

# U.S. Navy Mine Countermeasures

National Defense Industrial Association  
13th Expeditionary Warfare Conference  
October 2008



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*Mine Warfare Branch Head (N852)*



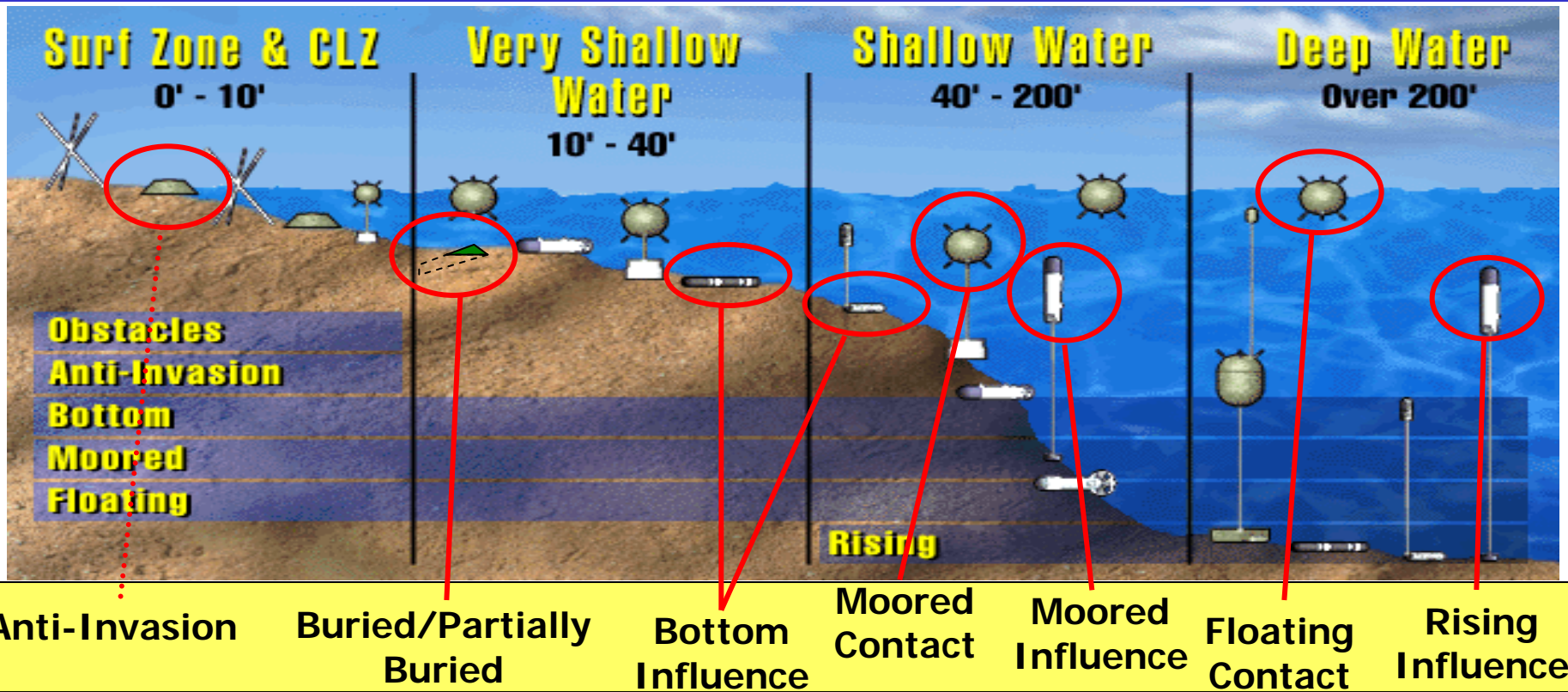
# Agenda



- **Mine Threat**
- **The Transition Challenge**
- **MCM Mission Package Program Overview**
- **OMCM Challenges**
- **Summary**



