



UGVs IN THE FIGHT – MAKING A DIFFERENCE

LtCol Dave Thompson, USMC, Project Manager



14 December 2011

Distribution Statement A: Approved for public release; distribution is unlimited.



Mission

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

Vision

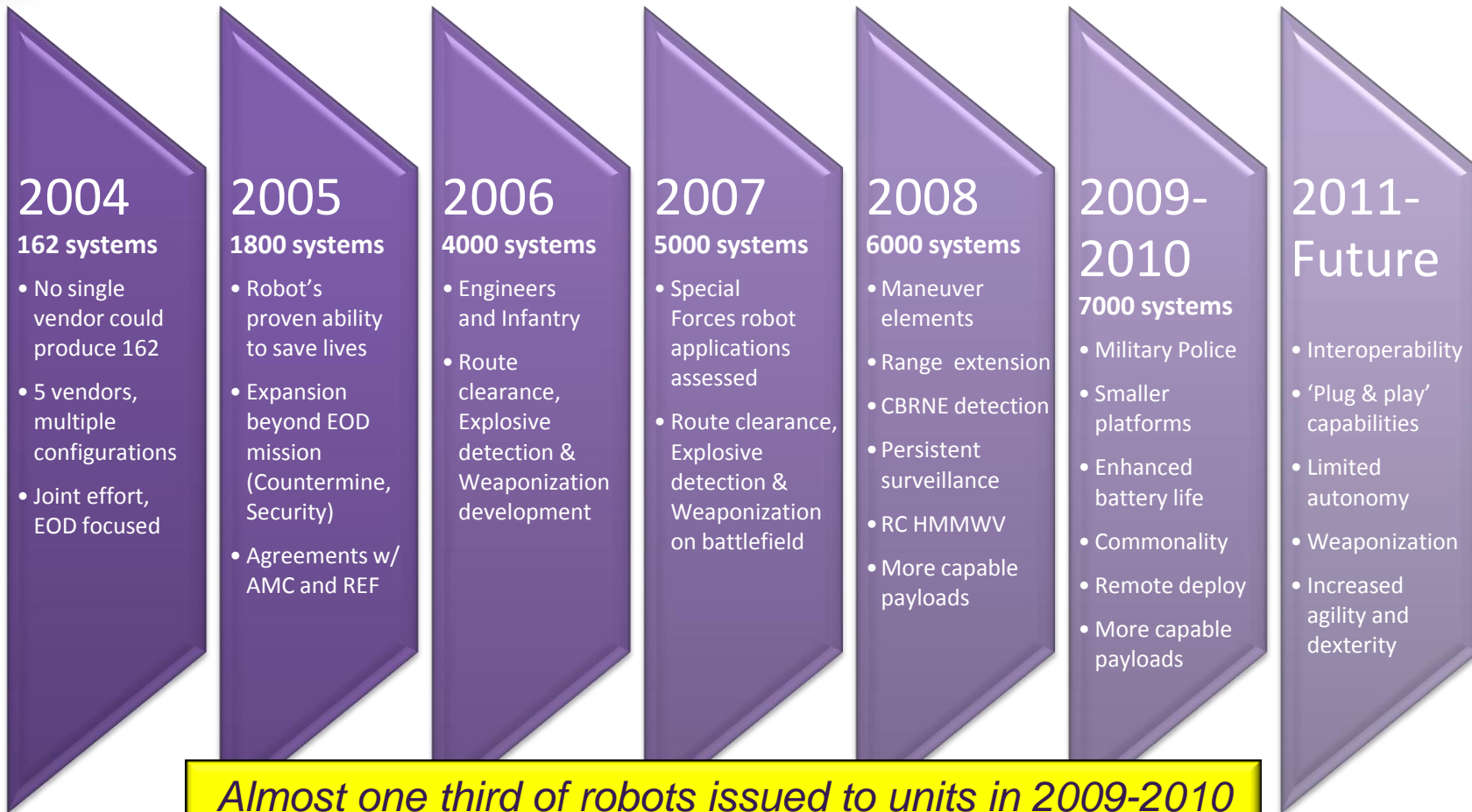
Continuous improvement of unmanned system capabilities to meet current and future Joint Warfighter objectives.



Evolution of Ground Robotics in Combat

- Sustainment, Modernization, Interoperability and Modularity

ROBOTIC SYSTEMS JPO

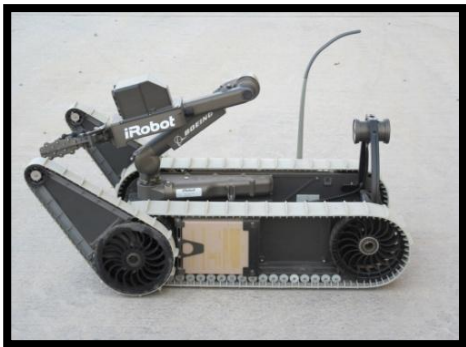


Almost one third of robots issued to units in 2009-2010 went to units other than EOD and Combat Engineers.

