Robotic and Autonomous Systems Strategy

Army Capabilities Integration Center (ARCIC)

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Agenda

1) Robotic and Autonomous Systems Strategy Overview
2) Robotic Wingman
3) Small UAS
4) Common Operating Environment
Robotic and Autonomous Systems Strategy

Objective Capabilities: Over the next 25 years, RAS supports the Army to:

1. Increase situational awareness
2. Lighten the Warfighters’ physical and cognitive workloads
3. Sustain the force with improved distribution, throughput, and efficiency
4. Facilitate movement and maneuver
5. Protect the force

Endstate: Increase combat effectiveness of the future force and maintain overmatch against enemies.
**Capability Objectives:** Over the next 25 years, RAS supports the Army to:

1. Increase situational awareness
2. Lighten the Warfighters’ physical and cognitive workloads
3. Sustain the force with improved distribution, throughput, and efficiency
4. Facilitate movement and maneuver
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**End state:** Increase combat effectiveness of the future force and maintain overmatch against enemies.

<table>
<thead>
<tr>
<th>Near-Term (2016-2020)</th>
<th>Mid-Term (2021-2030)</th>
<th>Far-Term (2031-2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase Situational Awareness:</strong> Soldier Borne Sensor</td>
<td><strong>Increase Situational Awareness:</strong> Swarming Unmanned Aircraft System</td>
<td><strong>Increase Situational Awareness:</strong> Autonomous Recon Systems + Warrior Suit</td>
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<tr>
<td><strong>Lighten Soldier Load:</strong> Squad Multipurpose Equipment Transport</td>
<td><strong>Lighten Soldier Load:</strong> Exoskeleton</td>
<td><strong>Improve Sustainment:</strong> Autonomous Cargo Delivery Aircraft</td>
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<td><strong>Improve Sustainment:</strong> Leader-Follower Semi-Automated Resupply</td>
<td><strong>Improve Sustainment:</strong> Fully-Automated Convoy Operations</td>
<td><strong>Facilitate Maneuver:</strong> Improved Unmanned Combat Vehicle</td>
</tr>
<tr>
<td><strong>Facilitate Maneuver:</strong> Husky Mounted Detection System / Light Flail</td>
<td><strong>Facilitate Maneuver:</strong> Unmanned Combat Vehicles and Advanced Payloads</td>
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<td><strong>Protect the Force:</strong> Counter-Improvised Explosive Device (C-IED)</td>
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The RAS Strategy prioritizes investments over time, enabling the Army to maintain overmatch and win in a complex world.

Robotic Wingman
# Robotic Wingman Draft Plan

## S&T development phase

### Robotic Wingman (2016-2023)
- M113 or HMWWV
- Teleoperation technology+

## Program of Record-1

### Semi-Autonomous Robotic Wingman (2023-2035)
- Existing combat vehicles used
- Increase in semi-autonomous capability:
  - Leader-Follower,
  - Waypoint Navigation,
  - Obstacle Detection/Avoidance

## Program of Record-2

### Autonomous Robotic Wingman (2035-2045)
- Purpose built platform
- Fully autonomous navigation capability (teleoperated weapons)

**Platform requirements/challenges:** Autonomous off-road mobility, obstacle detection and avoidance

**Lethal Payload requirements/challenges:** external power, self-reload, switch ammo, greater ammo storage

Semi-autonomous weapons station to manage latency and delays
Abrams Lethality Enabler (ALE)

Demonstration:
What: Abrams Lethality Enabler Experiment
When: Summer 2017
Where: Fort Benning, GA
Why: Assessing augmentation of loader with UGV roles

Augment Loader with UGV role
Robotic Wingman - JCTD

S&T Demonstrator - TARDEC, ARDEC, ONR 30

Phase 1: AUG ‘17 – Fort Benning

M113 Demonstrator (Phase 2)
Wingman Payload objectives/challenges

- Situational delay vs. latency (need semi-autonomy)
- Sensor field of view (few cameras vs. more eyes, Soldiers and buddy-teams)
- Data/target sharing (UxS, sensors, e.g. LRAS3)
- Network connection (local then global)
Wingman platform objectives/challenges

- Obstacle detection and avoidance; dynamic obstacles; dust, negative obstacles, water and brush/vegetation
- Haptic feedback, driver warnings, reverse-driving
- Dynamic operations; semi-autonomous capabilities
- Speed limited to control & sensors (20-25~ mph); stability control
Small UAS
**Army Unmanned Aircraft Systems**

- **Group 5**
  - Air Force has Group 5 (Global Hawk)
  - Gray Eagle

- **Group 4**
  - Shadow

- **Group 3**
  - Army has no Group 2

- **Group 2**
  - Puma
  - Raven

- **Group 1**

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**Capabilities:**

- **Battalion/Company:**
  - PUMA
  - POR/Funded
- **Company/Platoon:**
  - RAVEN
  - POR/Funded

**Platoon:**
- Short Range Micro (SRM)
- Unfunded POR

**Squad:**
- Soldier Borne Sensor (SBS)
  - ~3 ounces
  - 900M (T) 1200M (O)
  - 20 minutes

**Command and Control**
- PUMA
- RAVEN
- SRM
- SBS

**Echelon of Employment**
- **Battalion/Company:**
  - PUMA
  - POR/Funded
- **Company/Platoon:**
  - RAVEN
  - POR/Funded

**Capabilities:**

- ~3 ounces
- 900M (T) 1200M (O)
- 20 minutes
- 20 minutes
- 4.5 lbs
- 10km range
- 1.5 hr flight

**Unfunded POR**
- **Platoon:**
  - Short Range Micro (SRM)
  - Unfunded POR

**Squad:**
- Soldier Borne Sensor (SBS)
  - ~3 ounces
  - 900M (T) 1200M (O)
  - 20 minutes

**PLT capability is unfunded; no “perch, hover, stare capability”**

*Hunter UAS is getting divested*
Small UAS

1) Current POR
   Short-Range Micro UAS

2) Air-Ground combo
   Rooster by Roboteam

3) Tethered UAS
   Tethered UAS by Sky Sapience

Pegasus by Robotic Research
What is a Common Operating Environment?

FROM:
- Single Purpose HW/SW

TO:
- A Rich Set of Warfighter Apps (e.g. Intel, Intel)
- Common Software Baseline
- Converged onto Common Suite of HW Devices

Army Model

COMS
GPS/Location
Weather
Pictures
Sharing Data
Schedule
Maps

Dismounted
Mounted

Command Post

COE standards converge hardware associated to currently stovepiped systems into a common infrastructure, allowing the Army to deliver warfighting capabilities as software apps, more rapidly. Soldiers can work more efficiently.
The Army’s Common Operating Environment

The Common Operating Environment is not a system or Program of Record (PoR), rather, COE technologies and standards bring stovepiped systems onto a common foundation to allow the Army to deliver warfighting capabilities as software applications.
Data based on 28 August 2014 TAB Approved System Migration Binning List

COE Binning / MC Focus Areas

**CP CE**
26 Primary Systems

**Sensor**
38 Primary Systems

**M/HH**
10 Primary Systems
Focused on Mission Command

**DC/C/GF**
65 Primary Systems

**RTSCE**
44 Primary Systems

**Mounted**
6 Primary Systems

**Relationships/Dependencies**
- Schedules
- Interoperability
- Resourcing
- Services
- Performance
Example capability under test: Flexible Fire Control System (F2CS)

- Focus Assessment Emphasis: F2CS capability to integrate with multiple sensors, and multiple remote weapons (BOOMERANG, CROWS, JACCS, SGS, RAID, CERBERUS)
Questions?