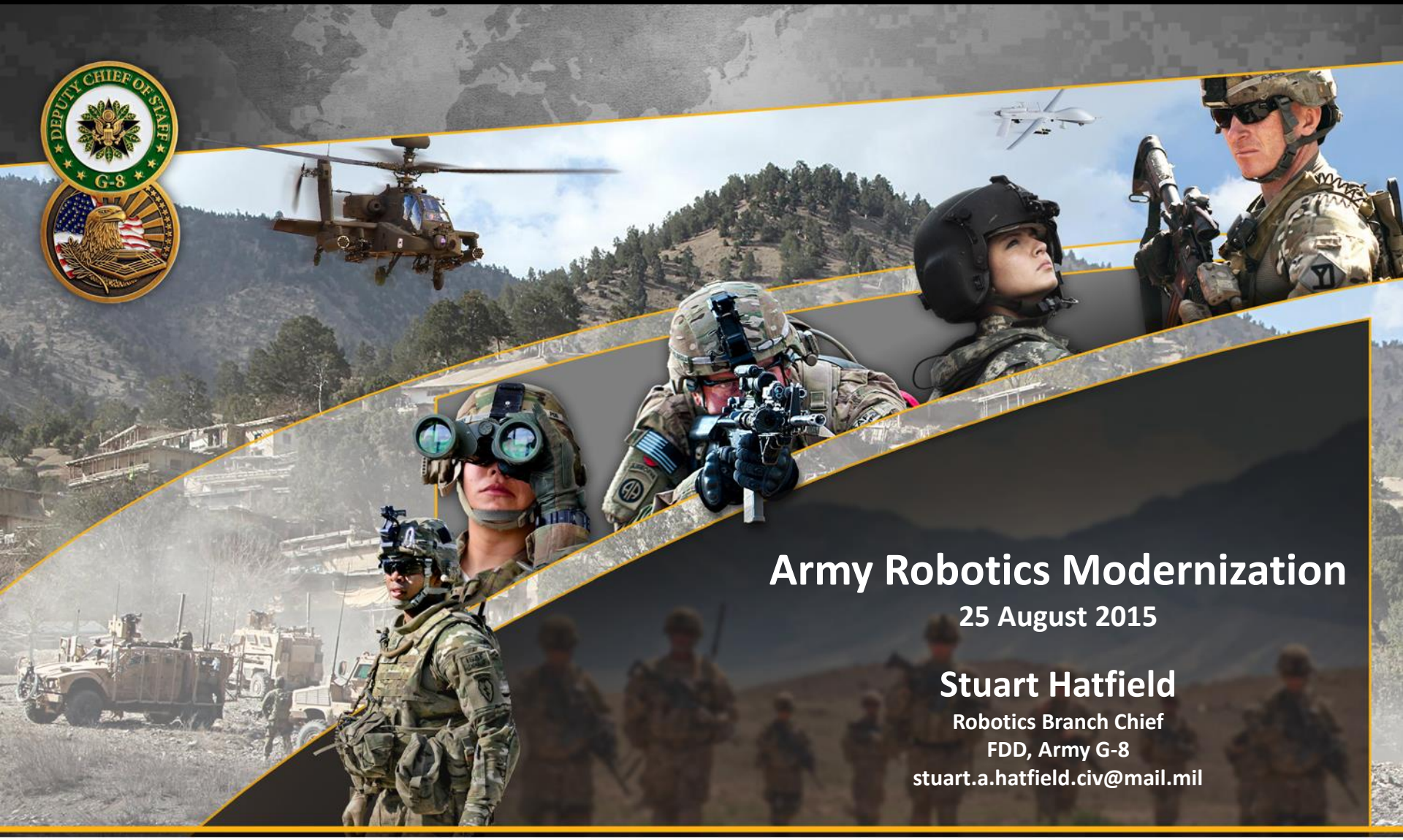


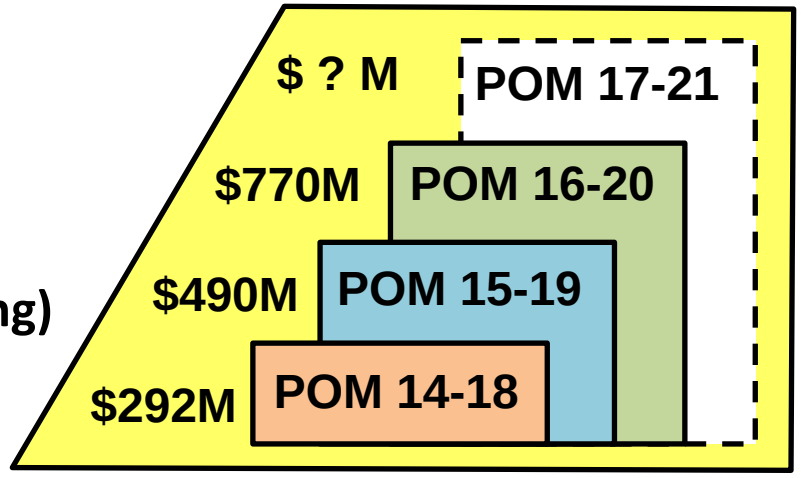
# Army Robotics Modernization

25 August 2015

**Stuart Hatfield**
Robotics Branch Chief
FDD, Army G-8
stuart.a.hatfield.civ@mail.mil

# New Developments in Robotics

- The Army Operating Concept, "Win in a Complex World" (Oct 2014)
- Army comprehensive study on the use of Unmanned Ground Systems – over a decade of lessons learned
- Joint Concept for Robotics and Autonomous Systems (RAS) – stop calling them "Unmanned"
- Army Concept for Robotics and Autonomous Systems (RAS)
- Transitioning Army Robotics from non-standard equipment to programs of record
- Maturing Interoperability Profiles for Commonality / Modularity
- Increasing resources (personnel and funding) dedicated for RAS



# G-8 Robotics Enterprise

## Robotics Branch, FDD

**Mr. Stuart Hatfield**
Robotics Branch Chief
stuart.a.hatfield.civ@mail.mil
(703) 692-6281

- Army Staff Lead for Ground Robotics
- BOS Resource Manager Responsible for PM Strategy, Prioritizes Systems within the BOS
- Link Capability Gaps w/Solutions,
- Co-chair Joint Ground Robotics Enterprise (JGRE) IPT
- Army chair for Joint Staff Remote and Autonomous Systems Team (JRAST)