# The Threat Across the Littorals

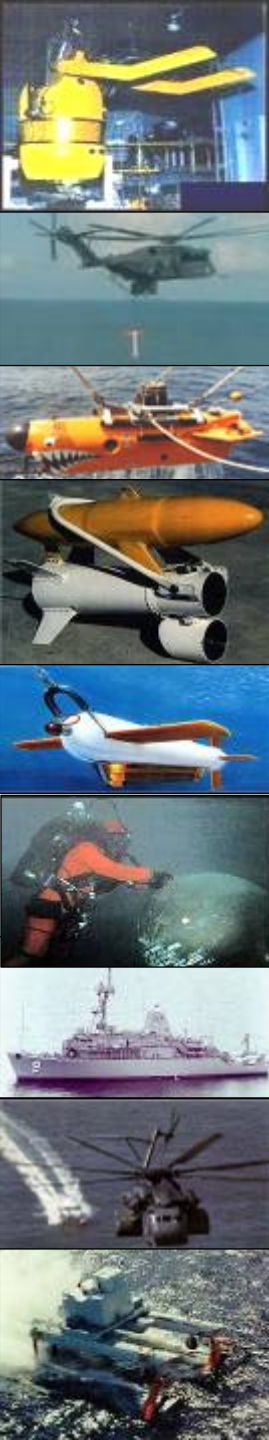


- The real goal of a minefield is Sea Denial, NOT the damage or destruction of a specific ship.
- Navy goal is Assured Access to defeat the minefield, NOT counter every mine.

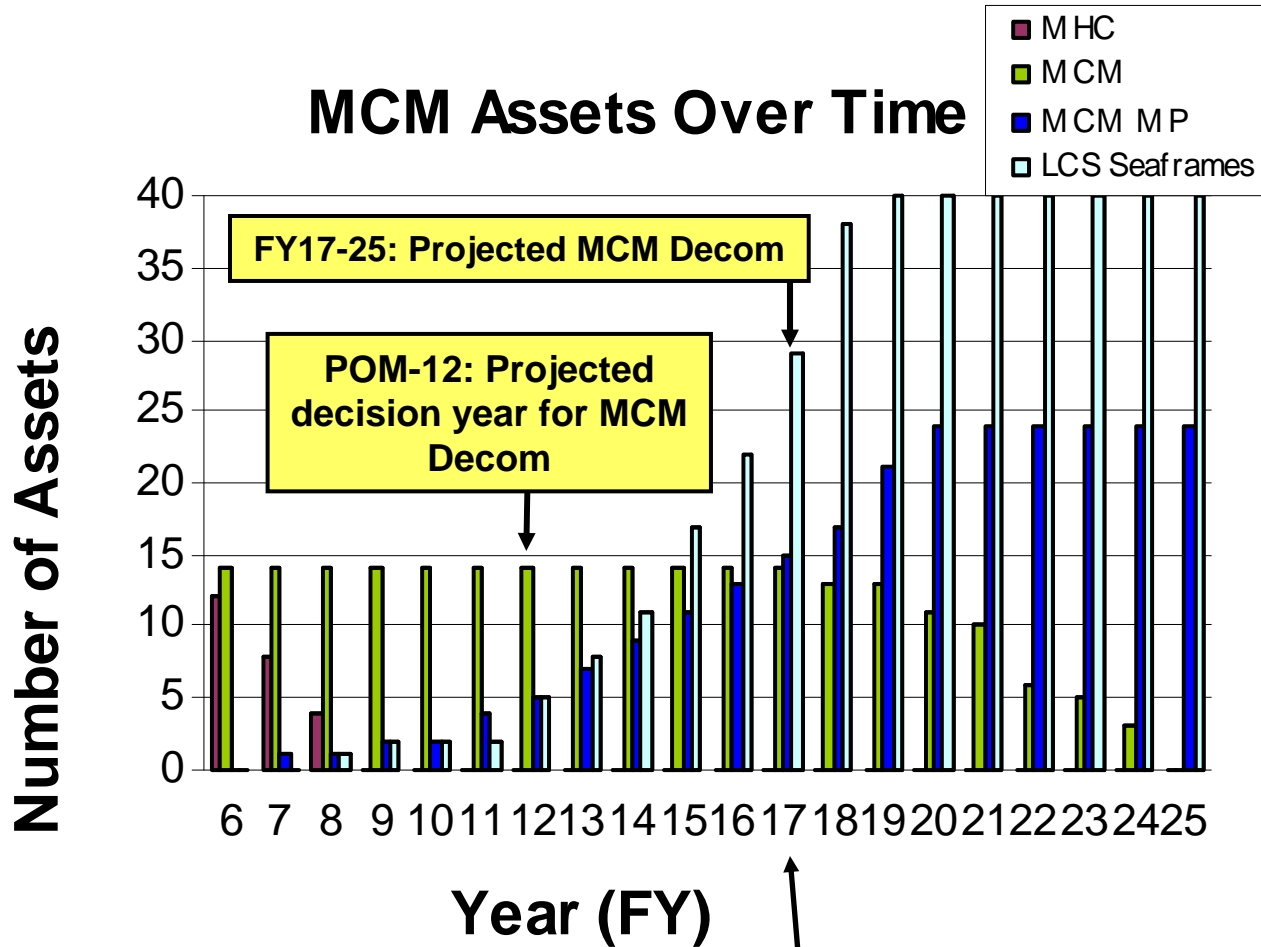
- Over 300 Mine Types
- Over 50 Countries Possess
- Low Cost
- Simple to Deploy



