



# ROBOTS IN THE FIGHT

## — MAKING A DIFFERENCE

Col Dave Thompson, USMC, Project Manager, Robotic Systems Joint Project Office



2 May 2012

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# Robotic Systems Joint Project Office (RS JPO)

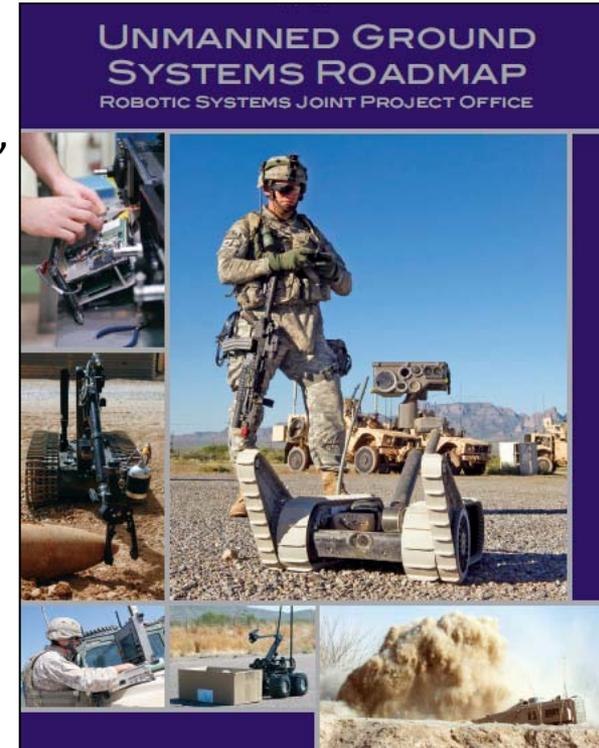
The RS JPO is a dual service organization reporting to Marine Corps Systems Command (MARCORSYSCOM) and the Program Executive Office for Ground Combat Systems (PEO GCS) as the executive agencies for the acquisition of Unmanned Ground Vehicles (UGVs) for the Army and Marine Corps.

## Mission

- Lead the development, systems engineering, integration, acquisition, testing, fielding, sustainment, and *improvement* of unmanned systems for the Joint Warfighter to ensure that safe, effective, and supportable capabilities are provided while meeting cost, schedule, and performance.

## Vision

- An integrated family of robotic systems by 2020 that multiplies Force effectiveness, improves Warfighter survivability and assures battlefield dominance.





