Assault Breaching System Technologies

Revolutionary Research . . . Relevant Results

Presented to
9th Annual Science & Engineering Technology Conference / DoD Tech Exposition
15-17 April 2008

Mr. Brian Almquist
Ocean Engineering & Marine Systems
Office of Naval Research
(703) 696-3351 almquib@onr.navy.mil

LtCol Tim McLaughlin
APM for ABS
PMS 495 Mine Warfare Program Office
(202) 781-4457 tim.j.mclaughlin@navy.mil

Mine Warfare Research Area Strategic Vision

Provide rapid, standoff mine countermeasures capability to support the unencumbered maneuver of combatants throughout the littoral penetration area (sea shield), to enable sea strike operations in the littorals from the sea (i.e. STOM), and to assure access to the sea base, intermediate staging bases, and Sea Ports of Debarkation (SPOD) to ensure strategic mobility and sustainment.

Mine Countermeasures Research Area

Investments Address Critical Capability Gaps

- Supports Development of an Organic Capability
- Supports Sea Shield Undersea Warfare (MIW) Gap Analysis

Goal is to Decrease the MCM Timeline & Eliminate the Requirement for Manned Ops in Minefields

- Highly Cluttered, Littoral Environment Provides Challenge
- Sensors, Automated Processing, Unmanned Systems Focus
- Air Deployable Mine and Obstacle Breaching System

  - Unique effort in support of amphibious assault

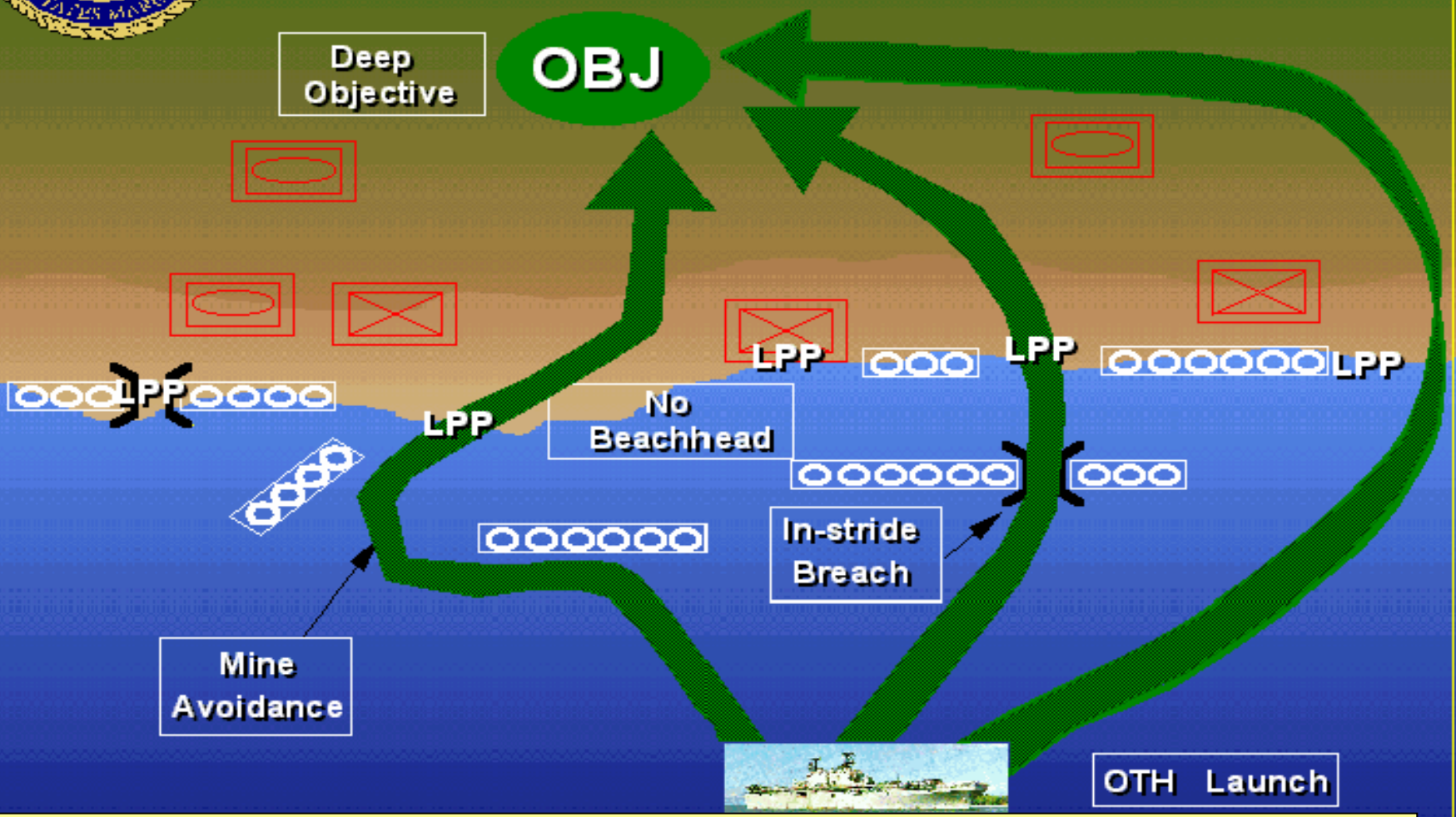
Organic Mine Counter Measures FNC Program