# The Organic Transition Challenge



## MCM Assets Over Time



**FY17-25: Projected MH-53E Sundown**



# Coverage Complete

Minefield Detection and Neutralization



Assault Breaching System



EOD Mobile Unit ONE

Laser (Hunt)



Airborne Laser Mine Detection System

Super-cavitating Projectiles (Kill)



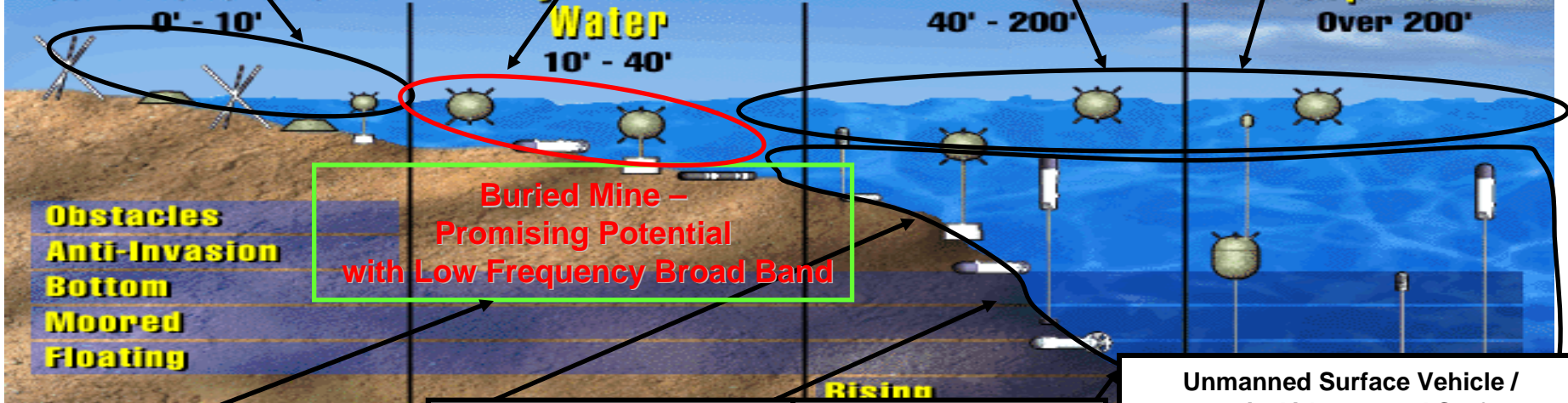
Rapid Airborne Mine Clearance System

Surf Zone & CLZ  
0' - 10'