# RS JPO Reporting Chains



**Marine Corps  
Systems Command**  
Commanding General  
BGen Frank L. Kelley, USMC  
Quantico, VA

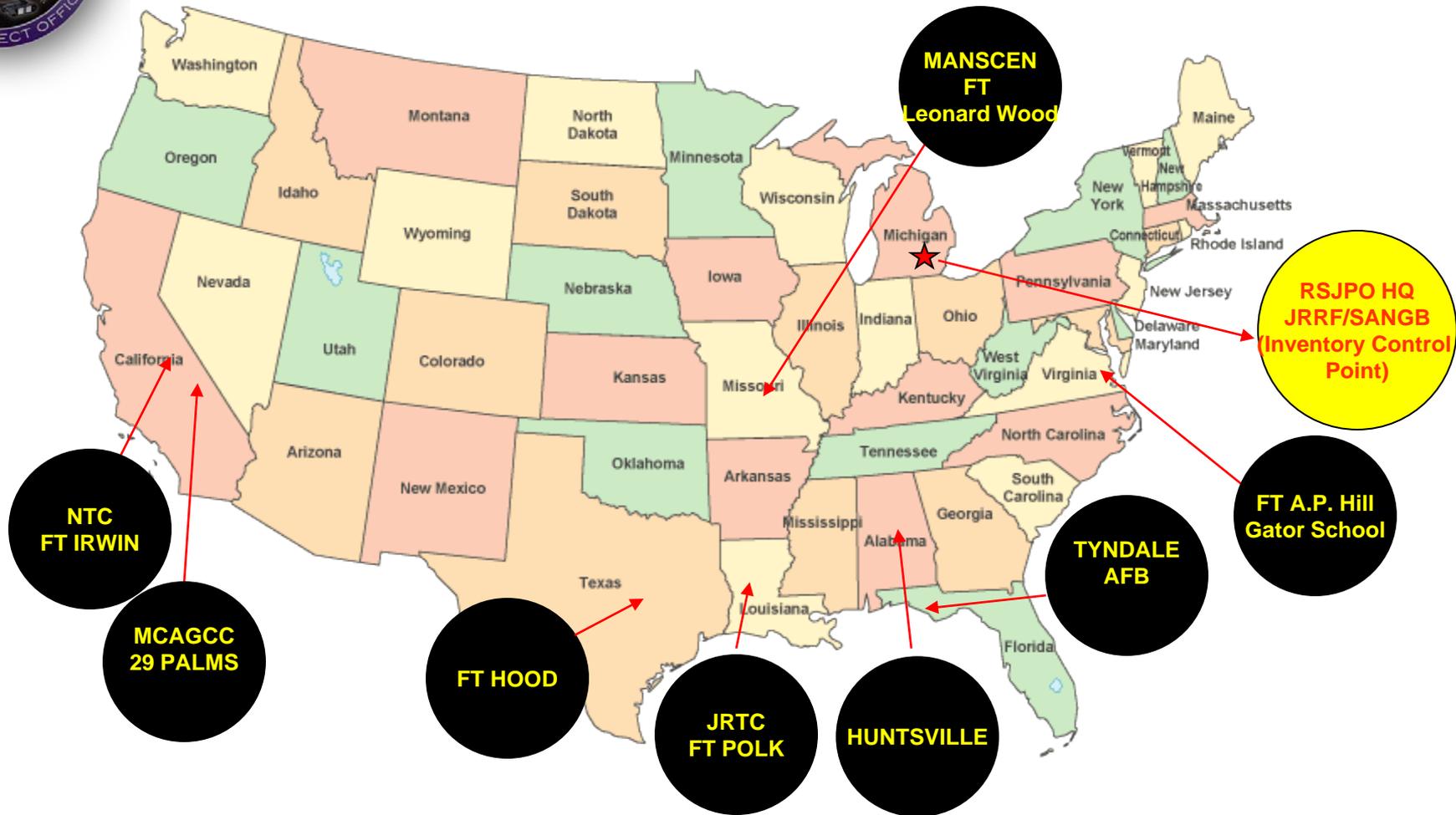


**Program Executive  
Office Ground Combat  
Systems**  
Program Executive Officer  
Mr. Scott Davis, SES  
Warren, MI



**Robotic Systems  
Joint Project Office**  
