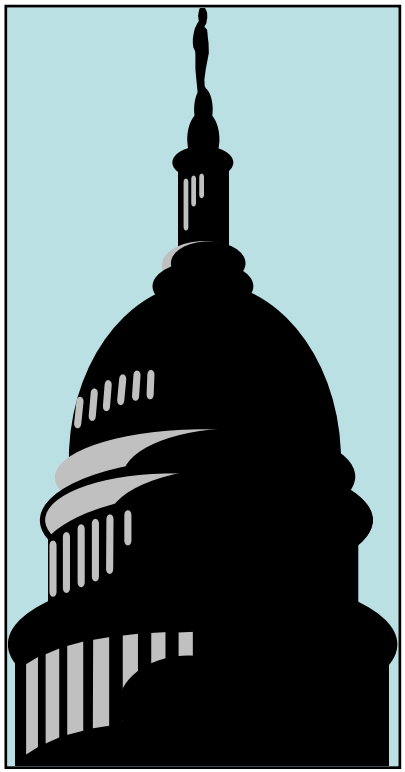
Joint Ground Robotics Enterprise
State of the Enterprise

Dr. Jim Overholt
17 March 2010

Agenda

- Congressional Language
- JGRE Overview and Organizational Structure
- JGRE Success Stories
- Robotics Range Clearance Competition (R2C2)

Congressional Language



CONGRESSIONAL DIRECTION

Department of Defense Appropriation Bill, 1990

".....The Committee reluctantly concludes that the only way to produce a more focused and cost-effective robotics program is to delete funds for all the separate projects and consolidate them under <u>OSD policy and program direction</u> ....."

.....The Committee also is concerned that many of the robotics programs are proceeding without definite requirements from those organizations which would employ such capabilities in combat.....

.....The Committee expects that OSD will decide both the funding and technology priorities for these efforts...."

