



The Navy's Plan to Enhance Underwater Mine Countermeasures (UMCM) Capabilities and Capacities with Expeditionary Unmanned Underwater Vehicles

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by

Mr. Rob Simmons

PEO LMW/PMS-408(EOD)

Underwater Systems APM

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CDR A.K. Williams
Deputy Program Manager
PMS-408 (EOD)

CAPT John Neagley
Program Manager
PMS-408 (JCREW/EOD)



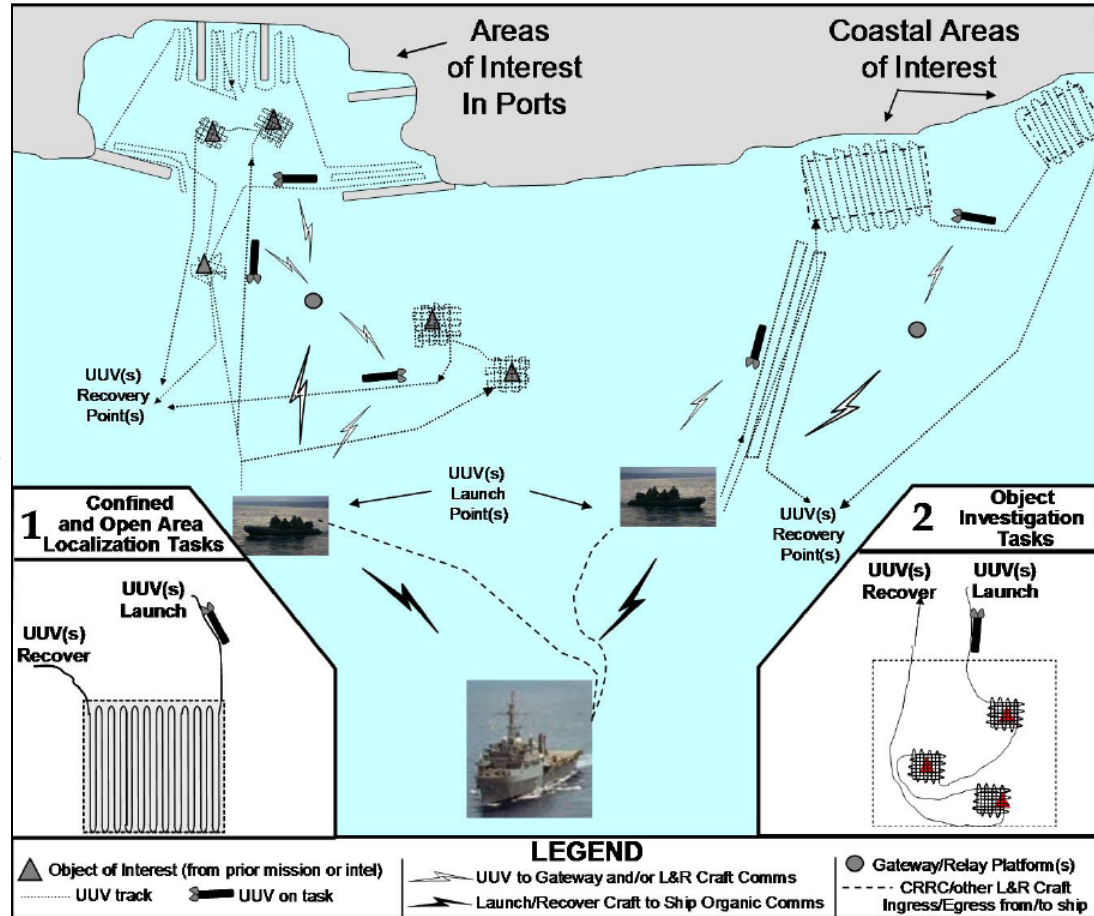
Outline

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- Navy UMCM Program Investment
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 - Expendable UUV Neutralization System
 - Program Plans
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- Summary



UMCM Mission

- Counter threats in near shore areas that “traditional MCM” assets do not yet address.
- UMCM environment: Areas relegated to Navy EOD divers and combat swimmers:
 - Pre-assault VSW MCM
 - Maritime Homeland Defense mine threats
- UUVs today tactically integrated with Navy EOD diver and MMS
- Long term goal: Unmanned solutions to perform the full range of Detect-to-Engage tasks.





Navy Expeditionary UMCM UUVs

Key Systems Attributes



❖ Expeditionary

- Rapidly deployable worldwide
- Platform independent deployability/recoverability
 - Combat rubber raiding craft (CRRC) (for 2-man-portable)
 - Rigid Hull Inflatable Boat (RHIB) (for lightweight UUV systems)
 - Pier side/craft of opportunity employment tactics
- Remote site supportable
 - Onboard repair parts kits;
 - Reach-back repair/replacement logistics (e.g. spares, FEDEX)
 - Multi-UUV system configuration

❖ Minefield Suitable

- Characterize influence signatures for minefield use
- Tactics/techniques and procedures (TTP)

❖ Easy to use

- EOD Common Operator Interface Navy (COIN) compatible
- Product improvements for improved automation, mission planners and post mission analysis interfaces.