Project Manager  
Col David Thompson, USMC  
Warren, MI

# RS JPO Current CONUS Locations





# RS JPO's Joint Robotics Repair Detachment (JRRD) in Afghanistan



Distribute



Repair



Train

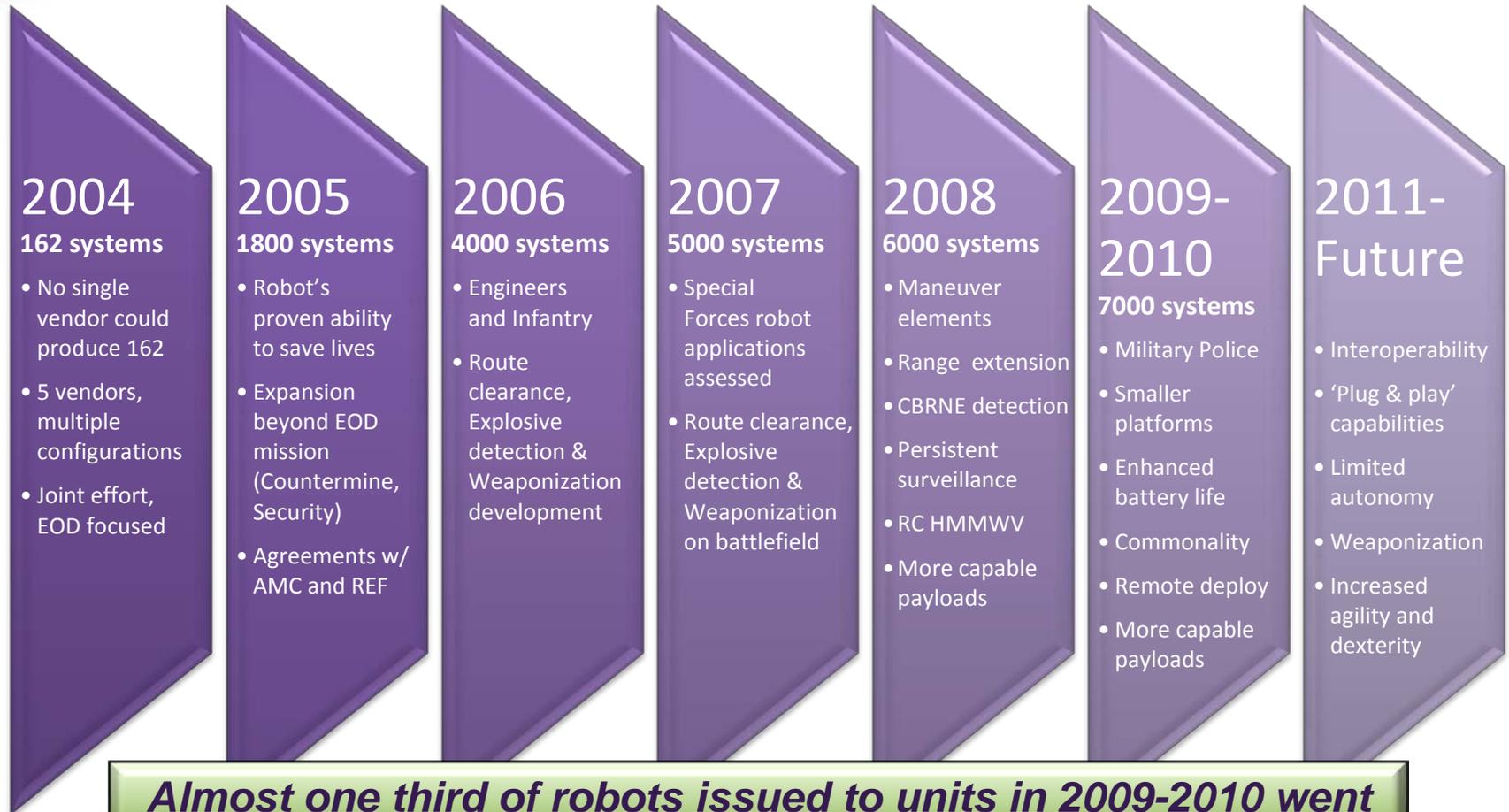


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# Evolution of Ground Robotics in Combat