- Joint Ground Robotics integration Team (JGRIT)
- Army Robotics Stakeholder Forum
- Robotics Enhancement Program (REP)

**MAJ Clay McVay**
Maneuver Robotics SSO
robert.c.mcvay.mil@mail.mil
COMM: (703) 692-4970

- Small Unit Power
  - Soldier Power Management and Batteries
  - Platoon Power Generator
- Common Robotic System – Individual (CRS-I)
  - Tactical Robotic Controller (TRC)
- Common Lightweight Autonomous Robotic Kit (CLARK) *
  - Micro Unmanned Ground Vehicle
  - Short Range Micro Unmanned Air System
  - Soldier Borne Sensor (Nano UAS)
  - Unattended Ground Sensors
- Squad Multi-purpose Equipment Transport (SMET) *
- *Warrior Suit (TALOS) ***
- *Robotic Wingman ***
- *Robotic Squad Member ***

**Mr. Leland Browning**
Maneuver Support Robotics SSO
leland.a.browning.ctr@mail.mil
COMM: (703) 545-1811

- M160 Light Flail
- Man Transportable Robotic System (MTRS) Inc 2
- Remote Ordnance Neutralization System (RONS)
- Non-Standard Equipment (NSE) Robots

**MAJ Dave Lowe**
Sustainment Robotics SSO
david.w.lowe.mil@mail.mil
COMM: (703) 692-6290

- Autonomous Mobility Appliqué System (AMAS) *
- Automated Convoy Operations (ACO) *