POM 06 / PR07 / POM08 Capability Gaps

- **Gap 1:** Capacity to clear large areas of mines without cued ISR

- **Gap 2:** Destruction of mines in areas through which Marine Corps and Joint Forces must maneuver, ranging from deep water through the surf and beach exit zone.

Ship-to-Objective Maneuver



Assured Access to Enable OMFTS/STOM

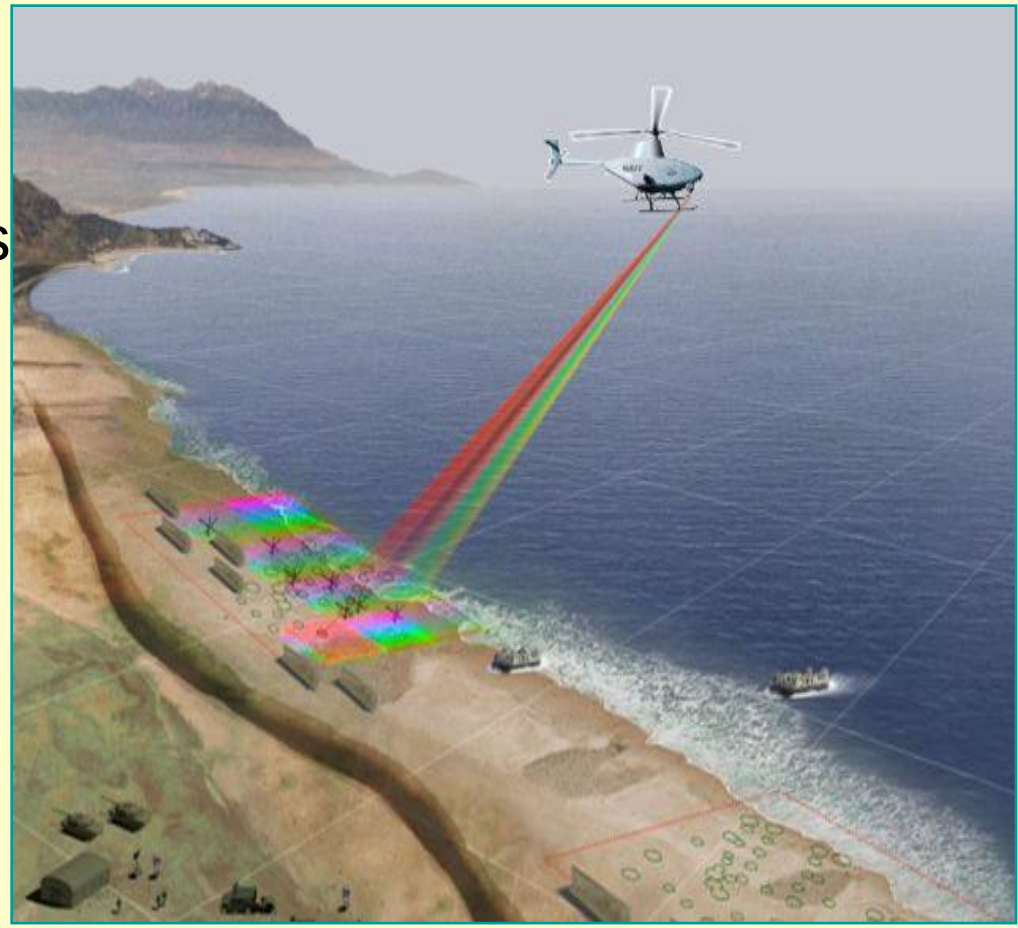
Ship To Objective Maneuver

Capabilities:

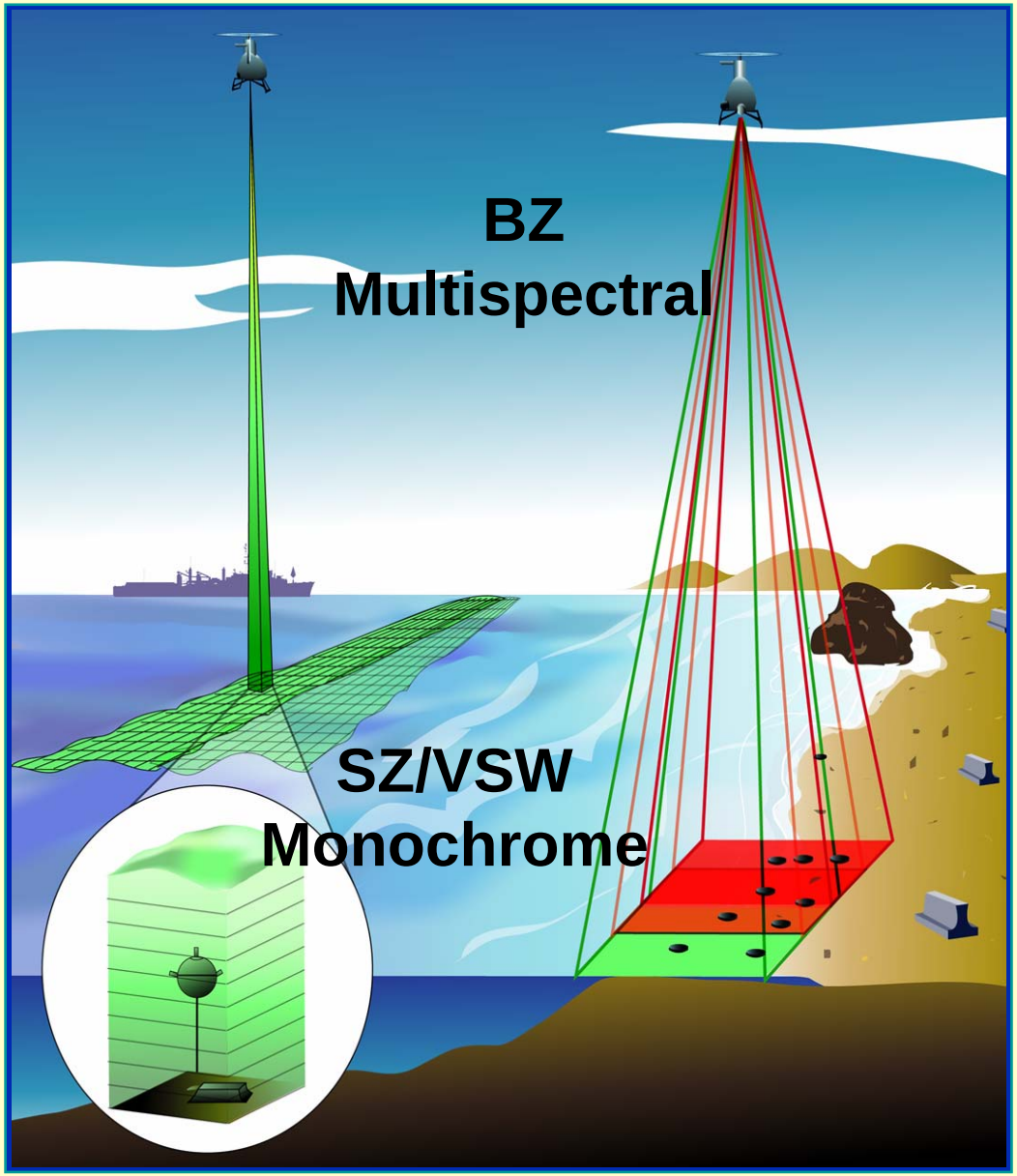
- Wide area surveillance to enable maneuver
- Clandestine reconnaissance to prepare the battlespace
- Rapid overt mine and obstacle reconnaissance
- Data Fusion to accelerate the planning process
- Timely MCM Common Tactical Picture to enable maneuver
- Stand-off neutralization of individual mines in VSW
- Stand-off breaching of mines and obstacles
- Autonomous, high speed compact influence sweep
- Precision localization and navigation from VSW to BEZ
- Rapid Follow On Clearance

