



PROCEEDINGS

UNMANNED SYSTEMS CAPABILITIES CONFERENCE III (USCC III)

Nashville, TN

January 23 – 24 2007

DAY ONE

1. **Conference Welcome**

A. Mrs. Ellen Purdy, Enterprise Director, Joint Ground Robotics (ED, JGR) welcomed conference attendees and said she believed USCC III has a great agenda lined up with some high quality speakers. She observed that lots of synergy has been observed in the UMS community and looked forward to a very productive two days.

B. Tony Detrick, Technical Support Working Group (TSWG) also welcomed the attendees and suggested we're not where we need to be, i.e., capabilities for first responders are lacking. Help us make a difference for the users.

2. **Mr. David Ahern, Director Portfolio Systems Acquisition, Office of the Under Secretary of Defense, Acquisition, Technology and Logistics**

Title: "What's the Right Answer for DoD Ground Robotics?"

Mr. Ahern presented an overview of his perspective on unmanned ground robotics. He compared it to the beginning stages of the development of military aviation, in that technology advancement is needed to realize the full potential of the capability. He also discussed the Unmanned Systems Roadmap currently in draft. His slides are located at [Tab A](#).

3. **Lieutenant Larry Burns, Las Vegas Police Department SWAT**

Title: "Robotics in the Tactical Environment"

Lt. Burns gave a presentation on unmanned ground systems from the Special Weapons and Tactics (SWAT) view. He discussed and presented situations that his department had experienced in the use of robotics. He further described how robotics can be used for negotiation and surveillance. His slides are located at [Tab B](#).

4. **CWO2 Bryan Stotts – Marine Corps EOD Operations**

Title: "USMC Robotics Experience in OIF"

Chief Warrant Officer Stotts conducted a review of his experiences with ground robotics during his tours in Iraq. He has operational experience with RONS, Vanguard, Bombot, TALON, Packbot, and the MARCBOT. He discussed how 'Plug and Play' modules enable operator level repair and improvement in operational availability. His slides are located at [Tab C](#).

5. **Mrs. Ellen Purdy, Enterprise Director, Joint Ground Robotics**

Title: "A Funny Thing Happened on the Way to the Future or No Plan Survives First Contact"

Mrs. Ellen Purdy briefed the attendees on the new Joint Ground Robotics Enterprise (JGRE). She discussed the need to plan and program for the opportunity to position the technologies available to support emerging capability needs over the next 3-5 years. Central to the JGRE process is an assessment of current and future capability gaps, which will feed a technology maturity and funding assessment to inform funding decisions. Also emphasized was the need of getting 80% solutions out to war fighter. Her slides are located at [Tab D](#).

6. **Tony Detrick, Technical Support Working Group**

Title: "Next Generation Robotics Program"

Tony Detrick delivered a presentation that led off with an overview of the TSWG. He also covered a description of the Next Generation EOD system and then discussed the Operational Analysis which to be

expanded to include more than just Bomb Squads, including SWAT, fire, EOD, Law Enforcement, HAZMAT, and first responder capability needs. His slides are located at [Tab E](#).

7. **Jason Luck, Alion**

Title: “Self Mobile Trailer”

Jason Luck described his robotic programs that are leveraging prior and current work by the Army and GDRS. It requires a modular/removable litter capability for casualty evacuation. His slides are located at [Tab F](#).

8. **Bruno Eddy, ARA**

Title: “TSWG NGEODRCV Operational Analysis (OA)”

Bruno Eddy covered the first OA completed in 2002, the second civilian OA completed in 2003, and finally the third iteration from December 2006. He also presented the Top User priorities for NGEODRCV. His slides are located at [Tab G](#).

9. **Robert Wade, AMRDEC**

Title: “Standardization for UGVs”

Robert Wade’s presentation covered the JAUS approach, rationale, and history. He also discussed the new VPN capability, which is a recent improvement/augmentation to the Experimentation committee Task Group. His slides are located at [Tab H](#).

10. **Academic Panel**

A. **Dr. Julie Adams, Vanderbilt University**

Title: “Multi-Robot Coalition Formation”

Dr. Adams discussed her research in heuristic algorithms for coalitions of robots and how they can validate tasks and reform coalitions when necessary. She also presented the Robot Allocation thru Coalitions using Heterogeneous Negotiation Agents (RACHNA). Her slides are located at [Tab I](#).

