

Gun and Missile System 2008 Symposium

**Unmanned and Autonomous Systems
Weapon System Integration**

Ground and Air System Platforms

Panel Discussion

23 April 2008

- **Enabling—System Integration, Operational Readiness, and Warfighter Application of:**

- **Unmanned and Autonomous Systems
Weapon System Integration**

- **Ground and Air Platforms
Ground Robotic Systems (GRS)
Land and Sea
Unmanned Aircraft Systems (UAS)**

- ***Challenges, Needs, Solutions, Opportunities
Ensuring Integrated Systems
And
Realizing Operational Capability***

- **Identify and Examine DOD and Industry Requirements, Needs, and Challenges to Enable Weaponized GRS and UAS Systems**
 - Legal and Related Considerations
 - Requirements
 - Technologies
 - System Integration
 - Safety
 - Concept of Operations (CONOPS)
 - Risks
- **Assess Status of System Development/Deployment Readiness**
 - Success Demonstrated/Applied—Barriers Identified
- **Identify Path Forward —Challenges-Technologies--Integration**
 - DOD
 - Industry

- **Panel Opening Comments/Format Description** Moderator
- **Panel Member Remarks** Each Member
- **Panel Dialogue—Lead by Moderator** All
- **Questions from Attendees** Panel Members
 - Written Questions
 - Open Format Questions (As Time Permits)
- **Concluding Summary Comments** Panel Members
- **Wrap-Up Summary** Moderator

- **Dave Broden** Moderator Broden Resource Solutions LLC
- **Robert Fondren** NSWC-Dahlgren
- **Kim Jones** US Army--Picatinny-ARDEC
- **Ed Hackett** iRobot
EH Group

- **Ricky Houghton**

Ibis Tek

- **Adrian Erkenbrack**

Foster Miller
Defense Technology Solutions

- **Charlie McCullough**

BAE Systems

- **Jim Krafcik**

USAF Eglin AFB

- **Integration Challenges—**

- The Evolving Requirements
- Establishing Programs and Priorities
- Funding
- Matching Platforms and Technology for Capability
- Linking the Technology and Resources---Collaboration
 - Platforms
 - Integration Resources/Capability
 - Manufacturing
 - Technology
- Realizing the Needed Innovation and New Technology etc.
- Evolving Operational Criteria --CONOPS
- How Can Resources be Captured/Shared/Applied to Meet DOD Needs and Industry Business Objectives
 - Data Rights Considerations



Robotics
Companies Establishing
National Ground Robotic
Consortium

- **System Integration Approach and Criteria**
 - What are the Drivers for System Design/Performance?
 - *Requirements Driven Pull*
 - *Vs.*
 - *Technology Push*
- **Role of Industry and Government In Defining/Selecting:**
 - Requirements Pull vs. Technology Push
 - Innovation— “Making it Happen”
 - System Design
 - Technology
 - System Integration

- **DOD Requirement Evolution and Status:**
 - **Status of Requirements:**
 - **Ground Robot Vehicle Systems (Ground and Sea)**
 - **Weaponized Systems (Armed)**
 - **Unmanned Aircraft Systems**
 - **Weaponized Systems (Armed)**

 - **DOD Priorities for GRV's and UAS's**
 - **Defined or Evolving?**

 - **Program Focus**
 - **FCS**
 - **Service Mission Specific**
 - **Joint vs. Specific Service etc.?**
 - **Other**

- **Unmanned And Autonomous Weaponized Platform Status**
 - **Ground Robotic Systems (GRS)**
 - **Unmanned Aircraft Systems (UAS)**
- **Requirements and Initiatives—Opportunities**
- **Legal and Related Considerations**
- **Weaponized Platform Characteristics —Size—Weight etc.**
- **Weapon Capabilities and Characteristics**
 - **Missiles**
 - **Cannons**
 - **Other**
 - **Munitions Required**
 - **Lethal vs. Non-Lethal**

- **Weapons Available for Integration vs. Unique “New” Weapons?**
- **System Integration Considerations**
 - **Technologies**
 - **Barriers**
 - **Risks**
- **Command and Control Links**
 - **Sensors—Sensor Resolution—Capture Details
Video, IR, Fusion etc.**
 - **Communication**
 - **Data Links—Content—Transfer Needs/File Size/Data Rate**
 - **Man in Loop Control**
- **System Integration Status**

- **Safety Assessment Factors—**
 - Review/Approval Process
 - Design/Performance
 - Operational
 - Collateral Damage
- **Situation Awareness**
 - What is Required etc,
- **Coordinated Missions**
 - Apache plus UAS
 - Bradley plus GRS
- **Concept of Operations (CONOPS)**
 - Mission Flexibility
 - Surveillance and/or Lethal
 - Recon
 - Other

