Taking the Next Step: From “Unmanned” to True Autonomy

Topic 7: Architectures, Technologies, and Tools

Mr. George Galdorisi
Mr. Robin Laird
Ms. Rachel Volner
“My view is that technology sets the parameters of the possible; it creates the potential for a military revolution.”

Max Boot

War Made New
Outline

▼ The Plan

▼ The Challenge

▼ C4ISR Innovation As the Answer

▼ Into the Future
"Creation of substantive autonomous systems/platforms within each domain will create resourcing and leadership challenges. There is no question that the Navy,...

The combat potential of UV's (unmanned vehicles) is virtually unlimited. There is no question that the Fleet/Force of the future will be heavily dependent upon UVs."

Naval Research Advisory Committee (NRAC) Roles of Unmanned Vehicles, March 2003

"The National Defense Authorization Act for FY2007... called for the DoD to establish a policy... on unmanned systems, some key points of which included identifying a preference for unmanned systems in acquisitions of new systems."

FY 2009-2034 Unmanned Systems Integrated Roadmap

"DoD envisions the continued expansion of unmanned systems in the future force structure... Unmanned systems are still a relatively new concept... As a result, there is a fear of new and unproven technology..."

FY 2009-2034 Unmanned Systems Integrated Roadmap

"Creation of substantive autonomous systems/platforms within each domain will create resourcing and leadership challenges... Trust of unmanned systems is still in its infancy in ground and maritime systems... Unmanned systems are still a relatively new concept... As a result, there is a fear of new and unproven technology..."

FY 2009-2034 Unmanned Systems Integrated Roadmap

"DoD envisions the continued expansion of unmanned systems in the future force structure... expanding into new mission areas... defined a path toward unmanned vehicles...FY 2009-2034 Unmanned Systems Integrated Roadmap

"The National Defense Authorization Act for FY2007... Services, budgets, and all three domains..."

FY 2011-2036 Unmanned Systems Integrated Roadmap
The Plan
“The Department of Defense’s vision for unmanned systems is the seamless integration of diverse unmanned capabilities … DoD envisions unmanned systems seamlessly operating with manned systems while gradually reducing the degree of human control and decision making required.”

FY 2011-2036 Unmanned Systems Integrated Roadmap
DoD Guidance

Key Challenges

- Interoperability
- Autonomy
- Airspace Integration
- Communications
- Training
- Propulsion and Power
- Manned-Unmanned Teaming
Navy’s AISR&T “Family of Systems”

- **Broad Area Maritime Surveillance (BAMS)**
  - Long-endurance remotely operated signals intelligence
  - Airborne support for MDA and battlespace preparation

- **Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS)**
  - Carrier-based intelligence and precision strike

- **MQ-8B FireScout**
  - Real-time ISR, battle management and target classification

- **P-8A Poseidon**
  - Maritime patrol ASW, ASUW and armed ISR capability

- **H-60 Helicopter**
  - Will be equipped with additional sensors

- **E-2D Advanced Hawkeye**
  - Carrier-based Airborne Early Warning and Battle Management Command & Control
The Challenge
“Today’s unmanned systems require significant human interaction to operate. As these systems continue to demonstrate their military utility and are fielded in greater numbers, the manpower burden will continue to grow … [this] is occurring at a time when constrained budgets are limiting growth in Service manpower authorizations.”

*FY 2011-2036 Unmanned Systems Integrated Roadmap*
The Total Ownership Cost Challenge

▼ The irony of “unmanned” systems

▼ TOC issue intensified by increasing manpower costs, ongoing budget crisis

▼ Data overload exacerbates the challenge

▼ C4 technological innovation a prerequisite for success
Manpower Costs HaveReached An All-Time High

Military Personnel Expenditures (in billions of current dollars)

Data from: Office of Management and Budget, *Budget of the U.S. Government, FY 2012, Historical Tables*
C4ISR Innovation As the Answer
“We will win – or lose – the next series of wars in our nation’s laboratories.”

Admiral James Stavridis
SOUTHCOM Commander
“Deconstructing War”
_U.S. Naval Institute Proceedings_
December 2005
Making UxV Smarter

- Automated TCPED processes
- Ability to sense and adapt to the environment
- Autonomous collaboration
- One operator, multiple UxV
Multi-Robot Operator Control Unit (MOCU)

MOCU is a flexible software framework capable of monitoring and controlling unmanned systems across multiple domains.

- Modular, open architecture
- Government developed and owned
- Widely adopted
Intel Carry-On Program

▼ A portable, robust suite of ISR PED capabilities for unit-level platforms

▼ Allows operators to exploit data & video from multiple UAS simultaneously

▼ Demonstrated in exercises such as Trident Warrior 2011
UCAS-D

▼ Conceived as operating in swarms, using state-based control

▼ Operators would collectively task and communicate with the swarm

▼ Autonomy and manning challenges must still be overcome
Into the Future
“To change anything in the Navy is like punching a feather bed. You punch it with your right and you punch it with your left until you are finally exhausted, and then you find the damn bed just as it was before you started punching.”

President Franklin Delano Roosevelt
UxVs’ ability to deliver revolutionary change is real …

… but to be realized, this vision must be supported by commitment at the top levels of naval leadership, and by leadership and stewardship at the programmatic level

A way ahead: operationalize the mandate of the Department of Defense Unmanned Systems Integrated Roadmap to “expedite the transition of unmanned technologies from research and development activities into the hands of the Warfighter.”
THE NEW FACE OF WAR

How War Will Be Fought in the 21st Century

BRUCE BERKOWITZ
Recent experience suggests that the right technology, used intelligently, makes sheer numbers irrelevant. The tipping point was the Gulf War in 1991. When the war was over, the United States and its coalition partners had lost just 240 people. Iraq suffered about 10,000 battle deaths, although no one will ever really be sure. The difference was that the Americans could see at night, drive through the featureless desert without getting lost, and put a single smart bomb on target with a 90 percent probability.”

Bruce Berkowitz

*The New Face of War*
Questions?