Very Shallow Water  
10' - 40'

Shallow Water  
40' - 200'

Deep Water  
Over 200'



Buried Mine – Promising Potential with Low Frequency Broad Band

Surface Mine Countermeasures  
Unmanned Underwater Vehicle and Low Frequency Broadband



Buried Mine Detection

Remote Minehunting System & MH-60S  
AN/AQS20A



Sonar (Hunt)

Airborne Mine Neutralization System



Propelled explosive charges (Kill)

Unmanned Surface Vehicle / Organic Airborne and Surface Influence Sweep



Magnetic Acoustic Influence Sweep



# Shallow Water to Beach Zone



## Assault Breaching System

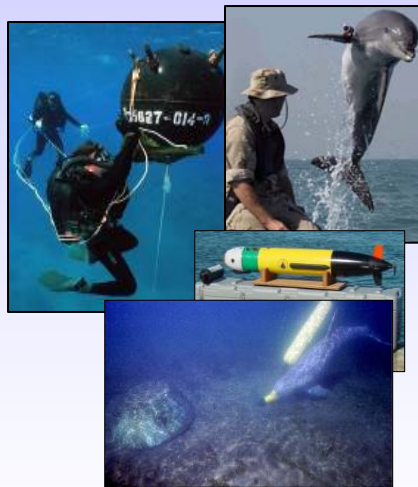


JDAM  
& CMS



COBRA

## EOD Mobile Unit One



EOD Mobile Unit (One)

## LCS MCM Mission Package



2 H-60s or 1 H-60  
and 3 VTUAVs



RAMICS



ALMDS

US3



RMS

UUV LFBB



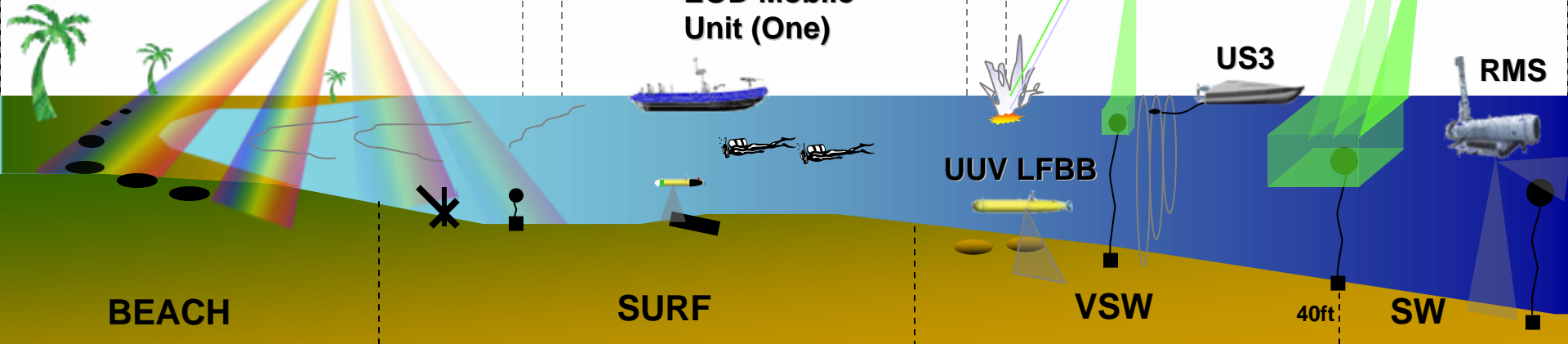
VSW

40ft

SW

BEACH

SURF





# LCS MIW Mission Package: System Coverage



	Detect		Engage	
	Battlespace Preparation	Minehunting (Detect/ Classify/ Identify)	Neutralize	Sweep
Beach Surf Zone	VTUAV+ COBRA	VTUAV+ COBRA	ABS, EOD Mobile Unit 1	
Near surface & floating		ALMDS	RAMICS	
Volume and bottom mines		AQS-20	AMNS	OASIS US3
		AQS-20	AMNS	OASIS US3
Buried	SMCM UUV LFBB	AQS-20	AMNS	OASIS

