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More Brains, Less Brawn:
Why The Future of UxV Depends On Making Them Smarter

Topic 3: Information and Knowledge Exploration

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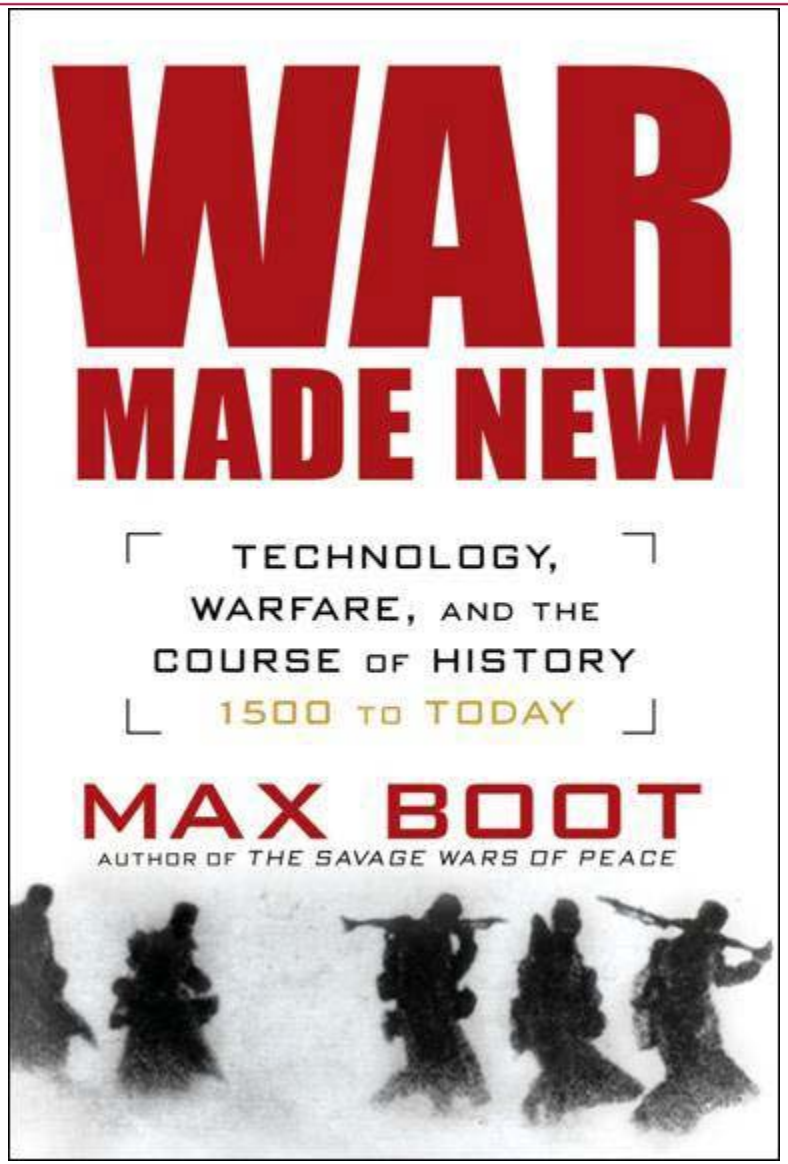

"My view is that technology sets the parameters of the possible; it creates the potential for a military revolution."

Max Boot

War Made New

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Outline

- UAVs Have Paved the Way
- UMVs Are Coming On Strong
- The Total Ownership Cost (TOC) Challenge
- C4ISR Innovation As the Answer
- Into the Future

“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

“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 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 (Draft)

“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

UAVs Have Paved the Way

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"By performing tasks such as surveillance; signals intelligence (SIGINT); precision target designation; mine detection; and chemical, biological, radiological, nuclear (CBRN) reconnaissance, **unmanned systems have made key contributions to the Global War on Terror (GWOT).** As of October 2008, coalition unmanned aircraft systems (UAS) … have **flown almost 500,000 flight hours in support of Operations Enduring Freedom and Iraqi Freedom."**

FY 2009-2034 Unmanned Systems Integrated Roadmap

UAVs Have Paved The Way

- UAVs' explosive growth since the Gulf War has created myriad opportunities, for unmanned systems in all domains
- These opportunities have been inculcated in official policy …
- … but UAVs' extensive use has not come without costs.

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UMVs Are Coming On Strong

"DoD continues to expand the breadth of missions supported by unmanned systems in the maritime domain. A recent study concluded that unmanned maritime systems "have the potential to provide critical enabling capabilities for current NATO maritime missions that can improve Alliance security and stability."