Spiral Development of COBRA

- **Block I (FY09) limited:**
  - Daytime operations
  - Surface mines & obstacles
  - Detection in BZ
- **Block II (FY13)**
  - Night operations
  - Full detection in surf zone
- **Block III (FY16)**
  - Buried mine line detection
  - Near real-time processing



Rapid, Overt, Airborne, Reconnaissance (ROAR)



General

- Day / Night Operation
- Altitude: 3,000 feet
- Speed: 75 knots
- Swath: 200 meters

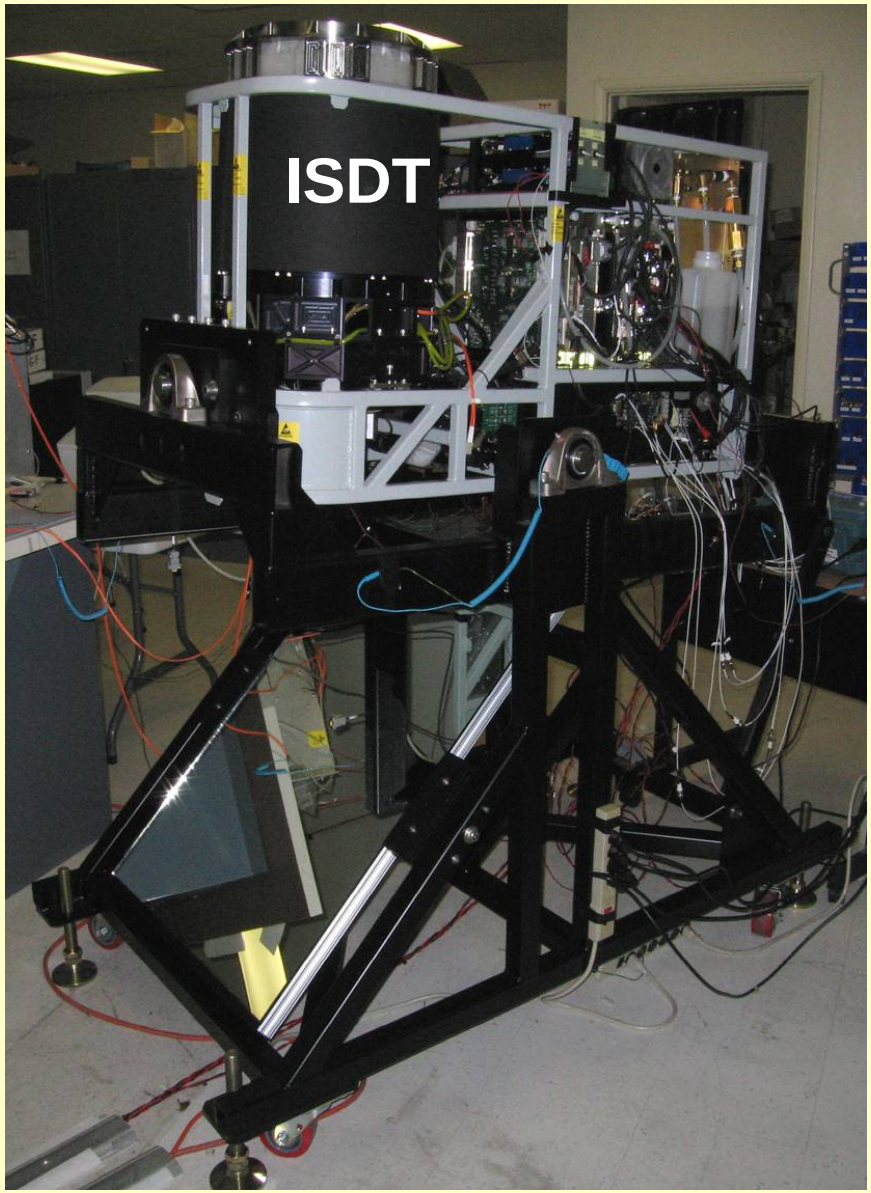
Surf Zone (SZ)