\* NOTE : Depth Coverages Vary with System and Mine Type

UNCLASSIFIED



# MCM Package Sensor Status



MCM Package Program	ACAT	Programmatics	Testing	Contractor	IOC
 RMS	1C	In Low Rate Initial Production	<ul style="list-style-type: none"> <li>✓ TECHEVAL completed on DDG-96 Mar 07</li> <li>• Op Assess on USS BAINBRIDGE 14 Sep 08</li> </ul>	Lockheed Martin	2009
 AQS-20A	2	In Low Rate Initial Production	<ul style="list-style-type: none"> <li>✓ TECHEVAL on MH-60S completed</li> <li>• OPEVAL w/ MH-60S Aug 09 – Oct 09</li> </ul>	Raytheon	2010
 AMNS	2	In Low Rate Initial Production	<ul style="list-style-type: none"> <li>✓ MS C Approval Jan 08</li> <li>• DT Live Fire Ground Testing Jul 09</li> </ul>	Raytheon	2010
 ALMDS	2	In Low Rate Initial Production	<ul style="list-style-type: none"> <li>✓ Commenced WSIT CT on MH-60S Apr 08</li> <li>• Commence TECHEVAL 2nd Qtr FY09</li> </ul>	Northrop Grumman	2010
 OASIS	2	Milestone C: 3QFY10	<ul style="list-style-type: none"> <li>✓ Re-design PDR 12 Jun 08</li> <li>• MH-53E OA Sep 09</li> </ul>	ITT Corp	2011
 RAMICS	2	Milestone C: 4QFY10	<ul style="list-style-type: none"> <li>• MH-60S Captive Carriage &amp; Jettison OCT 08</li> <li>• Lake Glendora II Ground Testing Oct-Dec 08</li> </ul>	Northrop Grumman	2011
 COBRA	3	Milestone C: Jan 09	<ul style="list-style-type: none"> <li>✓ Started Performance Validation (MH-53E)</li> <li>• Integration flight tests on VTUAV Oct 09</li> </ul>	Northrop Grumman	2010
 CMS	3	Milestone C: FY14	<ul style="list-style-type: none"> <li>✓ SD&amp;D Contract awarded 24 Jul 08</li> <li>• System Requirements Review 1st Qtr FY09</li> </ul>	Boeing	2015
 US3	3	Milestone C: 4QFY10	<ul style="list-style-type: none"> <li>✓ Sweep Gear integration test on USV Jul 08</li> <li>• End to End US3/USV/MP test Oct 08</li> </ul>	TBD	2014
 UUV LFBB	TBD	Milestone B: 2QFY09	<ul style="list-style-type: none"> <li>• CDD in Navy Staffing</li> </ul>	TBD	2015



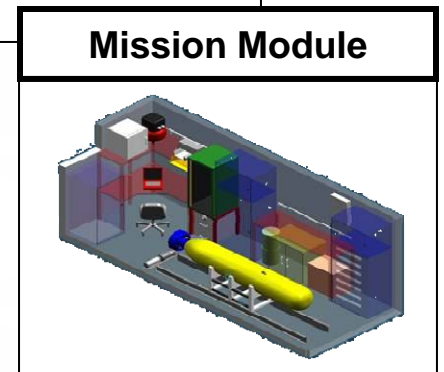
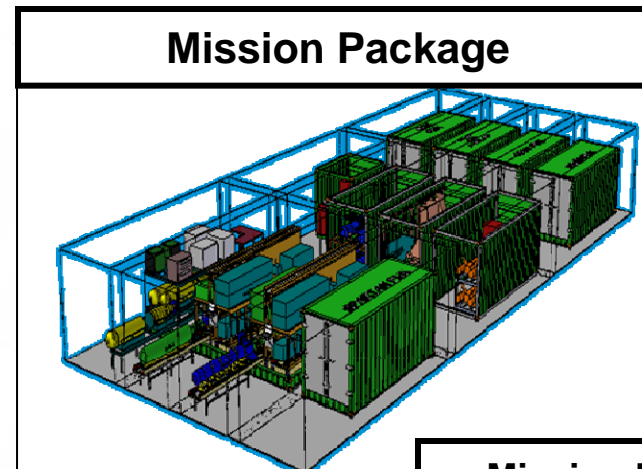