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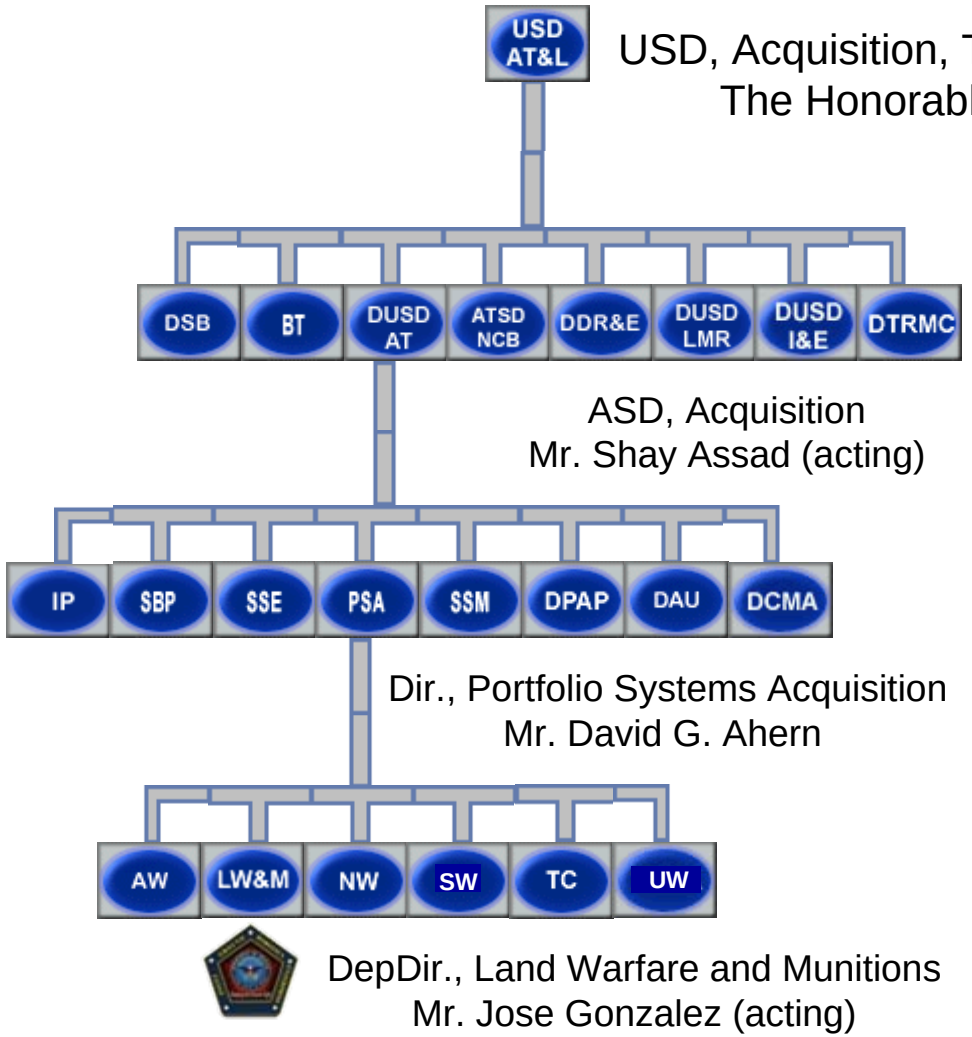
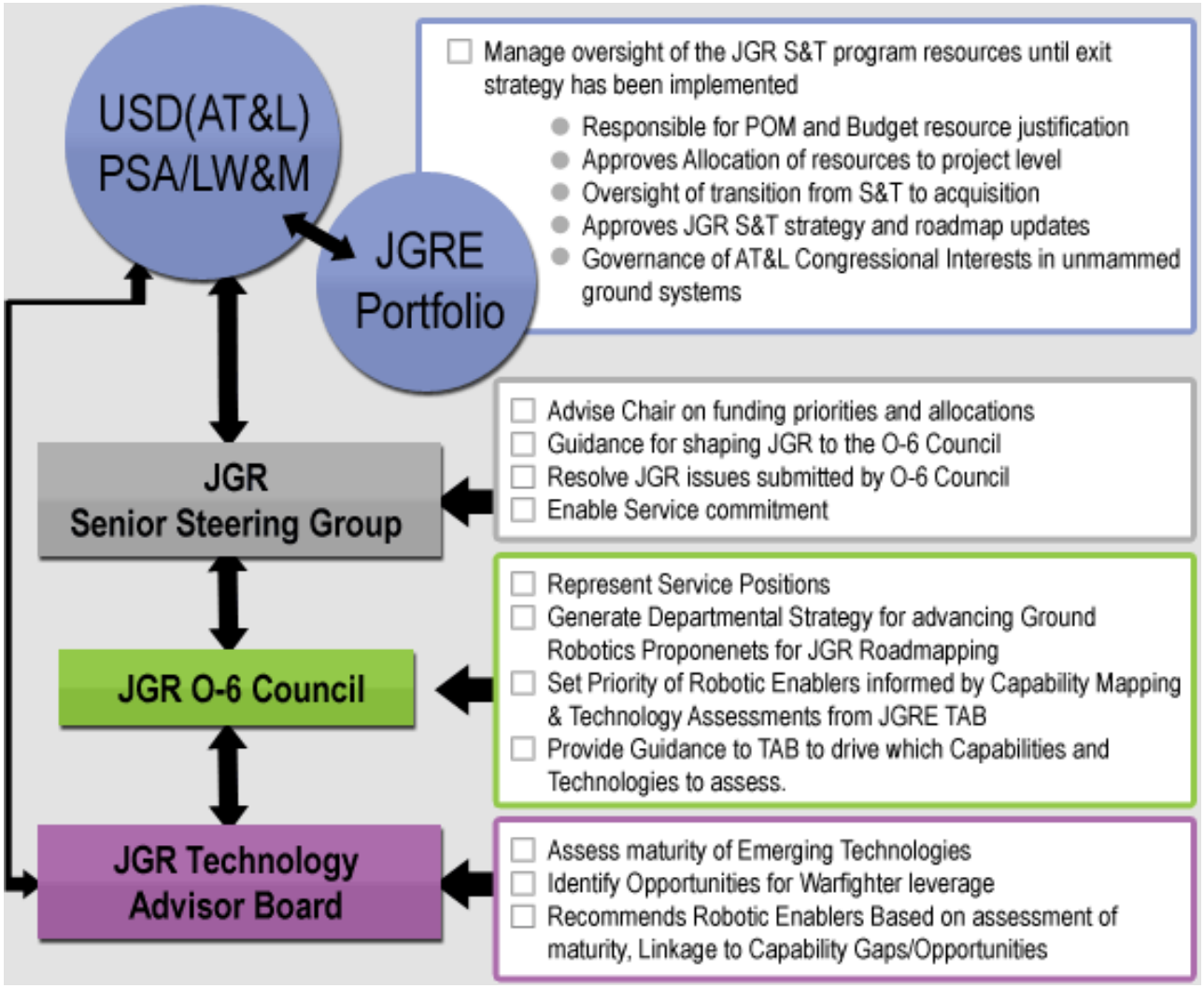
LW&M Placement in DoD