B. **Dr. Carl Crane, University of Florida**

Title: “Academic Views on Robotics Research”

Dr. Crane described the University of Florida’s approach to scoping research challenges into manageable units which is important in order to aim for one primary behavior. He also covered the 2005 and 2007 DARPA Grand Challenge efforts. His slides are located at [Tab J](#).

C. **Dr. Lynne Parker, University of Tennessee**

Title: “Research Challenges for Achieving Robust Intelligence in Robotics”

Dr. Parker’s presentation centered on future trends for multi-robot systems, large scale robot team mapping and sensor network deployment (100+ robots), and the use of Fuzzy ART (Adaptive Response Theory). Her slides are located at [Tab K](#).

D. **Dr. Charles Reinholtz, Virginia Tech**

Title: “View from Academia on the State of Development and Use of Unmanned Systems”

In his presentation, Dr. Reinholtz discussed hybrid vehicles, spectrum overcrowding, teaming, JAUS, HMI, complimentary commercial applications in highways, assistive robots, and safety. His slides are located at [Tab L](#).

DAY TWO

11. **Colonel Camille Nichols, The Joint Staff (J8)**

Title: “JCIDS”

COL Nichols made opening remarks supportive of robotics research and development. She noted that robots are here to stay in growing areas of our lives. She also expressed her congratulations on supporting troops in harm’s way with robots.

12. **Mr. David Mitchell, Director, Tennessee Office of Homeland Security**

Title: “Tennessee Regional Information Center”

Mr. David Mitchell gave an overview in which information sharing is a high priority at state level after September 11 and is a long-term effort. He also covered HLS national priorities and forecasting and identifying trends in crimes. His slides are located at [Tab M](#).

13. **Captain Jeffrey Trumbore, Joint IED Defeat Organization (JIEDDO)**

Title: “JIEDDO”

CAPT Trumbore’s remarks were aimed at informing industry on ways that robotics can help in Iraq and Afghanistan (different capability gaps/needs for each). He also addressed the JIEDDO Concept of Operations: Attack the Network - Defeat the Device -Train the Force.

14. **COL Lee Fetterman, TRADOC Capabilities Manager (TCM) FCS**

Title: “Bringing FCS Capabilities to the Force”

COL Fetterman described how FCS is an unmanned-heavy formation (10 UMS) which will be unmatched in its capabilities. He also covered the JAUS requirement in FCS, as well as ROE issues that remain. His slides are located at [Tab N](#).

15. **Other Government Agencies (OGA) Perspectives Panel**

A. **Dr. Jim Albus, NIST, Department of Commerce**

Title: “NIST Unmanned Vehicle System Standards and Performance Measures”

Dr. Albus research areas include autonomous Driving and UGV standards, JAUS support, The 4D/RCS architecture, USAR performance requirements for NIJ to support procurement decisions, and DOT-DOD technology transfer. His slides are located at [Tab O](#).

B. **Chris Tillery, NIJ, Department of Justice**

Title: “The National Institute of Justice’s Perspective”

Chris Tillery described NIJ’s basic R&D process, and how they have UGV, UAV, and UUV requirements, but more UGV than anything else. He covered his perspectives on design considerations/capability needs and the fact that NIJ is looking for 80-90% solution to bomb & SWAT requirements. His slides are located at [Tab P](#).

C. **David Bruemmer, INL, Department of Energy**

Title: “Intelligent Autonomy for use in Hazardous DOE Environments”

David Bruemmer covered INL’s past work in radioactivity/HAZMAT monitoring, marsupials, swarms, UAVs, pipeline inspections; present work in experimentation to assist robotics benefits of robotic behaviors; future work to look at reducing errors and enabling reduced GPS dependency, as well as UAV-UGV teaming for counter-mine missions. His slides are located at [Tab Q](#).

16. **First Responders Panel**

A. **Jim Melton, Santa Ana Fire Department**

Title: “Hazardous Materials Robot”

Jim Melton’s main points were that a lack of robots adds about 30 minutes to any incident and increases team and bystander risk, robots can reduce time to detection to less than five minutes and reduce risk to HAZMAT, SWAT, Fire, and USAR teams, and that availability of robots will revolutionize HAZMAT operations and increase safety margin and increase situational awareness. His slides are located at [Tab R](#).