### TACON for Payload Coordination

**Protection Branch, FDB**

**Mr. Kevin Givens**
Engineer Deputy Team Chief
Kevin.p.givens.civ@mail.mil
COMM: (703) 692-6285

- Route Clearance Interrogation System (RCIS) Appliqué Kit
- Husky Mounted Detection System (HMDS) Appliqué Kit
- Dismounted Engineer Maneuver Support (DEMS) *
- Automated Mine Detection System (AMDS) *

**Transportation Branch, FDL**

**Mr. Duane Clark**
Transportation SSO
duane.a.clark3.ctr@mail.mil
COMM: (703) 545-1835

- Tactical Wheeled Vehicle (TWV) Leader-Follower (LF) System *
- Automated Convoy Operations (ACO) *

# Program in Sustainment
Current Fully Funded Program
* Emerging Program with Draft Requirement
** *Future Program in LIRA*

# UGS Strategic Vision

**Purpose:** Provide a modernized force of **manned – unmanned teams** with improved **protection, persistence,** and **endurance**. Realization of this will decrease physical and cognitive workloads on our Warfighters, and enable new tactics while increasing their combat capabilities.

**Method**

- **Reset and sustain** selected Non-Standard Equipment Unmanned Ground Systems (UGS) until transitioned to programs of record
- **Reduce cost** through commonalities within classes (Individual-Transportable, Vehicle-Transportable, Self-Transportable, and Appliqué)
- **Leverage commercial technology** and gradually introduce **autonomy** into units and the training base to **incorporate Soldier feedback** within technology development
- Focus new programs on addressing the priorities of:
  1) **Protect** the force at increased stand-off distances from the threat and hazards
  2) **Persistently monitor** a changing, complex, operational environment
  3) **Lighten** the Warfighter's physical and cognitive workloads
  4) **Sustain** the force with increased distribution, throughput, and efficiency
  5) **Facilitate maneuver** in Wide Area Security and Combined Arms Operations
  6) Conduct **lethal and non-lethal engagements** where manned systems are limited, denied entry, or unavailable

Secretary of the Army approved Jan2013

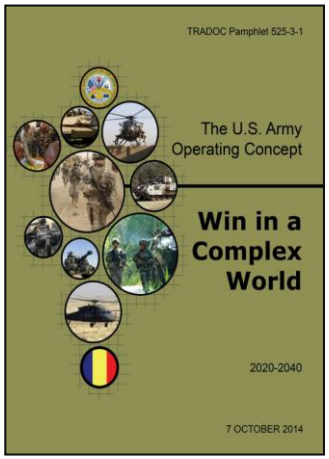
**End State:** The Army is equipped with affordable, interoperable, and increasingly autonomous UGS enabling integrated manned-unmanned teaming.

***Provides the US Army Vision that generates unity of effort across the UGS enterprise***

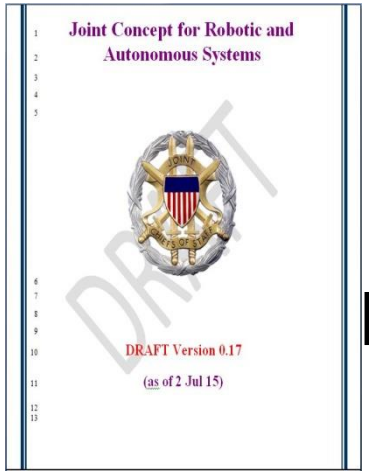
# Emerging RAS Doctrine

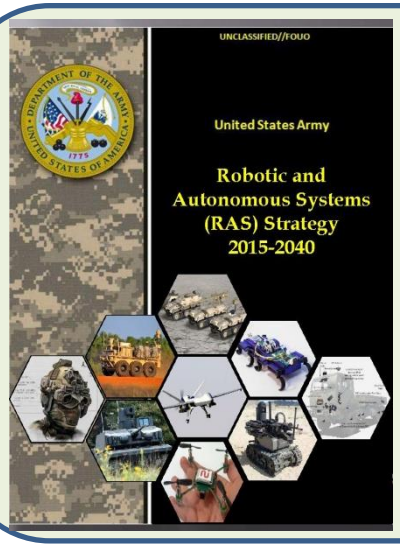
- Technologies will enable manned and unmanned teaming in both air and ground maneuver