❖ Affordable

- Inadvertent loss is not mission catastrophic
- Loss mitigation procedures, hardware/software design
- “Good enough” solutions/design decisions





Navy UMCM Program Investment



- **Near Term** (Five Year Defense Plan) – Improve/expand fielded UUVs to deliver unmanned system capabilities, in adequate capacity to support the UMCM requirement.
- **Far Term** - Build upon proven UUV-based UMCM capabilities and expand them seaward to address seamless Navy MCM capabilities and capacity.



UMCM Program Near Term (FYDP) Overview

- Procure and incrementally improve a **platform agnostic, expeditionary UUV “family of systems”**
 - Comprised of **search-based** and **standoff neutralization** UUVs for the UMCM detect-to-engage (D-T-E) sequence of tasks
 - Refine/Improve upon the UMCM Family of Systems
 - MK 18 MOD 1 UUV man-portable systems
 - Continue incremental capability development
 - MK 18 MOD 2 UUV lightweight variant
 - Develop/insert buried MCM sensor/sensor processing suite
 - Incrementally introduce autonomy and advanced sensors for more robust detection, localization, classification and ID (buried and proud)
- Initiate standoff Expeditionary UUV neutralization (EUNS) program for VSW and port clearance/confined area MCM.
 - Precision placement
 - Complement JABS
 - Provide low collateral/no-collateral solutions

DETECT



Detect, localize, classify, identify



ENGAGE

STANDOFF
“KILL”
Multiple Targets



INVESTIGATE &
“KILL”
Single Targets
In Confined Areas





Navy Expeditionary UMCM Search-Based Systems

MK 18 MOD 1 (Man-Portable UUV) CRRC Deployable



7.5 inch diameter/CRRC Deployable
Weight: <100 pounds in air

6 in service systems (FY 10)
2 additional units in production (FY11)
P3I Upgrades Schedules (FY12-20)

MK 18 MOD 2 (Lightweight UUV) RHIB Deployable



12.75 inch diameter/11-meter RHIB Deployable
Weight: < 800 lbs in air

1 prototype system in development (FY10-11)
4 system tentatively planned (FY 12-16)
P3I Upgrades Schedules (FY12-20)

Hull UUV Localization System



CRRC Deployable
Weight: ~150 pounds in air

1 system in production
7 systems planned
P3I Upgrades Planned



Deployable, highly portable, “platform agnostic” multi-vehicle systems to support globally dispersed UMCM capability needs