- 44 Range Gates
- Multiple Looks
- Track-and-Revisit Mode

Beach Zone (BZ)

- 3-Color Active MSI
- 70% Spectral Overlap

ROAR Technology Advances

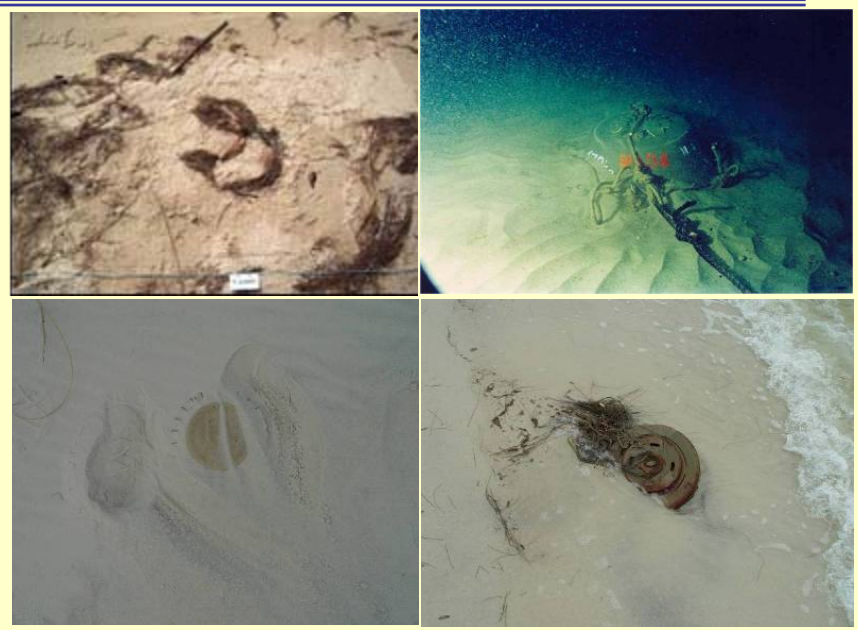


- Integrated camera, scanner, receiver, and laser system in compact design for UAV
- True 3-D LIDAR system
- Multi-look scan pattern
- Active multi-spectral provides day / night capability
- Optimized for Surf Zone

Tactical UAV Sensor for Detection of Minefields (Buried) in the BZ / SZ

Description

- Detection of buried minefields
- Technical Approaches
  - Active and passive imagers
  - Synthetic Aperture GPR
  - Laser Interferometric Sensor
  - High Resolution 3-D Imaging
  - Resonant Radio Freq Location