FY 2011-2036 Unmanned Systems Integrated Roadmap (Draft)

UMVs Are Coming On Strong

- Cultural / organizational challenges persist
- Technical challenges force innovation
- TOC issues present a challenge – and an opportunity – for UMVs

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The TOC 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 (Draft)

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The TOC Challenge

- The irony of “unmanned” systems
- TOC issue intensified by increasing manpower costs, ongoing budget crisis, and data overload
- Follow the Firescout model
- C4 technological innovation a prerequisite for success

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C4ISR Innovation As the Answer

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"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

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Making UxV Smarter

- Automated TPED processes
- Ability to sense and adapt to the environment
- Autonomous collaboration
- One operator, multiple UxV

Representative Lab Efforts

Air, Land, & Sea

Common Operator Control Unit (Common OCU)

Mobile Robot Knowledge Base

Robotic Systems Pool

Mobile Detection, Assessment, & Response

In-Theater Combat Support Platoon

Adaptive Mission Planning

Networked Remotely Operated Weapons

UGV-UAV-UMV Collaboration

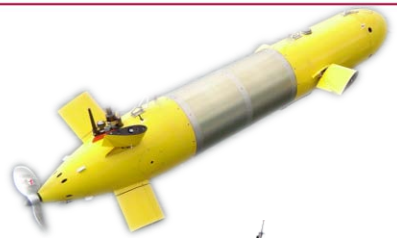
Technology Transfer

Automatically Deployed Communication Relays

Man-Portable Robots

Unmanned Surface Vehicle Technologies

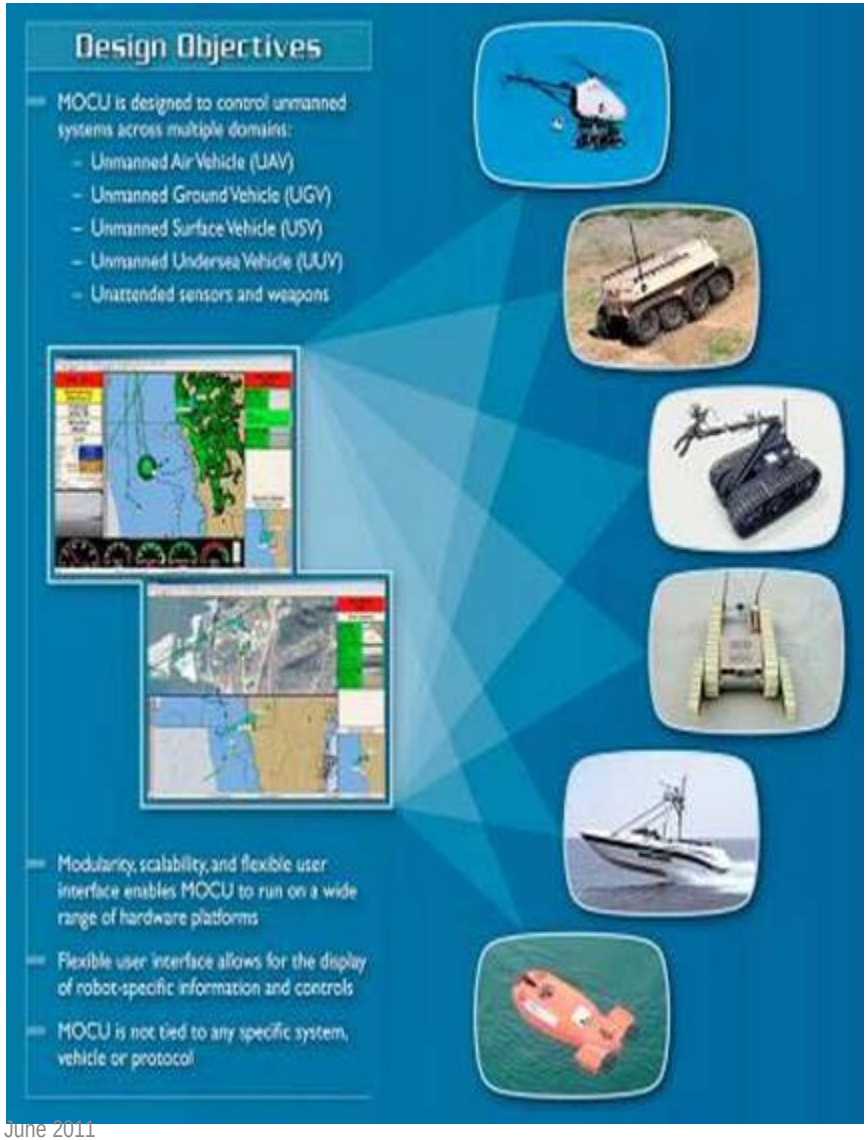
Multi-Robot Operator Control Unit (MOCU)