- Affordable, interoperable, autonomous and semi-autonomous systems will deploy as force multipliers at all echelons from the squad to the Brigade Combat Team to increase unit capabilities:




- Situational awareness
- Mobility
- Lethality
- Protection from CBRNE and lethal threats
- Freedom of maneuver and speed of action
- Terrain coverage in wide area security and combined arms operations
- Automated and autonomous ground and aerial resupply
- Machine intelligence to aid decisions and analysis




- Aligns and prioritizes robotics and autonomous systems requirements across all formations
- Defines operational employment of RAS in Force 2025 and Beyond
- Outlines RAS as an increase in capability and a key to the Army's differential advantage over adversaries

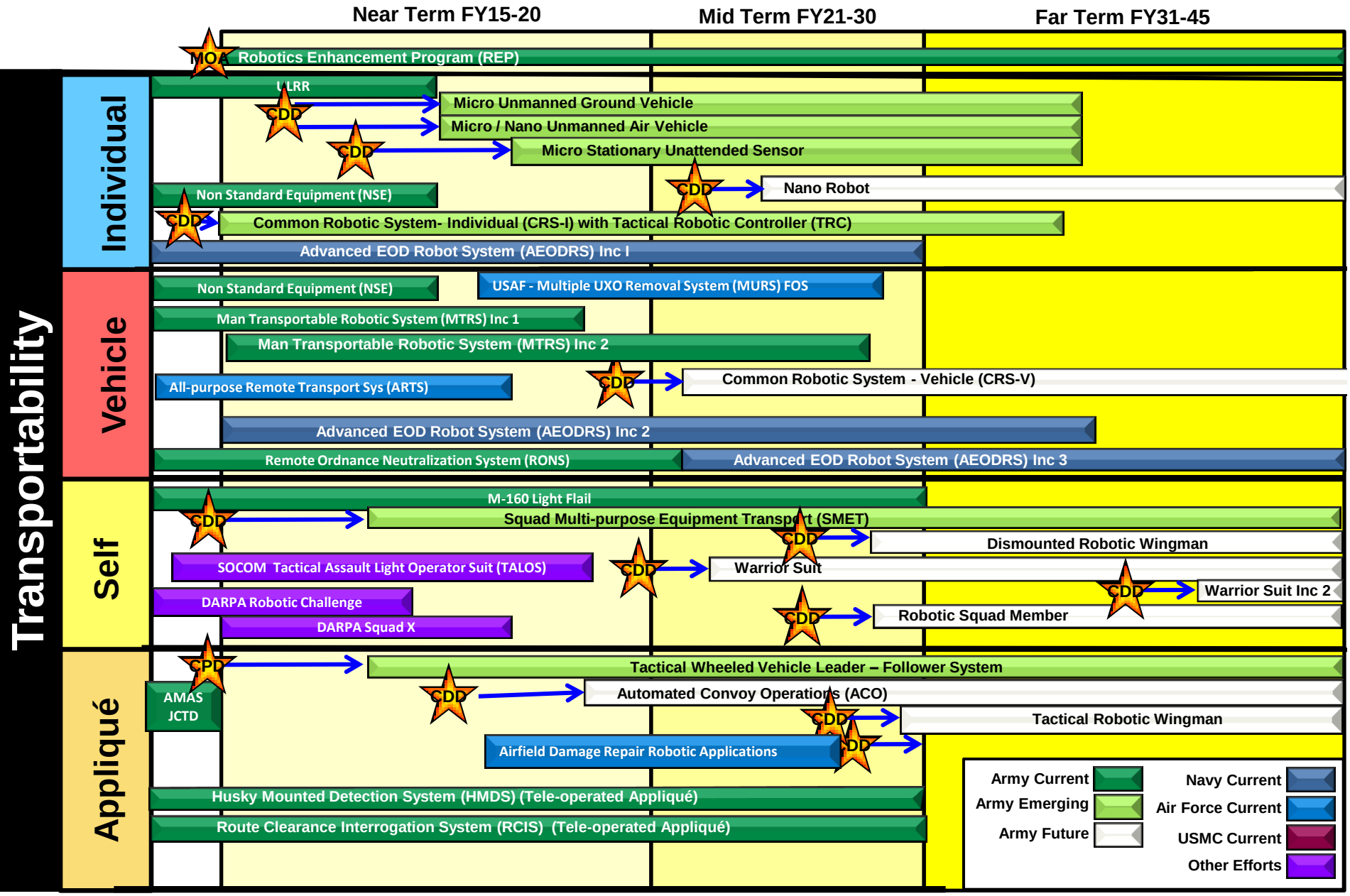
# Robotics Portfolio

## Robotic Classes

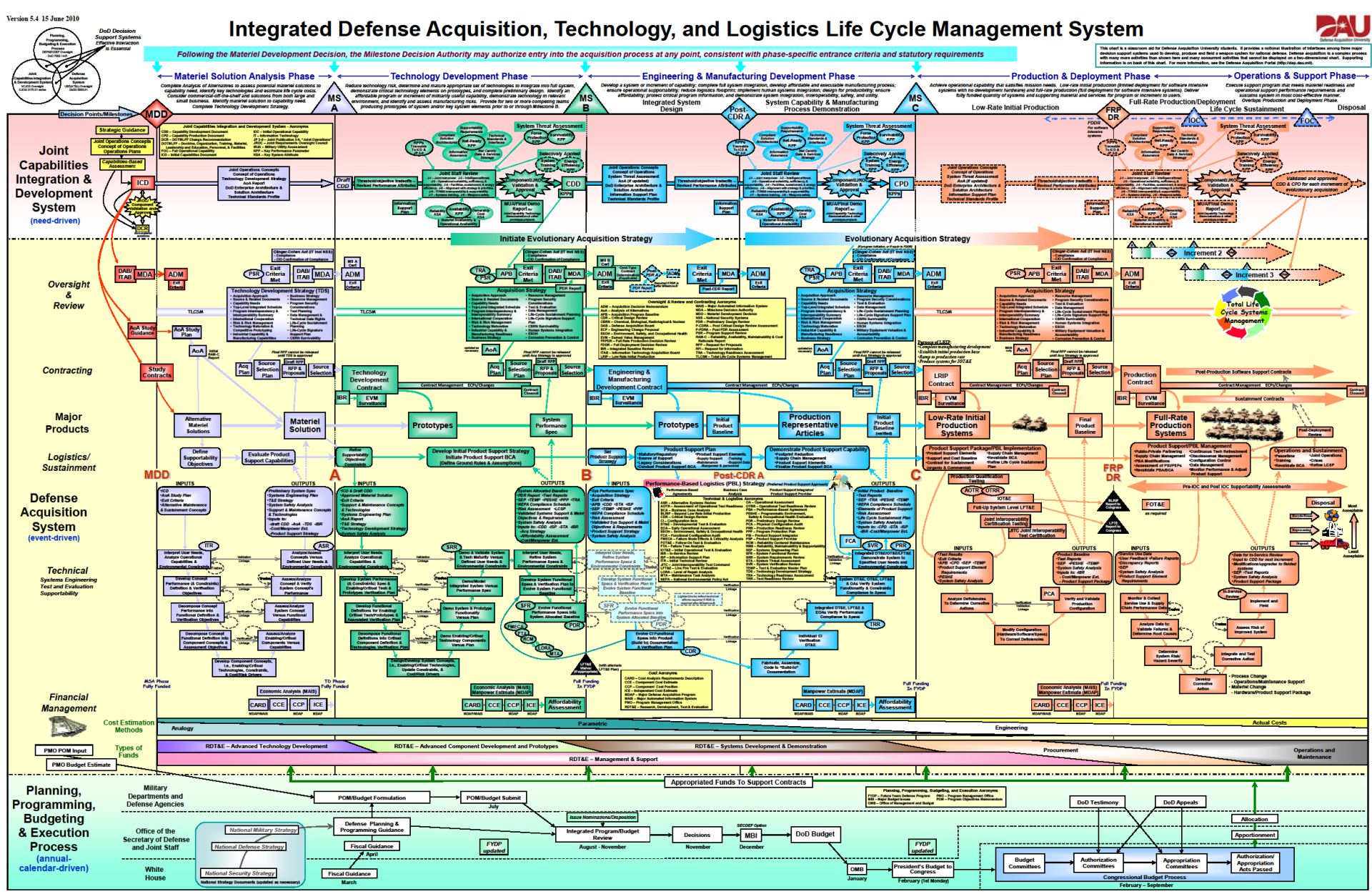
| System | Description |
|---|---|
| **Individual Transportable** | |
| Common Robotic System – Individual (CRS-I) | • Provides a Joint common chassis robot with the Universal tactical Robotic Controller (TRC) with modular mission payloads for IN, EN, CM, EOD, and SOF use for reconnaissance and protection. |
| Soldier Borne Sensors (SBS) | • Family of mobile Soldier sensors including micro air, ground, and unattended systems. |
| **Vehicle Transportable** | |
| Man Transportable Robotic System (MTRS) Inc 2 | • A medium, 160 pound, robot used to interrogate suspected explosive hazards by Engineer, Chemical , SOF, and EOD units. |