- Sustainment, Modernization, Interoperability and Modularity

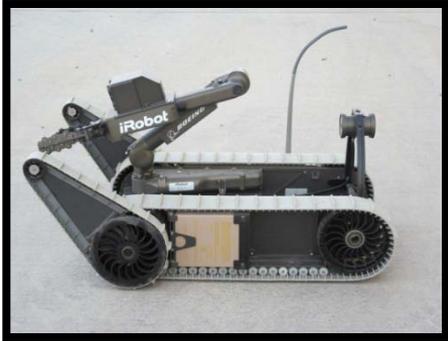


***Almost one third of robots issued to units in 2009-2010 went to units other than EOD and Combat Engineers.***

# Robots Currently in Combat



### Mini-EOD (SUGV-310)



### PackBot Family



### Recon Scout XT



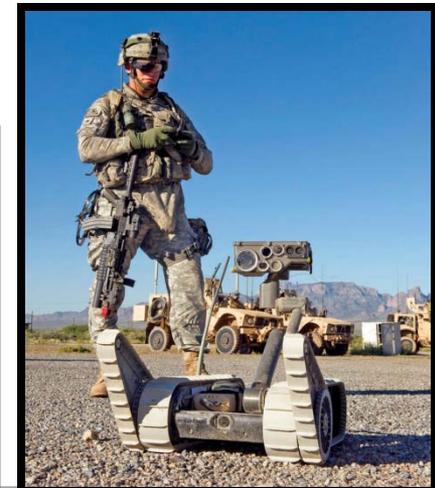
### MARCBot



### TALON Family



### XM1216 Family



### M160



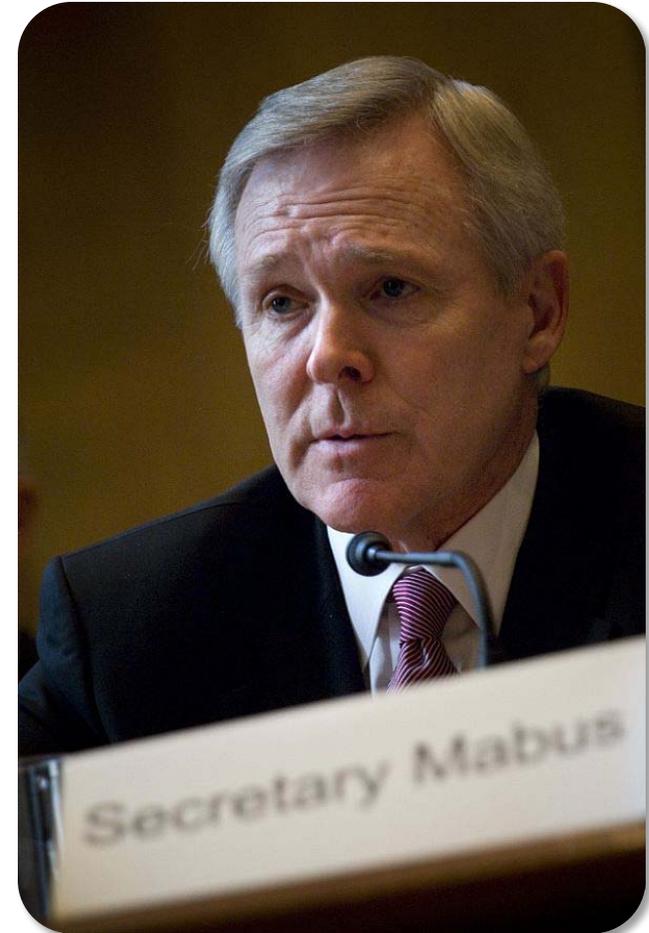
# Secretary of Defense Statement on Defense Strategic Guidance

Lastly, as we reduce the overall defense budget, we will protect, and in some cases increase, our investments in special operations forces, in new technologies like ISR and **unmanned systems**, in space -- and, in particular, in cyberspace - capabilities, and also our capacity to quickly mobilize if necessary.



# Secretary of the Navy Priorities

- 1) Taking care of Sailors, Marines, Civilians and their families
- 2) Treating Navy energy requirements and solutions as issues of national security
- 3) Creating acquisition excellence
- 4) Optimizing unmanned systems



# Secretary of the Navy Unmanned Systems Goals

- **Published November 17, 2010**
- **Addressed to all Navy and Marine Corps Acquisition Leadership**
  - » **Field an integrated Family of Robotic Systems by 2020 to augment the capabilities of the MAGTF**
  - » Increase firepower: Provide one weaponized UGV section per infantry battalion to enhance offensive and defensive capabilities
  - » Increase mobility & force protection: Equip and train Engineer battalions and Explosive Ordnance Disposal units with robots that are capable of conducting 75% of explosive obstacle reduction/neutralization missions.
  - » Enhance ISR: Equip all maneuver units (from squad through battalion) with autonomous tactical sensors of various sizes and capabilities that can provide 24 hour, all-weather surveillance of their AOR.
  - » Logistics: Continue to leverage joint programs so that 50% of all USMC logistics vehicles will have optionally-manned capability that will allow commanders to tailor convoy operations depending on the tactical situation or mission.



THE SECRETARY OF THE NAVY  
WASHINGTON DC 20350-1000

November 17, 2010

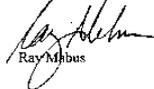
MEMORANDUM FOR DISTRIBUTION

SUBJECT: Secretary of the Navy Unmanned System Goals

Based on coordinated input from the Secretariat and the Navy and Marine Corps' staffs I have approved a set of goals to implement the Unmanned Systems priority (TAB A).

I intend to unveil these publicly early in 2011. In advance of this, you should use these goals as we finish the POM 12 deliberations and begin the POM 13 build, as well as in the relevant ongoing Unmanned Systems' requirements and acquisition processes.