# MCM Mission Package Evolution



## MCM MM Delivery

MCM MP 1 Spiral Alpha Modules	<ul style="list-style-type: none"> <li>USV w/USSS (x1) (EDM)</li> <li>RMMV (x1) (EDM)</li> <li>AMNS (x1) (EDM)</li> <li>ALMDS (x1) (LRIP)</li> <li>AN/AQS-20A (x2) (LRIP)</li> <li>UUV (x2) (EDM)</li> <li>Support Equipment</li> </ul>	FY07 Delivered
MCM MP 2 Spiral Alpha Modules	<ul style="list-style-type: none"> <li>USV w/USSS (x1) (EDM)</li> <li>RMMV (x2) (LRIP)</li> <li>AMNS (x1) (LRIP)</li> <li>ALMDS (x1) (LRIP)</li> <li>AN/AQS-20A (x3) (LRIP)</li> <li>Support Equipment</li> </ul>	FY09
MCM MP 3-4 Spiral Alpha Modules	<ul style="list-style-type: none"> <li>USV w/USSS (x1) (LRIP)</li> <li>RMMV (x2) (Production)</li> <li>OASIS (x1) (LRIP)</li> <li>AMNS (x1) (LRIP)</li> <li>ALMDS (x1) (LRIP)</li> <li>AN/AQS-20A (x3) (Production)</li> <li>COBRA (x1) (LRIP)</li> <li>Support Equipment</li> </ul>	FY11
MCM MP 5 Alpha Module Baseline	<ul style="list-style-type: none"> <li>USV w/USSS (x1) (LRIP)</li> <li>RMMV (x2) (Production)</li> <li>OASIS (x1) (Production)</li> <li>AMNS (x1) (Production)</li> <li>ALMDS (x1) (Production)</li> <li>AN/AQS-20A (x3) (Production)</li> <li>COBRA (x1) (Production)</li> <li>RAMICS (x1) (LRIP)</li> <li>Support Equipment</li> </ul>	FY12
MP X Spiral Bravo Modules	<ul style="list-style-type: none"> <li>Systems x,y,z</li> <li>Support Equipment</li> </ul>	Future



### Legend

- Systems Added/Matured
- Delivered

# OMCM Challenges

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Our most mature programs face many challenges (RMS, AQS-20A & ALMDS in or near Operational testing)

- **Sensor False Alarms**

- SONAR – (HFWB, LFBB)
- LIDAR – (ALMDS, RAMICS, COBRA)
  - New Data type; New viewers; Learning curve
  - High False Alarms mean longer PMA & higher False classification by PMA Operator
- CAD/CAC – improvements needed
  - Real time algorithms in Common Console?
  - Post mission via OPMA?

- **Reliability (Ao, MTBOMF)**

- Sensor Reliability needs to meet ORD or CPD
- Support Equipment Reliability (CSTRS, Common Tow Cable) needs improvement

- **WorkLoad / Crew Limitations**

- Streaming and Recovery of towed systems (high workload)
- PMA takes long time (Fatigue adds to problem)
- Learning Curve with new data types



# Summary

- **The Mine threat is real and not getting easier**
- **The transition to Organic MCM will have its challenges; therefore, the Navy needs Industry's help in meeting Organic IOC and preservation of current forces**
  - ✓ **MCM upgrades**
  - ✓ **MH-53 Flex**
- **MCM Mission Package program making progress**
- **We must make smart investments to reduce false alarms as they drive the Detect to Neutralize timeline**