| Large EOD System | • A heavy , 400+ pound, robot used to interrogate and neutralize suspected explosive hazards by EOD units. |
| M160 Light Flail | • A six-ton robotic Anti-Personnel Mine Clearing System, remotely controlled , performs area clearance of antipersonnel mine sown areas and limited route clearance operations to counter IED threats through the action of a rotating chain and hammer flail system. |
| **Self Transportable** | |
| Squad Multipurpose Equipment Transport (S-MET) | • A family of semi-autonomous robots designed to carry the squad load and other functions as required: power generation, network extension, dismounted route clearance, weapons platform , and casualty evacuation. |
| Robotic Wingman | • Both mounted and dismounted systems within formations to support BCT lethality, mobility, and survivability. |
| Robotic Squad Member | • Dismounted systems within formations to support BCT lethality, mobility, and survivability. |
| **Robotic Appliqué** | |
| Tactical Wheeled Vehicle Leader-Follower Appliqué | • Provides an optionally-manned Leader/Follower capability to currently manned platforms (Heavy Tactical Wheeled Vehicles) in the line haul mission. |
| Automated Convoy Operations (ACO) | • Provides an optionally-manned autonomous capability to currently manned platforms (Heavy Tactical Wheeled Vehicles) in the line haul mission. |
| Warrior Suit | • Fully integrated exo-skeleton system for human enhanced mobility, lethality, and survivability |
| **Other** | |