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

MOCU … Multiple UxV Control



- MOCU was designed from the ground-up to control multiple heterogeneous vehicles
- MOCU is not tied to any specific vehicle, vehicle type, or protocol
- Modularity, scalability and flexible display enable control of a wide range of vehicles

Joint Collaborative Technologies Experiment (JCTE)

- A two year joint (Navy, Army, Air Force) effort to demonstrate multiple unmanned systems operating in collaboration in multiple domains to accomplish select missions
- MOCU is the operator interface for all JCTE unmanned systems

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Into the Future

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"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

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Into The Future

- 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 *FY2009-2034 Unmanned Systems Integrated Roadmap* to "expedite the transition of unmanned technologies from research and development activities into the hands of the Warfighter."

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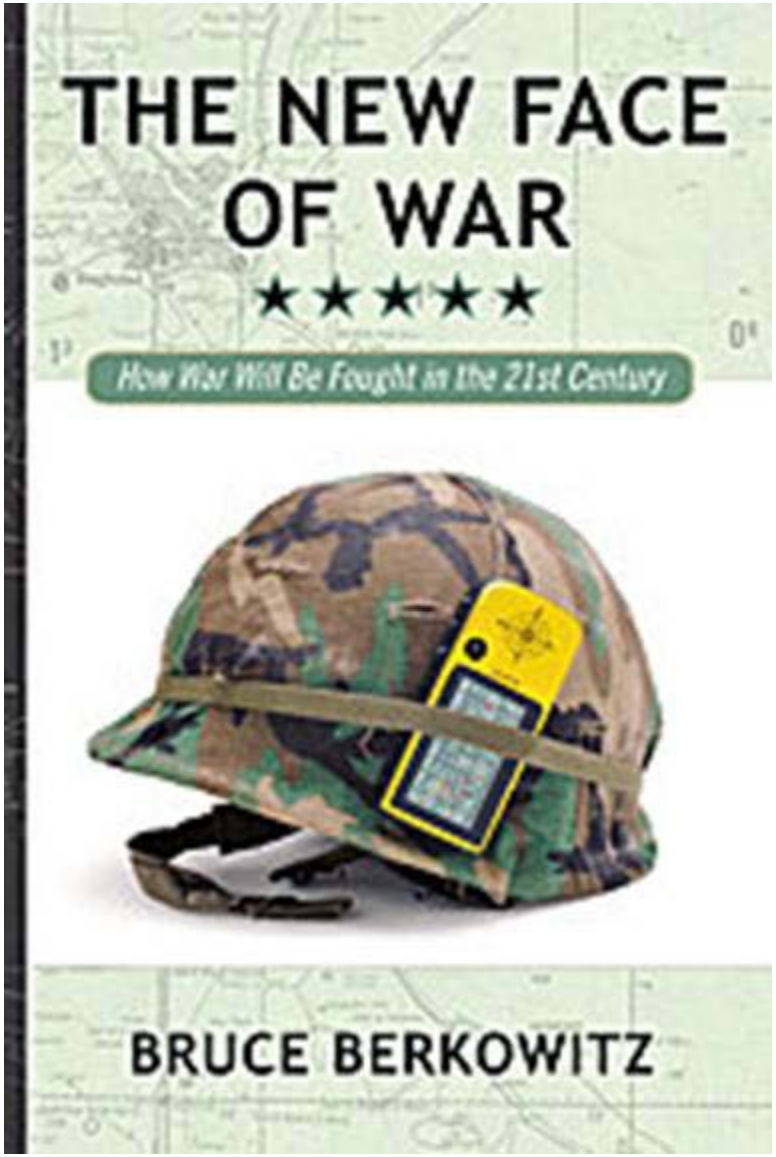

Recent experience suggests that the **right technology, used intelligently, makes sheer numbers irrelevant.** The tipping point was the Gulf War in 1991. When the war was over, the **United States and its coalition partners had lost just 240 people. Iraq suffered about 10,000 battle deaths**, although 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