The Secretariat lead for Unmanned Systems goals is Mr. Mark Gorenflo at (703) 614-0199 or email: Mark.L.Gorenflo@navy.mil.



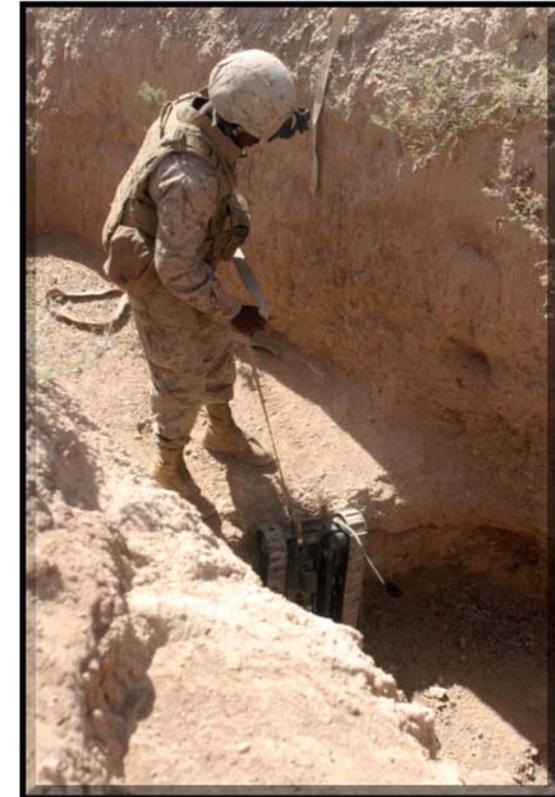
Ray Mabus

Attachment:  
As stated

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DUSN(PPOI)  
DUSN(BO&T)  
DNS  
DMCS  
DCNO (N8)  
DCNO (N2/6)  
DC (P&R)  
DC (Aviation)

# UGV Emerging Requirements

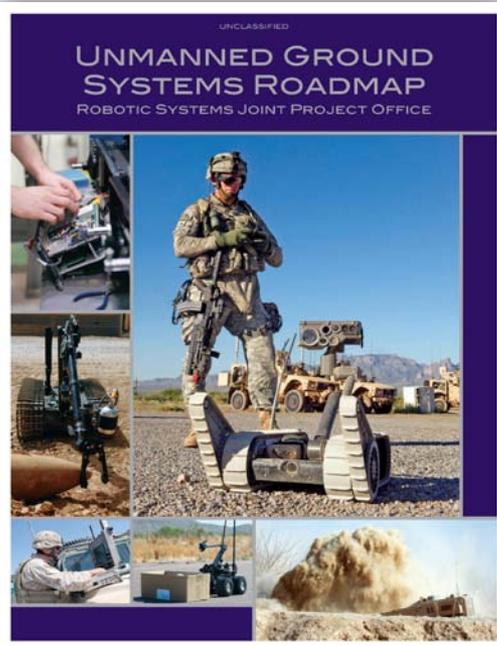
- **Autonomous Mobility Appliqué System (AMAS)**
  - » Add-on appliqué system to virtually any manned vehicle (Joint)
  - » Requirement Document in staffing
  - » Joint Capability Technology Demonstration approved
  
- **Squad Multi-Purpose Equipment Transport (SMET)**
  - » Semi-autonomous utility/cargo platform (Joint)
  - » Requirement Document in staffing
  
- **Engineer Squad Robot (ESR)**
  - » Man-portable, lightweight robot (USMC)
  - » Requirement Document Approved
  
- **Throwable/Ultra Light Recon Robot (ULRR)**
  - » Under 10 lb robot (JIEDDO, USMC, REF)
  - » Requirement Document Approved/Funded
  
- **Tactical Robot Controller (TRC)**
  - » “Common Controller” (Joint)
  - » Requirement Document in staffing



# Unmanned Ground Systems Roadmap July 2011



- RSJPO Organization
- Technology Needs/Enablers
- Modernization Strategy
- Systems/Programs Portfolio
- Technology Needs