| Robotics Architecture | • Common architecture hardware and software to control multiple, interoperable ground and air robotic and autonomous systems. |
| Robotics Development | • Early developmental funding to support technology transition from Science &Technology projects to affordable programs of record |
| Robotics Enhancement Program (REP) | • Purchases and evaluates small quantities of state of the art Commercial-Off-The-Shelf (COTS) and Government Off-The-Shelf (GOTS) solutions in support of the buy-try-decide methodology to inform emerging programs of record. |
| **Power** | |
| Small Unit Power | • SUP develops power sources and solutions for the individual Soldier, squad, and platoon. These power solutions include batteries, chargers, renewable energy, energy harvesting, and a portable platoon 1kW generator for use in the most austere operating environments. |

| Funded Program | Documented | Emerging | Future Concept |
|---|---|---|---|

# Joint Unmanned Ground Systems Strategy



# Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System



# Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System

**Needs Driven**

**Good idea to initial fielding averages seven years!**

**Event Driven**

DOTMLPF Analysis
CBA
ICD
DCR
MDD
Materiel Solution Analysis
MS A
Technology Development
Analysis of Alternatives
CDD
MS B
Engineering Manufacturing Development
CPD
MS C
Production and Deployment

| 1 – 2 years | 1 – 3 years | 1 – 3 years | 1 – 4 years | 3 – 10 years |
|---|---|---|---|---|