Enterprise Governance



Joint Ground Robotics Enterprise Organizational Structure

Joint Ground Robotics Senior Steering Group

Navy:
Mr. Victor Gavin (MD)
Ms. Carmela Keeney (S&T)
RADM James Shannon (CD)

Marine Corps:
BGen Walter Miller (CD)
Mr. George Solhan (S&T)
BGen Michael Brogan (MD)

Air Force:
BGen Dave Howe (CD)
Mr. Wendell Banks (S&T)

Army:
BG Robert Ogg (MD)
Mr. Donald Sando (CD)
Dr. Grace Bochenek (S&T)
Mr. John Miller (S&T)

Joint Staff:
BGen Glenn M Walters

Mr. Jose Gonzalez - Chair

Joint Ground Robotics Enterprise Organizational Structure

Joint Ground Robotics O-6 Council

LtCol David Thompson (Army/USMC) MD
COL Robert Effinger (Army/TRADOC) CD
Van Chapman (USMC/MCCDC) CD
CAPT Barry Coceano (Navy/OPNAV N85) CD
Paul Milcetic (Navy/EOD) MD
COL David Crow (Air Force/ACC) CD
Al Nease (Air Force/AFRL) MD
CDR Chris Nash (J8)
James Heusman (DTRA)

Dr. Jim Overholt, Dir, JGRE (Chair)

OTA Terms & Conditions

- Period of Performance 7 years
- OTA Price Ceiling $175M
- Phase I authorized: Participation in TAB Process
- Phase I locally authorized to $5M: Research & Development based on funding allocation
- Phase II authorized an additional $170M

Joint Ground Robotics Consortium
12 March - 199 Members

AL - 10
- 7 Trad Small Business
- 3 Non-Trad Small Business

AZ - 2
- 1 Trad Large Business
- 1 Non-Trad Small Business

CA - 30
- 12 Non-Trad Small Business
- 10 Trad Small Business
- 4 Trad Large Business
- 3 Trad Non-Profit
- 1 Trad Academic

CO - 3
- 1 Trad Small Business
- 2 Non-Trad Small Business

CT - 3
- 1 Trad Small Business
- 1 Non-Trad Large Business
- 1 Non-Trad Small Business

DC - 5
- 2 Trad Small Business
- 1 Non-Trad Small Business
- 1 Trad Large Business
- 1 Trad Academic

FL - 3
- 1 Trad Small Business
- 1 Trad Large Business
- 1 Trad Academic

GA - 2
- 1 Trad Small Business
- 1 Trad Academic

HI - 1
- 1 Trad Small Business

ID - 2
- 1 Non-Trad Small Business
- 1 Non-Trad Non-Profit

IL - 2
- 1 Trad Large Business
- 1 Non-Trad Small Business

IN - 2
- 1 Trad Small Business
- 1 Non-Trad Small Business

KS - 1
- 1 Non-Trad Small Business

LA - 2
- 1 Non-Trad Small Business
- 1 Trad Academic

MA - 20
- 9 Non-Trad Small Business
- 3 Trad Small Business
- 6 Trad Large Business
- 1 Non-Trad Academic
- 1 Trad Academic

MD - 11
- 4 Trad Small Business
- 4 Trad Large Business
- 3 Non-Trad Small Business

MI - 17
- 6 Trad Small Business
- 4 Non-Trad Small Business
- 6 Trad Academic
- 1 Non-Trad Academic

MN - 2
- 1 Trad Small Business
- 1 Non-Trad Small Business

NC - 2
- 1 Non-Trad Small Business
- 1 Non-Trad Academic

NH - 4
- 4 Non-Trad Small Business

NJ - 4
- 1 Non-Trad Small Business
- 2 Trad Small Business
- 1 Trad Large Business