Search-Based UMCM UUV Systems Capability Improvements/Technical Challenges

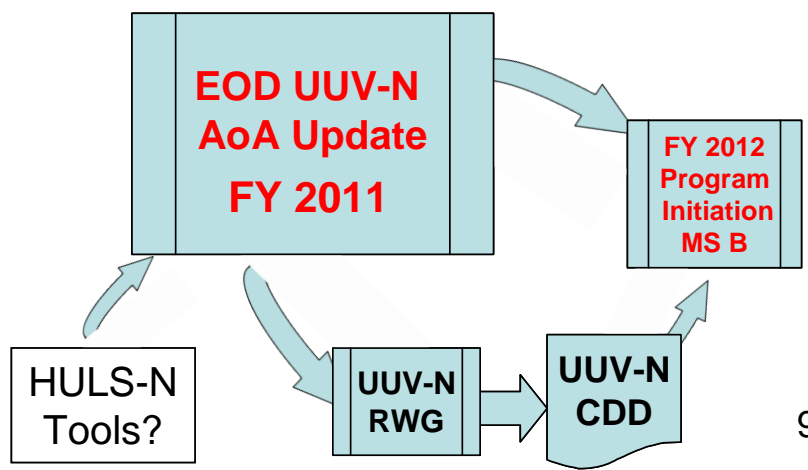
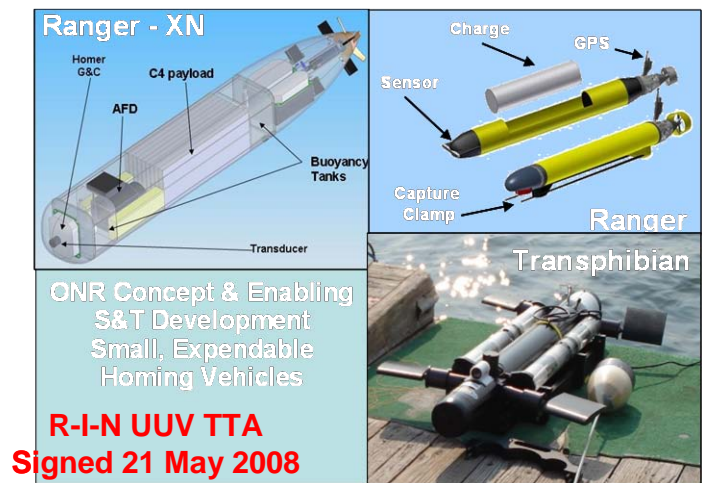
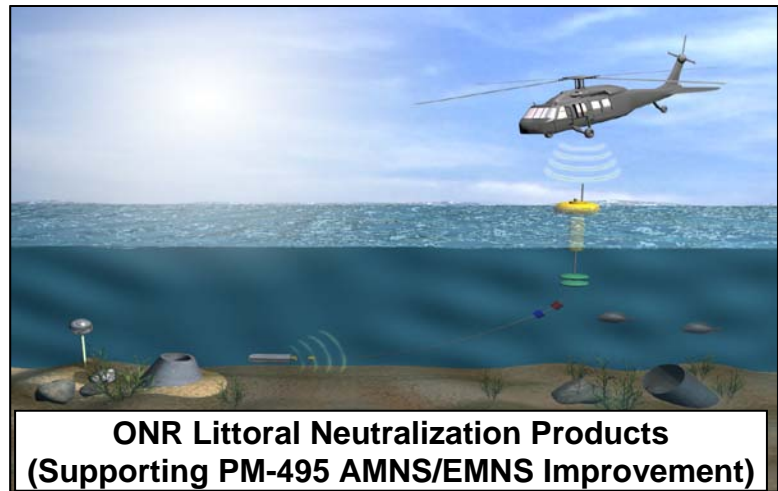
- **Improve Probability of Detection, Classification** in complex MCM environments. Improved sensor/sensor processing solutions for:
 - Mine burial detection/localization
 - False Alarm Rate reduction in high clutter MCM environments
 - Complex, irregular seabed conditions, marine growth
 - High clutter (natural and man-made) environments
- **Improve MCM effectiveness** during MCM exploration, reconnaissance and intelligent preparation of the environment (IPOE) tasks.
 - Robust, reliable, easy to use autonomy, automatic target recognition (ATR) and computer aided detection/classification (CAD/CAC) tools.
- **Improve underwater explosives threat object identification** capabilities
 - Imaging in zero visibility underwater conditions (turbidity, no-light)
 - Concealed threat objects (e.g. marine growth)
- **Maintain adequate UUV endurance** with introduction of more power hungry sensor and sensor processing solutions.
- **Improve UUV operating range** from launch-point through more robust communications solutions



Expeditionary UUV Neutralization System (EUNS) Path Forward



Current EOD and MMS “-N” Toolbox





Standoff EUNS Capability Technical Challenges

- Neutralization capabilities to support VSW MCM and Maritime Homeland Defense missions
 - Expendable neutralizers (or vehicle-delivered expendable charges)
 - Low collateral damage neutralizer solutions (near infrastructure)
 - Low cost sensor/navigation solutions
- Both neutralizer solutions require:
 - Autonomous reacquisition
 - Precision neutralizer placement/attachment/station keeping
 - User-supervised target-neutralizer position verification
 - Standoff Command actuation and post-actuation verification



Expeditionary UUV Systems - Evolutionary Acquisition Risk Mitigation Program Cooperation and Industry Partnerships

- ONR Technology Transition Agreements / Structured acquisition team TRAs
- Structured test and evaluation with engaged end users
- Monitor/incorporate related technology efforts at ONR/NSWC PC.
- Continue cooperation/information exchange via NATO and allied UUV MCM programs
- Participation in Fleet and allied exercises (e.g. RIMPAC) with AUS, NZ, UK, others
- Structured autonomy improvement testing and validation programs
- Small Business Innovative Research (SBIR) and Technology Transition (STTR) Initiatives
 - Compact Magnetic Sensor and Chemical Sensor SBIRs
 - Universal Power Architecture STTR



Industry Opportunities in the Path Forward

- FY 12-20
 - Innovative product improvement solutions for the current UMCM family of systems
- Fall 2011 – EUNS Industry Day
 - Pre-Solicitation
- FY 2012 – EUNS Solicitation
- FY 2013/14 – Industry Day
 - Next Generation search-based system solicitation



Summary

- Search based UUV systems are fielded and incremental capability improvements continue
- Ongoing analysis for planned program initiation for the Expeditionary UUV Neutralization System (EUNS) in FY 2012

Innovation through industry participation in ongoing and future programs remains key to realizing UMCM capabilities