Sponsor Activity | JCIDS Document | Acquisition Decision

**Calendar Driven**

**Where can we accelerate?**

| 2015 | | | 2016 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |

**FY16 Budget Execution**

**POM 17-21 OSD Review**
**FY17 OMB Review**
**FY17 Congressional Budget Hearings**
**FY17 Congressional Budget Markups**

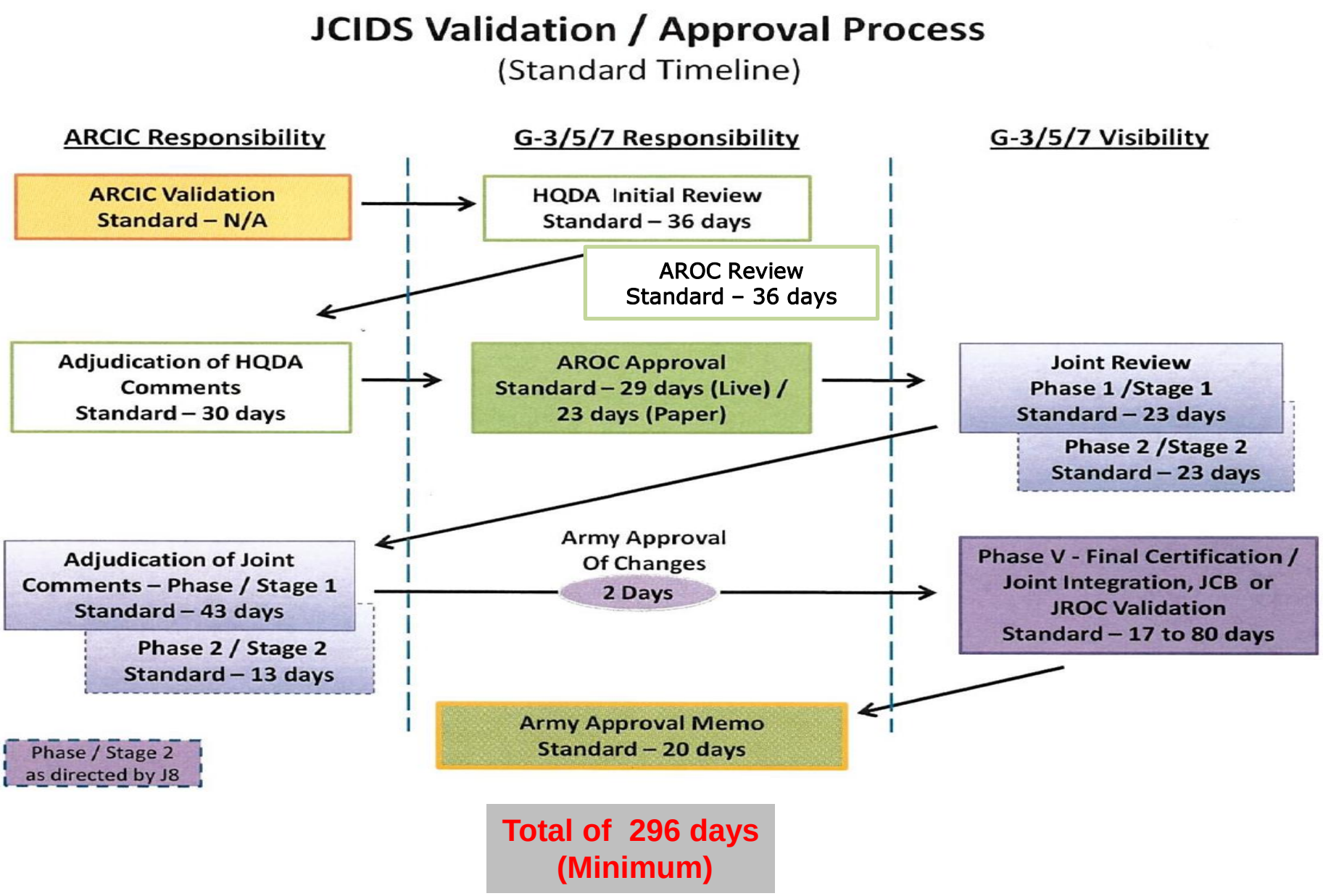
**POM 18-22 Requests / Prioritization**
**POM 18-22 PEG Build**
**POM BES 18-22 Build**