Leadership • Service • Innovation

Robots Currently in Combat

Mini-EOD
(SUGV-310) (~400)



PackBot Family (~1100)



SUGV XM1216
w/Tether (38)



TALON Family (~1000)



MARCBot
(~350)



M160 (45)



ROBOTIC SYSTEMS JPO



Joint Robotics Repair Detachment – Afghanistan



ROBOTIC SYSTEMS JPO



Program Executive
Office Ground Combat
Systems
PEO Mr. Scott Davis

Warren, MI



Marine Corps Systems
Command
BGen Frank L. Kelly
USMC

Quantico, VA



Robotic Systems Joint
Project Office
PM LtCol David Thompson
USMC

Warren, MI



Distribute



Repair



Train

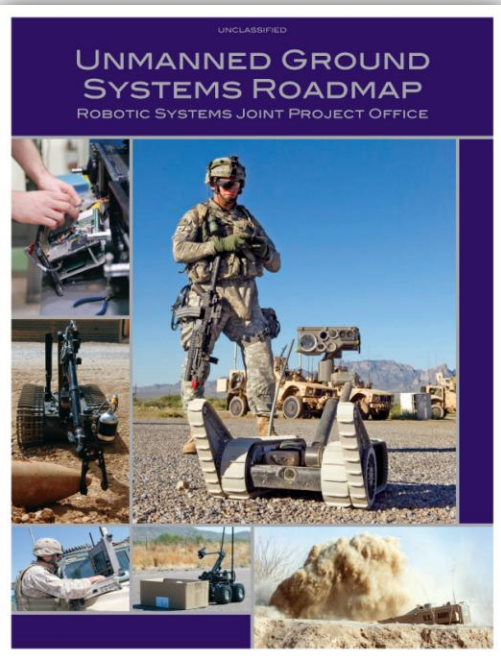


Unmanned Ground Systems Roadmap July 2011



ROBOTIC SYSTEMS JPO

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



2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

	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		Intelligent/Reactive Architectures						
Communications	Technology				Incremental Advancements in Navigation and Sensor Fusion (throughout)					
	Capability	Way Point Navigation	Semi-Autonomy		Formation Control/ Multi Robot			Operations in High Latency/ Low Bandwidth Environment		Autonomous Operations
Power	Technology	IP Addressable Radio	MESH Networking/ Repeaters		Smart Antennae/ MIMO			Cognitive Radio		
	Capability	Software Defined Radio			Multi-Cast		Encryption Standards			Global Mesh Networking
Vision	Technology	Single Radio Communications	Increased Communication Range		One Operator/Multiple Robot Comms					Any Operator/ Any Robot Comms
	Capability	Radio Diagnostics/Status			Frequency Agile Radio		Anti-Jamming/ Interference Suppression			
Architecture	Technology	Improved Performance Li-Ion Technologies	100 W Fuel Cell Packaged Fuel		Fuel Cell Off Board					Advanced Fuel Cell Tech JP-8 Reformation on Platform
	Capability	Hybrid Energy Storage			High Power Small Engines					
SMI	Technology	Improved Duration & Reduced Signature			Longer Duration Silent Watch			Increase Service Life, Increased Energy Density		
	Capability									
Manipulators	Technology	1024 x 768 IR	Visible/IR Fusion		Stereographic Imaging Display Tech/ Improved Software			Stereoscopic Processing		Image Search/ Object Identification
	Capability	On-Chip Image Enhancement								
Terrain Mobility	Technology	Increased Range Performance	Increased Awareness in All Light Conditions		Depth Perception / 3D Data Collection					Human-like Visual Cognitive Understanding
	Capability									
Payloads	Technology	Open Architectures	Accepted Specification/Standards		Industry Provides Open Common Architecture					
	Capability									
Autonomous Navigation	Technology	Mounted Touch Screen Displays	Dismounted Touch Screen Displays		Advancements in Interface Automations & Neuro-Ergonomics					
	Capability	Tactile Feedback	Voice Recognition		Flexible Displays					
Manipulators	Technology	OCU/ Multiple Dissimilar Robots in One Domain	OCU/ Multiple Dissimilar Robots in One Domain		Server Control Robots					
	Capability	OCU/ Handheld Controller w/ Proprietary GUI								
Terrain Mobility	Technology	Inverse Kinematics	Visual Servos		Inverse Dynamics			3D World Modeling, Control Algorithm		Autonomous Grasping
	Capability	Cartesian Control	Automatic Tool Change	Haptic Feedback (safer handling)	Detect & Track Moving Objects	Efficient Arm Movement	Lighter/Stronger Arms	Heavy Lifting		Grasp Complex Objects
Payloads	Technology	Stability Control & Semi-Active Suspension	Terrain Recognition		Waterproof/ Swim/Jump Kit			Object Classification Algorithms		Active-Passive Gait
	Capability									
Autonomous Navigation	Technology	Rollover, Oversteer & Understeer Recovery	Snake-Like Robots		Adaptive Behavior to Terrain					Legged Robots
	Capability	Flatroad/30W/ Track or Wheel	Semi-Autonomous Star Climbing		High Obstacle Negotiation			Energy Efficient Legged Gait		
Manipulators	Technology	Visual/IR/Thermal/ Stereo Cameras	UWB Radar		RAMAN Spectroscopy			Brain-Computer Interfaces		Full-Autonomy Packages
	Capability	Low Cost LIDAR	Fuel Cells/Generators					Non-Lethal, Lethal Weapon Systems		
Terrain Mobility	Technology	Limited 3-D World Building	Supervised Autonomy		Persistent State			Offensive Missions		Greatly Increased Control
	Capability									
Payloads	Technology									
	Capability									

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 (USA)
 - » 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” (USMC)
 - » Requirement Document in staffing



Way Ahead/Opportunities for Small 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



Leadership • Service • Innovation





Any Questions?

ROBOTIC SYSTEMS JPO



Leadership • Service • Innovation