



NDIA Robotics Division Update

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2008 Top 10 (1-3)



- **Unmanned Systems Integrated Roadmap**
 - Mission to Means mapping in all domains
 - 8 Goals, 15 Objectives
 - 27 Prioritized Action
 - Joint Requirements Council Review in January 2009
- **Robotics Technology Consortium**
 - Industry Day 1/16/2008 – signed OTA with RTC 5/20/2008
 - 6 Requests for Proposal in FY08
 - 6 Requests for Proposal in FY09
 - 2 years worth of funding despite original plan of initial FY10 funding
- **Test Implications**
 - Army Developmental Test Command Committed to establishing Safety Certification Test methodologies
 - Defense Test Resource Management Center directed study to identify needed investments into infrastructure upgrade



2008 Top 10 (4-6)



- **War Fighter Experimentation**

- Convoy Active Safety Technology Demonstration Nov 2008 – successful demonstration of user requested attributes, strong support by CG, CASCOM leading to Joint Concept Technology Demonstration submission in FY09
- Cobra Gold May 2008 Demonstration resulted in continued/strong interest in UGVs for supplies transport across complex terrain – funding for maturation of platforms for participation in Cobra Gold 2009 Military User Assessment

- **SUGV Product Line Portfolio**

- Alignment of MTRS and Advanced EOD Robotics Systems Program Initiation

- **International Engagement**

- No more advanced than US, but provided insights into UAV/UGV collaboration in urban ops



2008 Top 10 (7-10)



• Armed Robots

- "Unmanned and Robotic Warfare: Issues, Options, and Futures." – participation by OSD, US Army RDECOM and TRADOC – still awaiting close-out

• Homeland Defense/Homeland Security

- Collaboration w/ DHS S&T Program Manager Explosives and Countermeasures to leverage DoD EOD robotic expertise

• Congressional Interest

- Legislative Proposal approved by Office of Management and Budget – SASC declined to address until after Senator Warner's retirement
- DoD will resubmit for FY09

• Earmarks/Unrequested Funding

- Executive Order sought 50% reduction - DoD asked to report...no action was taken beyond data call (no FY08 funding was returned)



2009 Top 10



#1 – To Be Announced

- If approved – very time consuming, but high expected return on investment

#2 – UMS Roadmap Ground Domain Actions Execution

- 8 out Top 10 prioritized actions will be worked for Ground Robotics
- 12 out of remaining 17 actions will be worked for Ground Robotics

#3 - Standards Harmonization

- Harmonization Plan in place, funding allocated, DoD lead identified
- Success = acceptance within US and NATO community of single standard for unmanned systems

#4 - Warfighter Experiments: Cobra Gold 2009

- Success = understanding of emerging requirements wrt performance, environment, lifecycle issues
- Plan for establishing requirements documents

#5 – Legislative Proposal

- Resubmit to address certification policy issue



2009 Top 10 (continued)



#6 – Convoy JCTD Support

- Funding allocated, commitment from OSD AS&C to socialize with COCOMS – requirements being worked by CASCOM