**Requirements Due**
**Budget To OMB**
**Budget To Congress**
**POMBES To OSD**

**No Requirement in FY15 = No Money in FY18 = No Program**

BES – Budget Estimate Submission
OMB – Office of management and Budget
OSD – Office of the Secretary of Defense
PEG - Program Evaluation Groups
POM – Program Objective Memorandum

# Joint Capabilities Integration Development System (JCIDS)



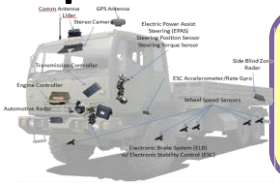
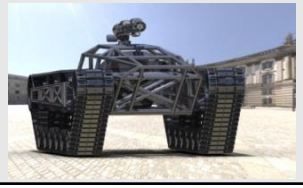
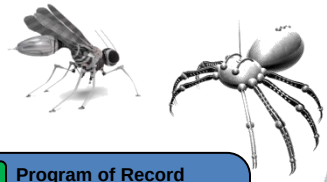
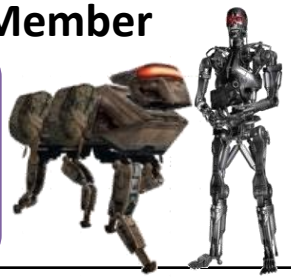

**Total of 296 days (Minimum)**

# Robotics Issues

- Decision Point to establish Robotics as a Separate Portfolio (LIRA 18? POM 18-22?)
- Decision Point to establish a Robotics Division / TCM within TRADOC (?)
- Army Concept for Robotics and Autonomous Systems (RAS) (Jan 2016)
- Army Execution Order to implement the RAS Strategy (Jan 2016)
- Joint Concept for Robotics and Autonomous Systems (RAS) (July 2016)
- Transitioning Army Robotics from non-standard equipment to programs of record (Complete FY17?)
- Robotics Enhancement Program Support (Sep 2015)
- Accelerating Acquisition Timelines
- Universal Controller separation (FY 16)
- Soldier Borne Sensor Split

# Questions ?

# Army Unmanned Ground Systems Classes

| Soldier Transportable | Vehicle Transportable | Self Transportable | Robotic Appliqué |
|---|---|---|---|
| **Small Bot**<br>Common Robotic System – Individual (CRS-I) CDD<br>  | **Mounted**<br>Man Transportable Robot System (MTRS) Inc 2<br>  | **Soldier Follower**<br>  <br>Squad Multipurpose Equipment Transport (SMET) CDD | **Remote Operation**<br>  <br>Husky Mounted Detection System (HMDS) |
| **UltraLight Bot**<br>Ultra Light Recon Robot<br>  | **or Towed**<br>  <br>M160 Light Flail | **Recon/Security**<br>  <br>Mobile Detection Assessment and Response System (MDARS) | **Supervised Autonomy**<br>  <br>Automated Convoy Operations (ACO) CDD |
| **Micro Bot**<br>Micro Unmanned Vehicle<br>  | **or Installed**<br>da Vinci Surgical System<br>  | **Robotic Wingman**<br>  | **Exoskeleton**<br>Tactical Assault Light Operator Suit (TALOS)<br>  |
| **Nano Bot**<br>  | **Humanoid**<br>DARPA Robotic Challenge<br>  | **Squad Member**<br>DARPA Legged Squad Support System (LS3)<br>  | **Prosthetics**<br>  |

- Program of Record
- Draft JCIDS Requirement
- Technology Initiative

Tactical Robot Controller (TRC) (Included in CRS-I CDD)

*Photos are Notional Representations*