		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Autonomous Navigation	Technology	Adjustable Waypoints	Layered Planning				Object Detection & Tracking				Trust Consensus
	Capability	Applique Autonomy Kits	Incremental Advancements in Navigation and Sensor Fusion (throughout)				Intelligent/Reactive Architectures				Operators in High Latency/ Low Bandwidth Environment
Communications	Technology	Way Point Navigation	Semi-Autonomy				Formation Control/ Multi Robot				Operators in High Latency/ Low Bandwidth Environment
	Capability		Retrofit Manned Vehicles w/ Autonomous Behaviors					Safe Ops in Urban Environments			Autonomous Operations
Power	Technology	IP Addressable Radio	MESH Networking/ Repeaters				Smart Antennae/ MIMO				Cognitive Radio
	Capability	Software Defined Radio	Increased Communication Range				One Operator/Multiple Robot Comms				Any Operator / Any Robot Comms
Vision	Technology	Single Radio Communications	Radio Diagnostics/Status				Frequency Agile Radio				Anti-Jamming/ Interference Suppression
	Capability	Improved Performance Li-Li-ion Technologies	100 W Fuel Cell Packaged Fuel				Fuel Cell Oil Board Processed Bulk Fuels				Advanced Fuel Cell Tech JP-8 Reformulation on Platform
Architecture	Technology	Improved Duration & Reduced Signature	Longer Duration Silent Watch				Increase Service Life, Increased Energy Density				
	Capability	1024 x 768 IR	Stereographic Imaging/Display Tech/ Improved Software				Image Search/ Object Identification				
SMI	Technology	On-Chip Image Enhancement	Visible IR Fusion				1820 x 1080 IR				Stereoscopic Processing
	Capability	Increased Range Performance	Increased Awareness in All Light Conditions				Depth Perception / 3D Data Collection				Human-like Visual Cognitive Understanding
Manipulators	Technology	Open Architecture, Accepted Specification/Standards					Industry Provides Open Common Architecture				
	Capability	UGV / UAS Shared Situational Awareness	UGV Common Domain Controller				UGV Cross Domain Controller				
Terrain Mobility	Technology	One Operator/ One Robot Control	Information and Plan Sharing Across All UGVs				Improved Teaming w/in Domain, Collaboration Across Domains				Coordinated Activities Across Multiple Dissimilar UG
	Capability	Mounted Touch Screen Displays	Dismounted Touch Screen Displays				Advancements in Interface Automations & Neuro-Ergonomics				
Payloads	Technology	Tactile Feedback	Voice Recognition				Flexible Displays				
	Capability	OCU w/ Multiple Dissimilar Robots in One Domain	OCU w/ Proprietary GUI				Server Control Robots				
Terrain Mobility	Technology	Inverse Kinematics	Visual Servos				Inverse Dynamics				3D World Modeling, Control Algorithm
	Capability	Cartesian Control	Automatic Tool Change				Haptic Feedback (baller handling)				Efficient Arm Movement
Terrain Mobility	Technology	Stability Control & Semi-Active Suspension	Terrain Recognition				Waterproof/ Swim/Jump Kit				Object Classification Algorithms
	Capability	Rollover, Overspeed & Understeer Recovery	Snake-Like Robots				Adaptive Behavior to Terrain				Active/Passive Gait
Terrain Mobility	Technology	Visual/IR/Thermal/ Stereo Cameras	UWB Radar				RAMAN Spectroscopy				Brain-Computer Interfaces
	Capability	Low Cost LIDAR	Fuel Cells/Generators				Non-Lethal, Lethal Weapon Systems				Greatly Increased Control
Terrain Mobility	Technology	Limited 3-D World Building	Supervised Autonomy				Persistent Stare				Autonomous Operations
	Capability										Incremental Improvements in Versatility & Modularity



# Way Ahead/Opportunities for Business

- Interoperability and Commonality goals
  - Interoperability profiles – industry participation
  - Promotes modularity
  - Promotes competition
  - Reduces logistics burden
- Partnering between Defense and Industry
  - NDIA, AUVSI, Robotic Technology Consortium
- Next Major Contract Actions
  - ESR, ULRR





# RS JPO Points of Contacts

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# Any Questions?



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