#7 – TAB Continuous Process Improvement

- Consideration of new or modified metrics

#8 – RTC Partnership Continuous Process Improvement

- Continued transparent collaboration between RTC and DoD
- STEM initiative

#9 – Test: Safety Certification Uniformity

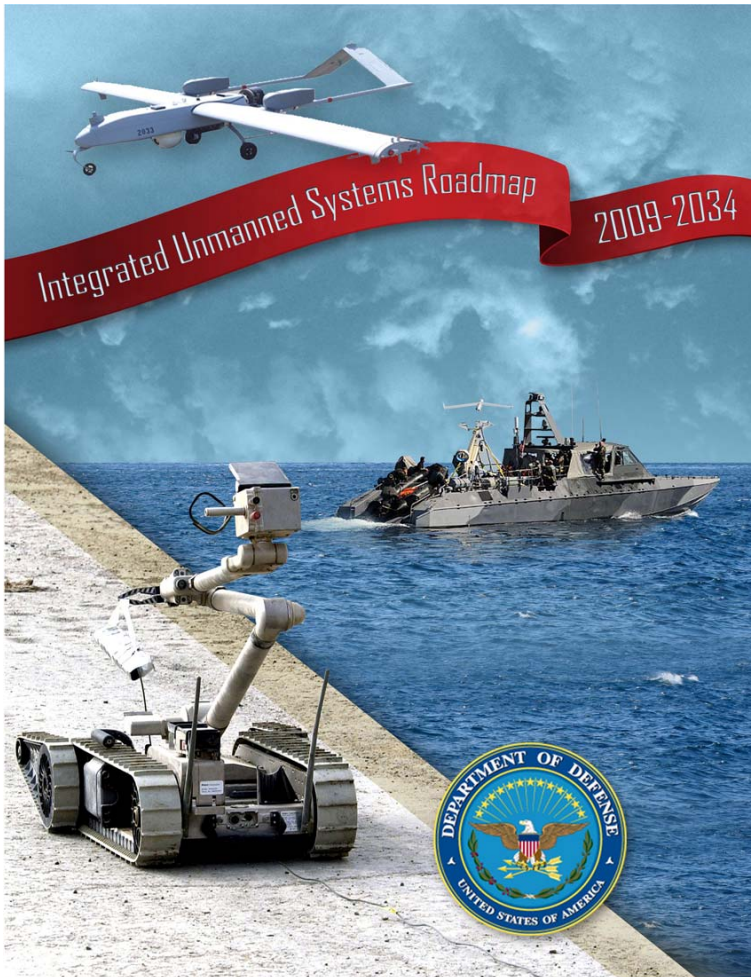
- SOCOM CAMS JCTD - “new territory” for test community
- Often Services have differencing requirements for similar systems to achieve certification – avoid for UGVs

#10 – User Community Engagement

- Uniformed Senior Leadership Champions in each Service



Unmanned Systems Integrated Roadmap



- **“VADM Stanley views this roadmap (although it avoids specific reference to requirements) having ties to future capabilities and requirements based decisions (compatibility, material availability, standardization, etc.)”**
- **Requires review by the Joint Requirements Oversight Council due to “the huge step (in the right direction) this version took toward laying out a path for UMS development, goals, etc.”**
- **JROC Review scheduled for early January, therefore public release expected late January**



Roadmapping Methodology



- **Craft Potential Future Vision**

- **Joint Capability Area Mapping (strategy & schedule per PL109-364)**
 - Depicts programmed Systems & projects systems beyond POM thru 2034
- **System Performance Envelope Evolution (challenges & gaps per PL 109-364)**
 - Depicts the evolution of increased performance to achieve mission accomplishment
- **Identify Technology Enablers (challenges & gaps per PL 109-364)**
 - Depicts key technologies leading to mission accomplishment and performance increases
- **Goals & Objectives (strategy per PL109-364)**
 - Depicts recommendations that if pursued will implement strategy of development & employment of unmanned systems across Capability Areas



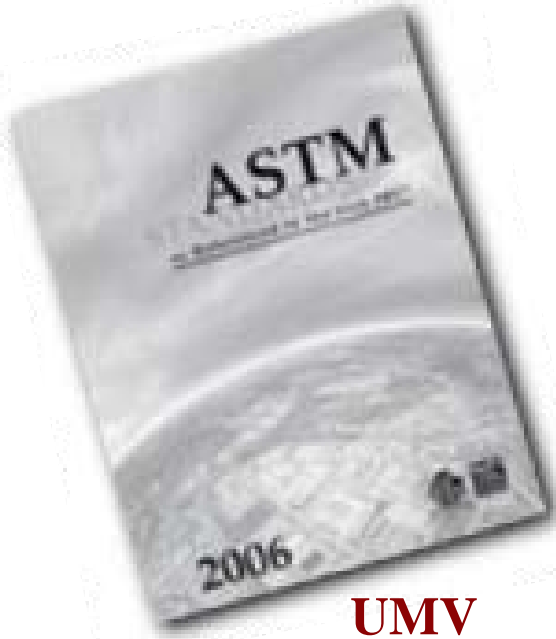
Roadmapping Methodology



- **Conduct Strengths, Opportunities, Challenges & Risks Analysis (challenges & gaps per PL 109-364)**
 - Assessment of what DoD can leverage to achieve vision
 - Assessment of challenges & risks to be mitigated in achieving vision
- **Recommend Actions Leading to Vision Achievement (strategy, schedule, challenges & gaps per PL 109-364)**
 - Based on vision, goals & objectives, and analysis, recommends actions DoD can pursue to achieve development and employment of UMS across next 25 years
- **Capture Planning Document in integrated narrative (implementation plan per PL 109-364)**
 - Transcribes planning products into integrated narrative document
- **Coordinate Document for Signature**



Standards Harmonization Situation



UMV

SAE Aerospace AEROSPACE INFORMATION REPORT **SAE AIR6665** 14
SAE International Group Issued 04/01/2008 Revised

Architecture Framework for Unmanned Systems

RATIONALE

This document includes architectural descriptions intended to aid in standards development and subsequently to aid in development of system architectures based on those standards. The Conceptual Framework describes the network of domain concepts and the relationships between them; the AS-4 Architecture describes the architecture of the standards and technical reports of the AS-4 Committee; and the Architecture Framework for Unmanned Systems is a framework with which to design architectures for systems that are to include unmanned systems.

