A FUTURE NAVAL CAPABILITY

Organic Mine Countermeasures

Sailors and Marines need to be able to clear mines from their operating areas—at sea, on the shore, and inland—without breaking stride. Organic mine countermeasures—the ability to detect, characterize, and neutralize mines using a unit's own assets—are vital to the Navy and Marine Corps' doctrines *Forward…From the Sea* and *Operational Maneuver from the Sea*.

Why is this Future Naval Capability important? An array of transnational, rogue, and subnational adversaries now poses the most immediate threat to American interests. The forces that will oppose the Navy and Marine Corps in the littorals pose an asymmetrical and asynchronous threat. Because of their relatively low cost and ease of use, mines will be among the adversary's weapons of choice.

What's our investment strategy? In developing our core investment program, the Organic Mine Countermeasures FNC IPT focused on identifying and filling capability gaps, fulfilling commitments to funded acquisition programs, and designing a strategy that would provide the wherewithal to execute the program. The overarching goal is to deliver mine countermeasures for assured access. Three enabling capabilities will get us there:

- ***First priority.*** We need to provide organic mine countermeasures that will enable us to execute Operational Maneuver From the Sea and Ship-to-Objective Maneuver.
- ***Second priority.*** We need to provide rapid, stand-off organic mine countermeasures to support the movement of surface and subsurface combatants throughout the Littoral Penetration Area.
- ***Third priority.*** We need to provide rapidly deployable mine countermeasures to assure our access to ports, harbors, sea lines of communication (SLOCs) and routes into ports (Q-routes).

How are we filling the gaps in those enabling capabilities? Each enabling capability has a set of milestones and transition opportunities.

First Priority: Enable Operational Maneuver From the Sea.

We need organic means to clear mines and obstacles rapidly in three challenging environments: very shallow water, the surf zone, and the beach zone. We also need a capability for rapid clandestine surveillance and reconnaissance of minefields and obstacles in these environments. We're working to fill those gaps with these technologies:

- ***In FY 2003:*** Clandestine uninhabited underwater vehicle (UUV) and autonomous underwater vehicle (AUV) reconnaissance in very shallow water; wide area surveillance; tactical uninhabited aerial vehicle (UAV) reconnaissance of surface minefields in the surf zone and beach zone; stand-off surface and buried minefield breaching in the surf zone and beach zone.
- ***In FY 2004:*** Tactical UAV (TUAV) reconnaissance of very shallow water and surf zone minefields; stand-off mine neutralization in very shallow water; stand-off obstacle breaching in the surf zone and beach zone; Common Tactical Picture for seaward maneuver.
- ***In FY 2005:*** Wide area surveillance of the beach entry zone; tactical UAV reconnaissance for buried minefields; stand-off breaching of mines and obstacles in the surf zone and beach zone; rapid follow-on clearance; accelerated planning processes.

Transition Opportunities:

- TUAV reconnaissance of surface and buried minefields—transition to MCCDC/N75/MCSC with an initial operational capability in FY 05.

· Clandestine UUV reconnaissance in very shallow water—transition to N75/PMS-EOD with an initial operational capability in FY 05.

· Stand-off mine and obstacle breaching—transition to N75/Program Executive Office-Mine and Undersea Warfare with an initial operational capability in FY 10.

Second Priority: Support assured access for land attack combatants throughout the Littoral Penetration Area.

Here we need organic and off-board sensors to extend the tactical horizon of naval platforms so we can defeat the full spectrum of littoral threats. We need an integrated undersea warfare capability that can detect, classify, and neutralize mines in the littorals. We're filling the gaps on this schedule:

· ***In FY 2005:*** Long-range classification; automated mine identification processing; surface ship emulation sweeping and jamming; multi-platform data fusion.

· ***In FY 2007:*** Semi-autonomous neutralization of sea mines; advanced mine identification sensor; UUV/uninhabited surface vehicle (USV)-based autonomous mine hunting.

Transition Opportunities:

· Long-range classification (SAS)—transition to N75/N87/PEO-MUW/PEO-USW (P3I RMS, LMRS) in FY 04.

· Automated mine ID processing—transition to N75/PEO-MUW (P3I AQS-20X / RMS) in FY 05.

· Advanced mine ID sensor—transition to N75/PEO-MUW (P3I AQS-20X / RMS) in FY 05.

· Multi-platform data fusion/CTP—transition to N75/N76/N77/PEO-MUW in FY05.

· RAMICS LIDAR and fire control algorithms—transition to N75/PEO-MUW (RAMICS P3I) in FY 06-07.

· Integrated USV/UUV minehunting—transition to N75/PEO-MUW in FY 07.

· Semi-autonomous neutralization of sea mines—transition to N75/PEO-MUW (P3I AMNS) in FY 07.

"I am convinced that UUVs and aerial sensors provide the way ahead for success against enemy defenses in the littorals."

—Rear Admiral Willie C. Marsh, Deputy Director, Expeditionary Warfare Division, OPNAV

Third Priority: Gain assured access to ports, harbors, SLOCs, Q-routes, and ship points of departure (SPODs).

Today we defeat the buried mine threat using divers and marine mammals—this is slow, dangerous, and logistically burdensome. We can do better:

· ***In FY 2007:*** Remote buried minehunting; autonomous drone operations.

Transition Opportunities:

· Remote buried mine detection—transition to N75/PEO-MUW in FY 07.

What's some of the sustaining discovery and invention science and technology? Exploitation and delivery depend upon discovery and invention. In ONR's vertically integrated program, we will continue to exploit basic work that proves relevant to organic mine countermeasures:

· ***Nanoelectronics*** will permit the development of ultraminiaturized low power electronics for application in small, highly functional AUVs and UUVs as well as smart weapons.

· ***Autonomous control theory*** will improve AUV and UUV performance and our ability to control multiple AUVs and UUVs. Autonomous control theory has broad implications for all robotic applications.

· ***Coupled ocean and atmospheric modeling*** will enhance littoral warfare capabilities. Enhanced representation of the physics of boundaries promises significant payoffs in weather prediction and environmental protection.

· ***Photonics*** promises dramatic improvements in lasers, communications, and data processing. Improved sensor performance and better processors will be important to mine countermeasures. Laser line scan has already become an important addition to the array of sensors used to detect, identify, and classify mines.

· ***Biosensors and biodetectors*** will yield breakthroughs in mine detection and classification.

· ***Automation of human decision-making***, coupled with robotics, would enable us to replace humans with machines in many dangerous environments. Because effective decision-making needs solid situational awareness, work here includes physics-based data fusion and assimilation as well as signal processing.