NM - 3
- 2 Trad Large Business
- 1 Non-Trad Small Business

NY - 4
- 3 Trad Small Business
- 1 Non-Trad Small Business

OH - 6
- 4 Trad Small Business
- 1 Non-Trad Small Business
- 1 Trad Non-Profit

OR - 1
- 1 Trad Small Business

PA – 25
- 11 Non-Trad Small Business
- 7 Trad Small Business
- 3 Trad Academic
- 2 Trad Non-Profit
- 1 Trad Large Business
- 1 Non-Trad Large Business

SC - 2
- 2 Trad Non-Profit

TN - 1
- 1 Trad Large Business

TX - 10
- 1 Non-Trad Small Business
- 3 Trad Small Business
- 2 Trad Academic
- 1 Non-Trad Academic
- 2 Trad Large Business
- 1 Trad Non-Profit

UT - 3
- 3 Non-Trad Small Business

VA - 10
- 5 Non-Trad Small Business
- 3 Trad Small Business
- 1 Trad Academic
- 1 Non-Trad Non-Profit

WA - 2
- 1 Non-Trad Small Business
- 1 Trad Academic

WI - 1
- 1 Trad Large Business

WV - 1
- 1 Trad Non-Profit

WY - 2
- 1 Trad Academic
- 1 Trad Small Business

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Mr. John Miller (S&T)

Joint Staff:
BGen Glenn M Walters

RTC:
Mr. Bill Thomasmeyer
Mr. Andy Dallas
Mr. Jorgen Pedersen
Mr. Lee Buchanan

Mr. Jose Gonzalez, Ms. Helen Greiner – Co-Chairs

FY10 TAB Members

Battlespace Awareness

P. Rowe	J. Lasswell
T. Cable	M. Bruch
W. English	Lt. Hobson
B. McBride	G. Hudas

Force Application

W. English	J. Bradel
B. McBride	M. Bruch
P. Rowe	B. Skibba
K. Kirkpatrick	R. Wade

Protection

K. Massey	J. Bradel
D. Theobold	B. Brezina
P. Koon	B. Skibba
T. Cable	R. Wade

Logistics

K. Kirkpatrick	J. Lasswell
P. Koon	B. Brezina
D. Theobold	Lt. Hobson
K. Massey	Greg Hudas

Dr. Jim Overholt; Andrew Dallas - Co-chairs

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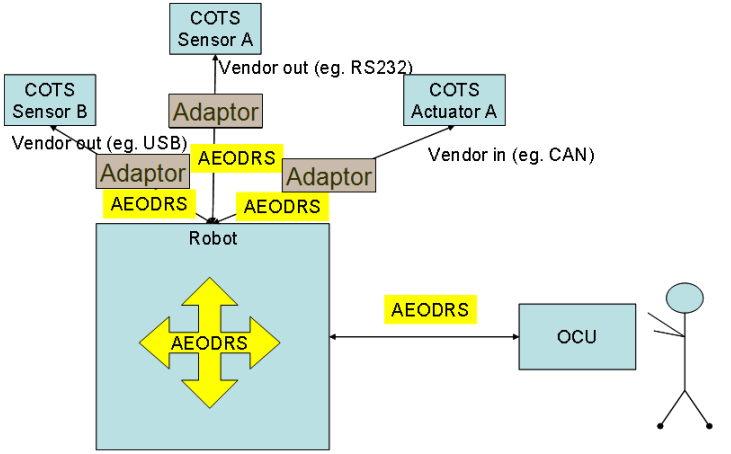
Success Stories USMC

- Enhanced Company Operations, Limited Objective Experiment 3.2
  - Main Objective: Evaluate the utility of a UGV in:
    - Supply distribution for small units operating beyond the capability of mutual support
    - Casualty evacuation for small units operating beyond the capability of mutual support
      - The technologies provided through the JGRE allowed the Marine Corps Warfighting Lab to conduct a live-force experiment which met the Main Objective
  - Results: Concept of Operations developed for UGV's has merit
    - Further experimentation and refinement before transition
  - Recommendation: Expand on unmanned re-supply experimentation
    - Continue with higher MAGTF level experimentation
    - Refinement on the ConOps for future experimentation informed by the results of ECO LOE-3.3

Success Stories NAVY

- Advanced EOD Robot System (AEODRS)
  - Scheduled for MS B 4QFY10
  - Matured Modular Manipulators and End Effectors
  - Matured Hybrid Power and Energy Systems for Robots
  - Tracking 50 technologies/efforts that may be leveraged by AEODRS
  - Completed Common System Architecture Roadmap
  - Established preliminary optimal definition of EOD robot family



AEODRS will have an extensible, open architecture which prescribes relevant interfaces and is configuration controlled by the Government.