This Architecture Framework for Unmanned Systems (AFUS) Aerospace Information Report was prepared by the SAE AS-4 Architecture Framework Subcommittee, Unmanned Systems Committee, Aerospace Council Avionics Systems Division.

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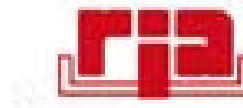
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UGV



UAS

There are several Standard Development Organizations (SDO) with efforts underway for mobile robots and more working in industrial robotics. Results: government and industry are both confused and inefficient; warfighters need to be better served.





Standards Harmonization Vision and Mission



VISION

Mandated, widely used, optimized, integrated, consensus based, open commercial standards for unmanned systems

MISSION

To achieve a set of open standards for unmanned systems (UMS) that NATO adopts. These open standards shall:

- 1) Satisfy needs of all UMS domains**
- 2) Use commercial standards to greatest extent feasible**
- 3) Be coordinated and integrated such that duplication is eliminated**
- 4) Evolve over time to meet changing needs of users and developers of UMS**



Standards Harmonization Success Criteria



Harmonization effort will be considered a success when the following is in place:

Standards for Unmanned Systems in use by the U.S. and NATO Allies are complementary – not competing – and SDOs are addressing common needs with common solutions.

Some domains or applications may have unique requirements and this is allowable. But emphasis is placed on open commercial standards



Standards Harmonization Assessment



- **Current climate is conducive to cooperation, thus the opportunity for harmonization of robotic standards is good**
- **Cooperation & *commitment* from all levels is a key factor**
- **Many moving parts, and diverse players, so it's a complex, dynamic environment – but goal is achievable**
- **Successful harmonization will pay off for the Warfighter**

BIGTIME



Cobra Gold Warfighter Experiment



- **Cobra Gold is a six-week exercise during April and May, the hottest time of the year in Thailand where daytime temperatures linger between 103 and 107 degrees Fahrenheit.**
- **PACOM interested in UGVs that can traverse highly complex terrain**
- **Two platforms are being matured for participation in Cobra Gold to serve as basis for Military User Assessment**



User Assessment Scenarios



- **Scenario – Tactical Logistical Supply**
 - Task- UGV functions as a logistical support vehicle, supporting a unit conducting tactical logistical supply (Infantry Training and Readiness Manual, Collective Task, INF-LOG-6410: Conduct tactical logistics)
 - Condition- Given vertical obstacles of varying slope gradients and terrain, UGV's will move a variety of military tactical cargo evaluating their capability for moving cargo loads of various sizes and weights.
- **Scenario – Extremis Casualty Extraction**
 - Task- UGV functions as an extremis casualty extraction device in circumstances where the casualty is exposed to direct effective enemy fires. (Infantry Training and Readiness Manual, Collective Task, INF-MED-6430: Process casualties)
 - Condition- Given a two-story urban structure with an open entry point, UGV's will enter the structure, locate an incapacitated combat equipped casualty and extricate the casualty located on either the bottom or top floor, in conditions of daylight and darkness.
- **Scenario6 – Area Security Operations**
 - Task- UGV functions as scout platform in close terrain (urban or dense vegetation) supporting a unit conducting area security operations. (Infantry Training and Readiness Manual, Collective Task, INF-PAT-5142: Conduct area security)
 - Condition- Given terrain consisting of urban streets, rolling hills with slopes to 45%, and light to moderate vegetation (trees), UGV's will move forward of an advancing unit to reconnoiter the area for enemy forces, or obstacles emplaced to impede friendly movement.



Wrap Up



- Top 5 Initiatives will garner most attention, but level of effort will be allocated against all 10 Initiatives
- Approval of 2009 Roadmap sets a new dynamic for DoD approach to unmanned systems
- Warfighter Experimentation is starting to become the “mode of operation” for engaging with the user community to foster requirements development
- Stay Tuned for new initiative which will become priority #1 if approved...