**Questions?**

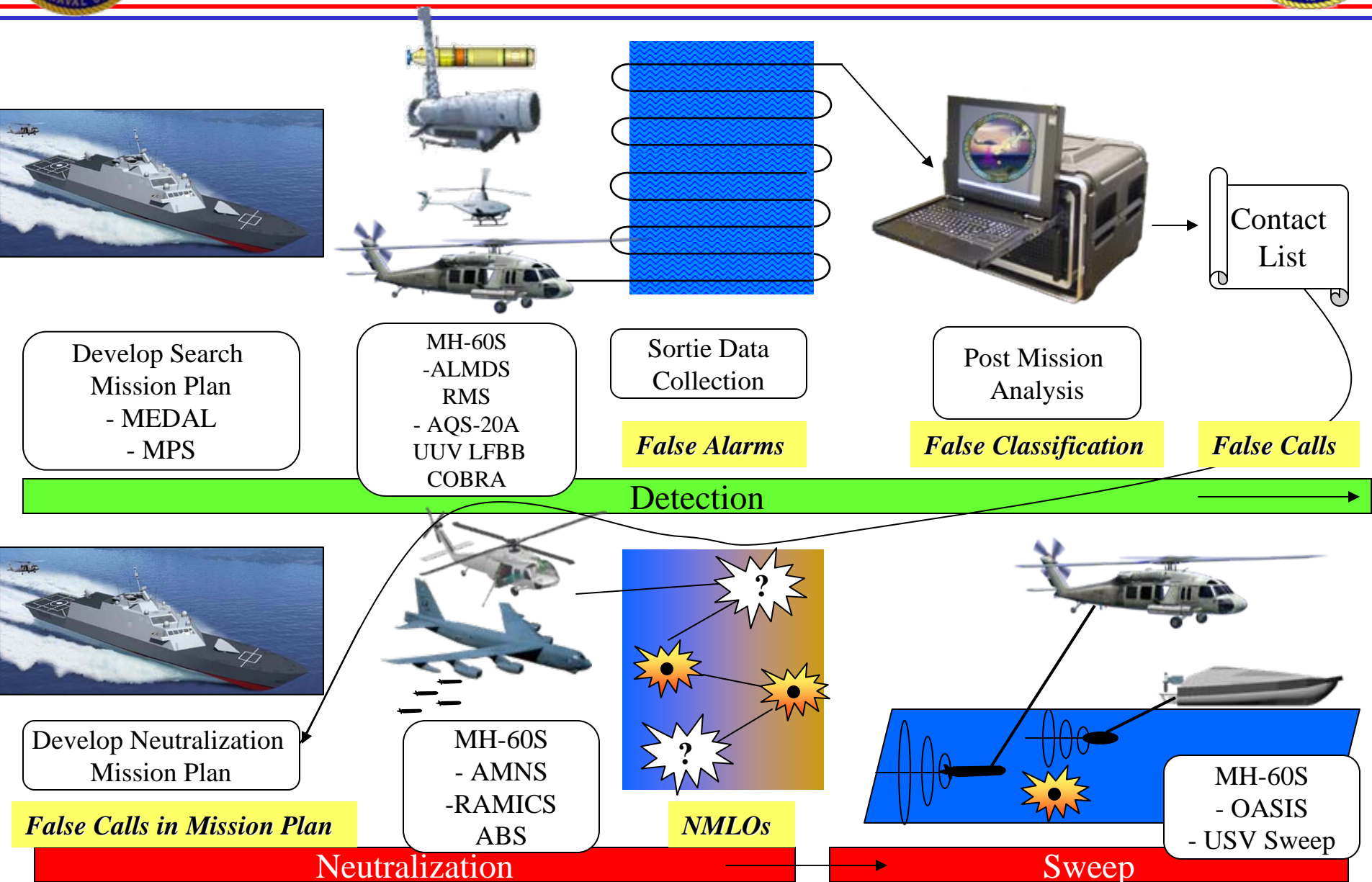




**BackUp**



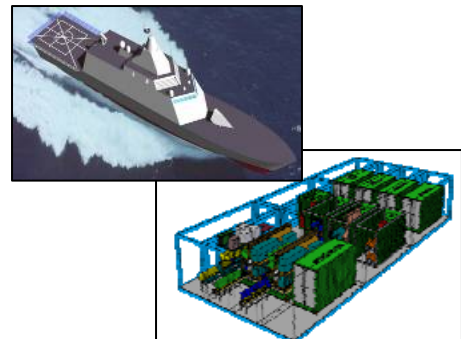
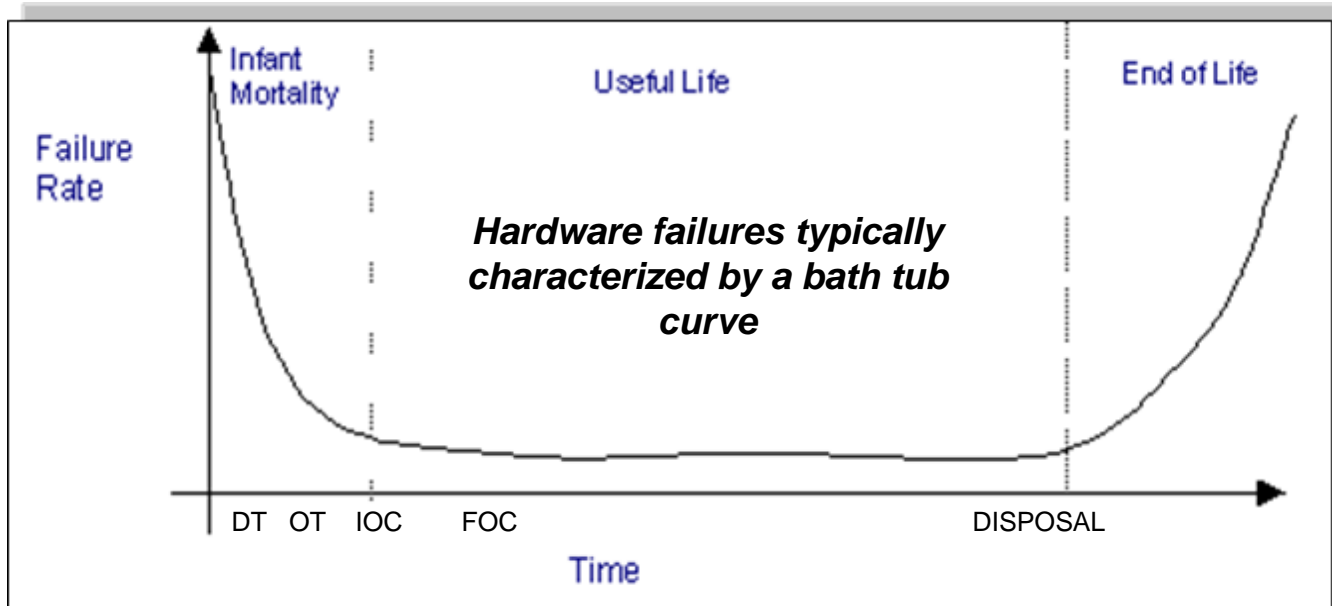
# False Alarms Lengthen Kill Chain



# Reliability

$$Ao = \frac{Uptime}{Uptime + Downtime} = \frac{MTBF}{MTBF + (MTTR + MLDT)}$$

**Mean Time to Repair & Mean Logistics Delay Time:**  
 Number of systems on LCS and O to D level maintenance philosophy



## MCM Mission Package

- |           |          |
|-----------|----------|
| 2 RMMV    | 1 AMNS   |
| 3 AQS-20A | 1 US3    |
| 1 ALMDS   | 1 COBRA  |
| 1 OASIS   | 1 VTUAV  |
| 1 RAMICS  | 1 MH-60S |

All MCO timelines are driven by required MTBF, so we must improve upon reliability to meet the requirements and increase useful life!