Success Stories ARMY

- Computer Assisted Robotic Manipulator (CARMAN)
  - Provide increased precision of manipulator contro and increased ease of operation
    - 30% reduction in the time required to manipulate the robotic arm;
    - 70% reduction in the number of inadvertent contacts of the manipulator arm
- Computer Assisted Tele-Operation (CATO)
  - Improves the tele-operated mobility of Unmanned Ground Vehicles through an improved interface
    - 20% reduction in straight line error (i.e. swerving);
    - 30% reduction in the number of inadvertent contacts while navigating

Due to the successful demonstration, these technologies are being inserted into existing platforms, in coordination with the NSWC EOD Technology Division.

Success Stories
ARMY/Air Force

- Joint Architecture for Unmanned Systems- SAE AS5684, JAUS Interface Definition Language
  - Mobility Service Set – Complete, balloted and passed
  - Manipulator Service Set – Draft complete and balloted once – in revision
  - Environment Sensing Service Set – Draft complete and balloted once – in revision
  - Mission Execution Service Set – Complete, balloted and passed
  - All service sets have been drafted and balloted. They are in revision and will be presented to the committees for final approval. Final approved versions expected by the end of Q3 – 2010.

Success Stories Air Force

- Autonomous Range Clearance
  - Successful demonstration of autonomous range clearance tasks and preliminary data have led the US Army to allocate funds for procurement of autonomous range clearance systems assuming successful results from Range Clearance Cash Prize Competition (R2C2)
  - R2C2 planning is ongoing to support competition in Aug/Sep 2011

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Robotic Range Clearance Competition Goal

- Advance the state of the art in robotics thru range clearance technologies
- $2 Million in cash prizes
- G3/5/7 releasing an IDIQ

Why Range Clearance?

- Currently there are millions of acres encumbered with spent training rounds and munitions debris
- The competition will help provide a safer, more timely, and more cost effective way to return the land to productive use

Robotic Range Clearance Competition (R2C2) Events

- Kick-off Meeting was held 22 October
- Industry Day was held 10 December
- Letter of Intent
  - Posted 26 February via www.roboticrangeclearance.com
  - Due date of 3 May
- Competition Rules
  - Posted 26 February via www.roboticrangeclearance.com

R2C2 Future Events

- Pilot run beginning of August 2010
- Open competitor test runs at Camp Guernsey
  - 1 August 2010-1 November 2010
  - 1 May 2011-1 July 2011
- In Progress Reviews (IPRs) at competitor sites 1-19 November 2010
- Final Competition scheduled Summer 2011
  - Will be held at Camp Guernsey in Guernsey, WY

Prize Scope

- Unmanned vegetation clearance ($250K)
- Unmanned geophysical mapping ($250K)
- Unmanned surface debris clearance ($250K)
- Unmanned sub-surface UXO clearance ($250K)

- **End Goal: Range Area Cleared of UXO ($1M) using Unmanned Technologies**

Focus is on increasing safety and operational effectiveness via robotics automation as well as reduce time and cost

Why Compete?

- OSD is offering prize money for the system that is most advanced and scores the highest
- Army Corps of Engineers in conjunction with the Army G3/5/7 will be releasing an IDIQ contract
  - Procure Services for Robotic Range Clearance
  - Participation in the competition will give competitors an opportunity to show the government success of their systems
  - Data collected for the competition can be used as test data to demonstrate capabilities for the IDIQ

Summary

- DoD is looking for the Robotics Range Clearance Competition to:
  - Advance the state of the art in robotics range clearance technologies
  - Foster opportunity for COTS procurement for Robotic Range Clearance
  - Provide the best balance of efficiency and innovation in robotic technology development
- Hope we see you at the Competition!

R2C2 Questions

- Please stop by the AFRL booth (211) or fill out a questions form on the roboticrangeclearance.com site