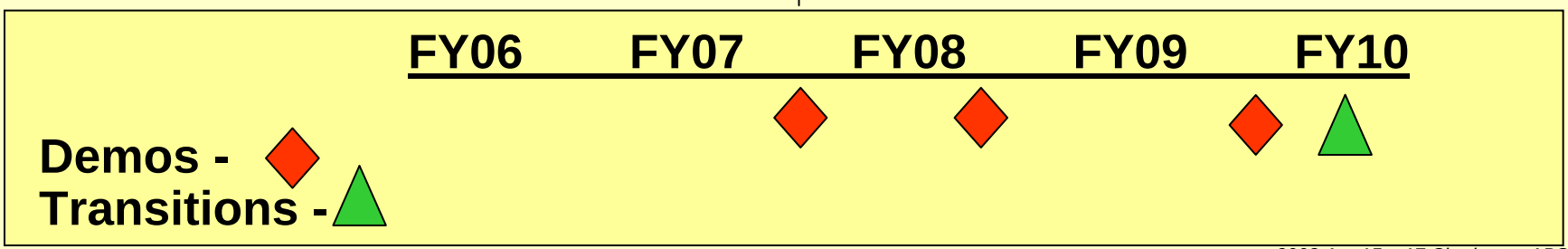


Demos / Transitions

- PMS 495 COBRA BLOCK III

Warfighting Payoff

- Rapid recon, day and night
- Supports targeting for ABS



Mine & Obstacle Breaching S&T Strategy

Develop a Precision Breaching Capability

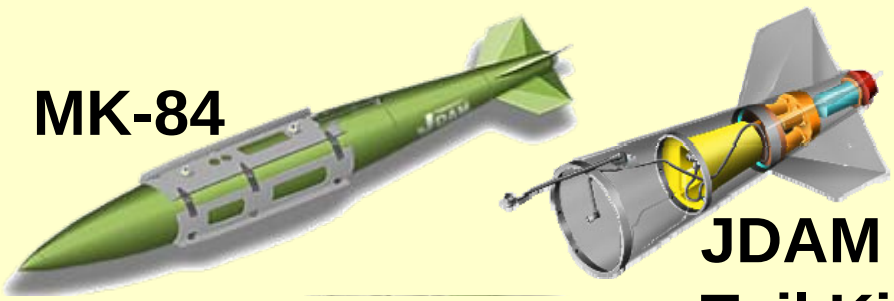
- Enabled by ISR and Weapon Precision Guidance
- Delivery by Naval TACAIR, USAF Bombers

Spiral Development Approach

- JDAM Assault Breaching System (JABS): Exploit existing precision guided bombs for surface laid BZ/SZ mines and obstacles; VSW Mines
- Advanced Warhead Development: Countermine darts with greater kill radius & effectiveness vs. buried BZ / SZ mines in water and on land

JDAM Assault Breaching System (JABS)

- **Requirements**
  - OPNAV Letter
  - Threshold and Objective
- **System Level Demos**
  - Beach Zone
  - Beach Zone / Surf Zone
- **Mission Planner**
- **Transitioned to PMS-495**



GBU-31(V)2/B Precision Guidance

VIDEO VIDEO

Mine and Obstacle Defeat System (MODS)

- **Requirements**
  - MCIA Mine Threat Letter
  - ABS IPT Mine Matrix
  - Mine "Kill" Criteria
- **Component Tests**
  - Chemical and HE Darts
  - Sled Tests
- **System Level Demos**
  - Flight Tests with Darts
- **Transitioned to PMS-495**

Dispenser

CM Darts

SLED TEST

LIVE DEMO

Standoff Assault Breaching Weapon Fuze Improvement

Description

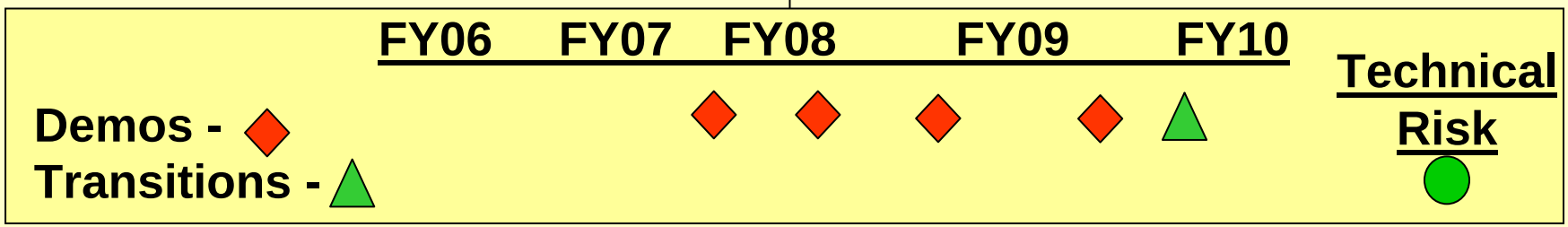
- Demo JABS vs. VSW mines
- Program will address:
  - Weapon Trajectory in VSW
  - Time of weapon detonation
  - Lethality against VSW mines
  - Fuze options

