Gun and Missile System
2008
Symposium

Unmanned and Autonomous Systems
Weapon System Integration

Ground and Air System Platforms

Panel Discussion

23 April 2008
Panel Topic Theme

• **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
Panel Objectives

• **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 Format and Process

- 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
Panel Members

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

• 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
Topic Categories

• **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
Topic Categories

- 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
Topic Categories

• **Barriers**
  - Technology
  - To Development
  - To Application

• **Opportunities**
  - Technology
  - System Integration
  - Production

• **Role of Industry** To Enable GRV and UAS Weaponization?

• **Path Forward—Vision Ahead**
Panel Topics and Questions

• 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?
Panel Topics and Questions

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
Panel Topics and Questions

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?
Panel Topics and Questions

• 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
Panel Topics and Questions

• 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
Symposium Attendee Questions

• 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