payload</u>
 (# and description of gap.)
 ✓ 16.1-35: SMET Expeditionary Bridging Payload
 Capability Enhancement: This demonstration will investigate the feasibility of an expedient, transportable bridge using lightweight hybrid inflatable structures designed to carry both vehicles and personnel. Inflatable structures have successfully been used for applications to include: temporary shelters, airplane wings, and pedestrian bridges.

REP Technologies to Date
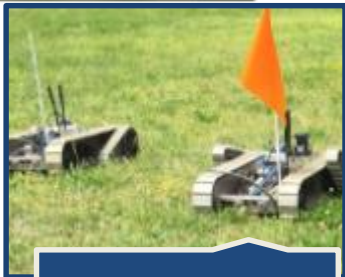
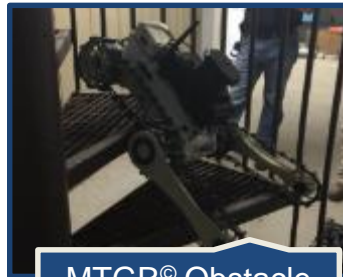TARDEC GVR Bots

Roboteam© Fleet

MTGR© Obstacle Negotiating

MTGR© Mapping

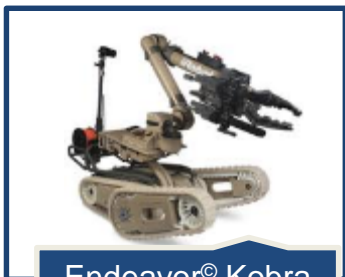MTGR© Range Extending SubT

User Interface

Breadcrumbs

Tethered Mast LiveSky

UxS Autonomous Neya Systems LLC

MIMO Radios Silvus Technologies

Endeavor© Kobra 710

Remotec© Andros FX
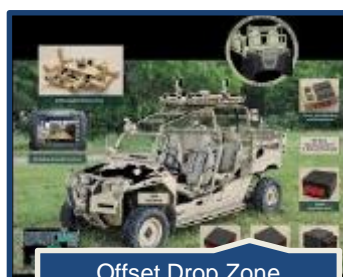
Offset Drop Zone Autonomous Transport TARDEC

RE2© Highly Dexterous Manipulation System (HDMS)

HDT© Expeditionary Bridge

REP Iterations 17.1 - CoCs conducted 17 AUG 2016

- 22 Proposals submitted
- 12 Proposals selected by CoCs
- 04 initiatives formed for experimentation
  - ✓ **Initiative #1:** Universal Controller Package @ Ft Benning
  - ✓ **Initiative #2:** Sensor Package
  - ✓ **Initiative #4B:** SMET Expeditionary Bridge Payload @ Fort Leonard Wood
  - ✓ **Initiative #5:** SMET Surrogate Platforms @ Ft Benning
- Experiments templated for 2QFY17 thru 3QFY17

REP Iterations 17.2 – CoCs scheduled 16FEB 2017

- Proposal Submission cutoff date 09 December 2016
- 08 Proposals submitted to date
- No initiatives currently set however, Potential initiatives may include:
  - SMET Payloads
  - Wingman/Dems
  - Squad ISR
  - Cyber Security
- Focusing on Leasing versus buying equipment provides better value and contractor incorporation into experiment efforts
- Working with Ft Gordon Cyber Community to work Interrogation of owned COTS systems into initiative time lines
- Experiments templated for 4QFY17 thru 2QFY18

NATIONAL ADVANCED
MOBILITY
CONSORTIUM

Feb 2017　　　**Spiral 3: Demonstrate using MOCU 4/UCS Software in an Operationally Relevant Environment**

Sep 2016　　　Spiral 2: Demonstrated MOCU 4/UCS Software on Multiple OCUs Operating Multiple RAS Platforms/Payloads in a Controlled Environment

Aug 2016　　　NAMC Demonstrates MOCU 4/UCS Software Operating Simulated RAS

July 2016　　　NAMC Contracts with PM-FP to Develop and Demonstrate a Prototype Capability based on the UCS Architecture and MOCU 4 Software

Q1/Q2 FY16　　　NAMC Briefs Proposed Path Forward to Sr. Army Leadership; Obtains Go-Ahead & Secures Funding Commitment from PM-FP

Q3 FY15　　　NAMC Devises and Begins to Socialize a Proposed Strategy; Catches the Attention of **Mr. Bryan McVeigh**, PM-Force Projection

Oct 2014　　　**Mr. Chris O'Donnell** (JGRE) Convenes a Roundtable of Interested Government and Industry Parties; Engages NAMC to Perform a Study and Devise a Recommended Path Forward

Raven *(Stationary)*

SAE MT/1 - GVRbot *(CRS(I) Surrogate)*

SAE VT/1 - Standardized TALON *(MTRS Inc 2 Surrogate)*

DDL Radio

Persistent Systems Radio

Persistent Systems Radio

AV Messages

IOP/JAUS Messages

DDL Radio — PS Radio — PS Radio — DDL Radio — PS Radio

Active Control — Active Control — Active Control — Passive Control — Active Control

TOGA (MOCU 3 Variant) — MOCU 4 Common UI VIS & Components

MOCU 4 Common UI VIS & Components

MOCU 4 Common UI VIS & Components

TOGA

ToughPad Tablet

Dual Screen TRC

Raven
(Flying)

SAE MT/1 - GVRbot
(CRS(I) Surrogate)

SAE VT/1 - Standardized TALON
(MTRS Inc 2 Surrogate)

DDL Radio

Persistent Systems Radio

Persistent Systems Radio

AV Messages

IOP/JAUS Messages

DDL Radio | PS Radio

DDL Radio | PS Radio

DDL Radio | PS Radio

Active Control | Passive Control | Active Control

Passive Control | Active Control

Passive Control | Active Control

MOCU 4
UAS UI *(TOGA Compatible)* | Common UGV UI
AV VIS | JAUS/IOP VIS

MOCU 4
Common UGV UI
AV VIS | JAUS/IOP VIS

MOCU 4
Common UGV UI
AV VIS | JAUS/IOP VIS

TOGA

HOCU

Dual Screen TRC Mini

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