B. **Dr. Robin Murphy, Institute for Safety, Security, and Rescue Technology**

Title: “Why Aren’t Rescue Robots Being Adopted?”

In her discussion of this question, Dr. Murphy covered the 50% of adoption rates that are influenced by deltas in relative advantages, capability, complexity, trial ability, observability; if you can’t figure out how to operate a technology in 10 minutes, it’s probably too complex; and that some adaptation or re-invention is required in each application area. And lastly, that JAUS needs to be mandated. Her slides are located at [Tab S](#).

C. **Jim Murray, Tucson Bomb Squad (SWAT)**

Title: “Robotics and Tactical Operations”

Jim Murray’s presentation contained highlights that noted robots are nearly ideal for majority of calls, especially barricaded and/or suicidal subjects; and that a requirement exists for robotic tools or capabilities that should be hidden or at least not apparent (prevent identification of robot capabilities). His slides are located at [Tab T](#).

17. **Combat Support/Combat Service Support Capabilities Panel**

A. **Walton Dickson, Maneuver Support Center (MANSCEN)**

Title: “MANSCEN”

Walt Dickson provided an overview of MANSCEN’s Concepts Force Integration Directorate (CFID) which includes capabilities to develop concepts, requirements determination, and battle lab ability to experiment and refine those requirements. He also discussed their concept of operations which is to analyze mission areas using the “detect, assess, decide, act, and recover” tenets. His slides are located at [Tab U](#).

B. **Gary Gilbert, Army Telemedicine and Advanced Technologies Research Center (TATRC)**

Title: “Combat Casualty Care Robotics Research”

Gary Gilbert referenced a very interesting study that analyzed robotic capability requirements in the logistics areas for the next 5, 10, 15, and 20 years. He described a DARPA trauma pod program is a \$35M effort that may have applications to TAGs vehicle. He stated that everything we do is JAUS compliant. His slides are located at [Tab V](#).

C. **CMSgt Jeff Schley, USAF Air Combat Command (ACC)**

Title: “USAF Capability Gaps”

CMSgt Schley stated that robots must be force multipliers and increase effectiveness and efficiency and that we need a suite of platforms to meet all mission requirements. He covered USAF UMS mission areas such as CBRN, firefighting, nuclear protection, UXO/Range clearance, and remediation.

18. **Break Out Sessions Out-Briefs**

A. **Vice Admiral Joe Dyer (USN ret), NDIA**

Title: “UAS Lessons Learned”

VADM Dyer presented the panel’s lessons to be offered to the UGV community:

- Crossing the chasm as a paradigm. Robotics today is just beginning to cross the chasm from early adopters to majority use.
- Focus on the mission.
- Get operational feedback during development.
- Early fielding - (going well today).
- Operational and logistics feedback (determine MTBF).
- Asset ownership is a f(time, distance, and space).
- Develop varied payloads.
- Vertical advocacy across leadership hierarchy.
- UGV challenge matrix
- Technology is the greatest challenge followed by requirements, resources, and reliability.
- Culture not seen as a major issue.
- Current funding picture is indicative of innovators and early adopters, but is unlikely to enable crossing the chasm.

His slides are located at [Tab W](#).

B. **Michael Toscano, Chair, PSEAG**

Title: “Technology Transfer”

Mike Toscano presented the considerations for technology transfer as developed by the panel:

- Panel’s mission was to have industry, academia, and government dialog on mechanisms to produce effective technology transfer.
- The topics discussed included why there is inefficient technology transfer; what are the barriers to effective technology transfer; how to best foster effective technology transfer.
- The panel recommended the following for consideration to foster more effective technology transfer:
 - Increase information sharing and knowledge dissemination.
 - Increased emphasis on development of common hardware and software standards (e.g., JAUS).
 - Commitment of resources to solve the technology ‘Long Poles’.

His slides are located at [Tab X](#).

C. **David Heaven, NBSCAB Support**

Title: “NBSCAB Capability Needs”

David Heaven briefed out the deliberations of the NBSCAB panel. He discussed the nature of the issues attendant to robotic development for bomb squads. In addition, the panel discussed:

- This body has developed and validated over 200 requirements that are available to industry on the web.
- How will we know we have a JAUS level one compliant robot? It will be up to industry, who will have to self-certify.
- There is much characterization work still needed on VBIED response items.
- VBIED is our most stressing threat.

His slides are located at [Tab Y](#).