- **Barriers**
 - Technology
 - To Development
 - To Application
- **Opportunities**
 - Technology
 - System Integration
 - Production
- **Role of Industry To Enable GRV and UAS Weaponization?**
- **Path Forward—Vision Ahead**

- **1. What are DOD and Service Needs and Requirements for:**
 - **Armed Unmanned Platforms**
Ground Robotic Vehicles (GRV)
Unmanned Aircraft Systems (UAS)

- **2. Definition and Consideration of Unmanned vs. Autonomous**

- **3. Military Application of Armed/Weaponized Systems--- Legal Implications**

- **4. What Initiatives are In Process for: GRV? UAS?**

- **5. Comments Regarding Warfighter Use of Armed Unmanned Platforms**
 - **“Lessons Learned”—Proven Systems—Results—Needs**
 - **Who Controls the Armed Platforms—Decision Maker?**

- **6. What are Priority Mission Objectives—Establishing Required Weapon Capability and Type?**
 - **Weapon Types Required? Lethal vs. Non-Lethal?**

- **7. What are Weapon System Integration Challenges and Barriers?**

- **8. What Technologies Drive and Enable Engagement/Defeat Objectives?**
 - **Precision Capability**
 - **Ability to Reach Into Threat Areas**

- **9. Coordinated Capability of Manned System and Unmanned System**
 - **Apache linked to UAS**
 - **Bradley linked to GRS**

- **10. What New Weapon Characteristics and Capabilities are Required?**
 - **Mechanisms—Type—Weight--Power**
 - **Lethality**

- **11. What System Integration Technologies Are Required?**

- **12. Unmanned Platform Command and Control Links:**
 - **Status**
 - **Barriers**
 - **Decision Maker—Who—Where—Links etc.**
 - **Needs**
 - **Issues**

- **13. Type and Size of Unmanned Platforms for Weaponization?**
 - **GRS**
 - **UAS**
 - **Small vs. Larger or Mix?**

- **14. Operational Benefits of Armed/Weaponized Unmanned Platforms**
- **15. Is Low Collateral Damage Realized?**
- **16. Safety Assessment Related to Unmanned System Integration and Operational Application**
- **17. Address Multi-Mission Capability and Flexibility:**
 - **“Surveillance Balanced with Quick and Precision Strike”**
 - **“Find, Fix, Finish” –Operational Implications and Benefits**
- **18. Operational Training**

- **19. Weapon Lethality Capability—Type**
 - **Lethal vs. Non-Lethal**

- **20. System Integration Considerations**
 - **Requirements Pull**
 - **Vs.**
 - **Technology Push**

- **21. Weapon Integration, Capability, and Sensor Range Relative to Operational Criteria and Rule of Engagement (Legal etc.)**

- **22. How does Situation Awareness Capability Drive Weaponized GRV and UAS System Integration and Application?**

- **23. Requirement and Challenges for Unmanned Water Craft**

- **24. Weaponization Considerations**
 - **Integration of Existing Weapon Systems vs. Development of New/Unique for Unmanned Systems**
 - **Technical Factors**
 - **Logistics and Supportability**
 - **Schedule**
 - **Cost**
 - **Benefits**

- **Written Questions Prepared During Panel Member Remarks**
 - **Moderator will Select and Ask Questions**
- **Open Format Questions From Attendees**
 - **Following Written Questions**

- Panel Members Present Wrap-Up Remarks
 - *Identify Top 2-3 Focus Priorities*
- *Focus on Key Topics*
 - Benefits of Weaponized Unmanned Platforms
 - Challenges
 - Barriers
 - Opportunities
 - Key Programs
- DOD and Service Objectives, Focus, and *Plans—Challenge and Opportunity for Industry*
- *Industry Focus Thrusts to Enable Weaponized Unmanned Capability Objectives*

- **Moderator Summary Comments**
- **Thank Panel Members for Participation and Candid Comments**
- **Panel Members will be Available for Discussion**
- **Panel Has Effectively Described Status of Unmanned Weaponized Systems—Identified the Needs—Challenges and Opportunities**
- **Partnership of DOD and Industry is Key to Evolving the Capability**
- **NDIA Offers a Forum for Exchange of Information and Networking to Enable Technology and System Integration Ensuring Superior Capability and Readiness.**

- **Opportunities for Gun and Missile Community**
 - Ground Robotic Vehicles
 - Unmanned Air Systems
- **Focus on Innovation and Systems Integration**
- **Ground Robot Consortium is Being Formed**
 - Linking the Robotic Community
 - Gun and Missile Community will be Complementary
- **Collaboration of Gun and Missile Committee/Armament Division and Robotics Division –**
 - Demonstrates Effective Leverage of Related Division Benefiting Membership/Attendees
 - Future Symposia will Expand Collaboration