Demos / Transitions

- ABS Program / PMS-495

Payoff

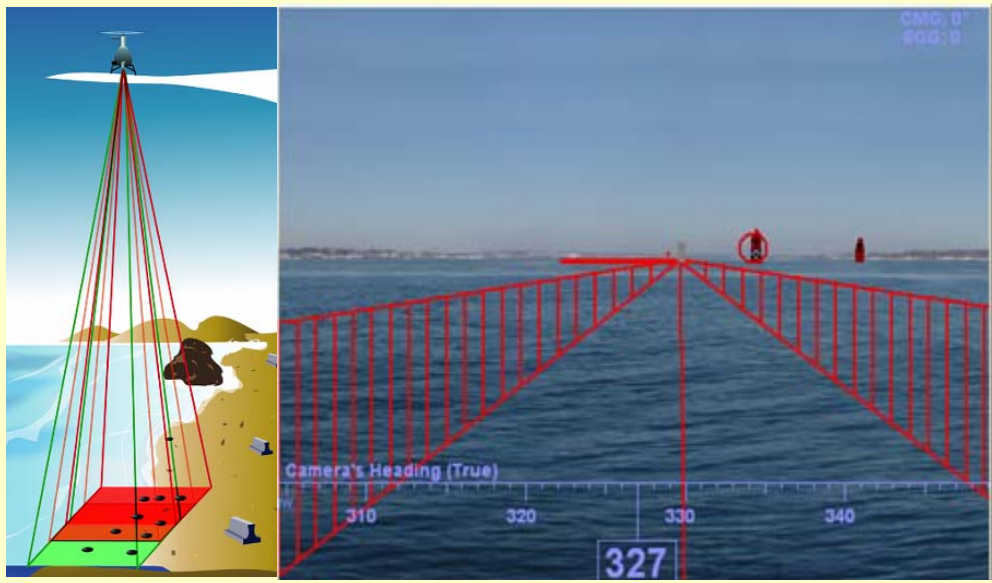
- Standoff clearance of VSW mines



Precision Assault Navigation in Mined Environments and Assault Lane Marking

Description

- Ensure Location Accuracy
  - GPS Augmentation
  - Zero Age of Data (ZOAD)
- Virtual Marking of Lanes
  - ARVCOP
  - Situational awareness
  - Virtual representation

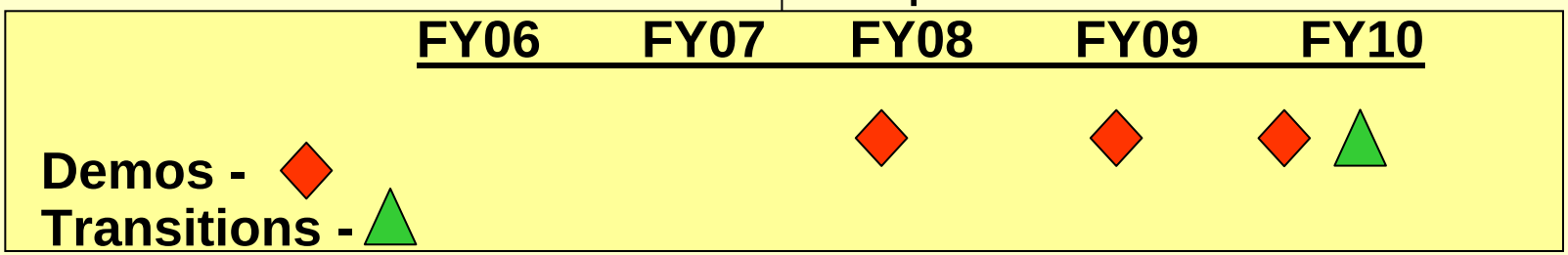


Demos / Transitions

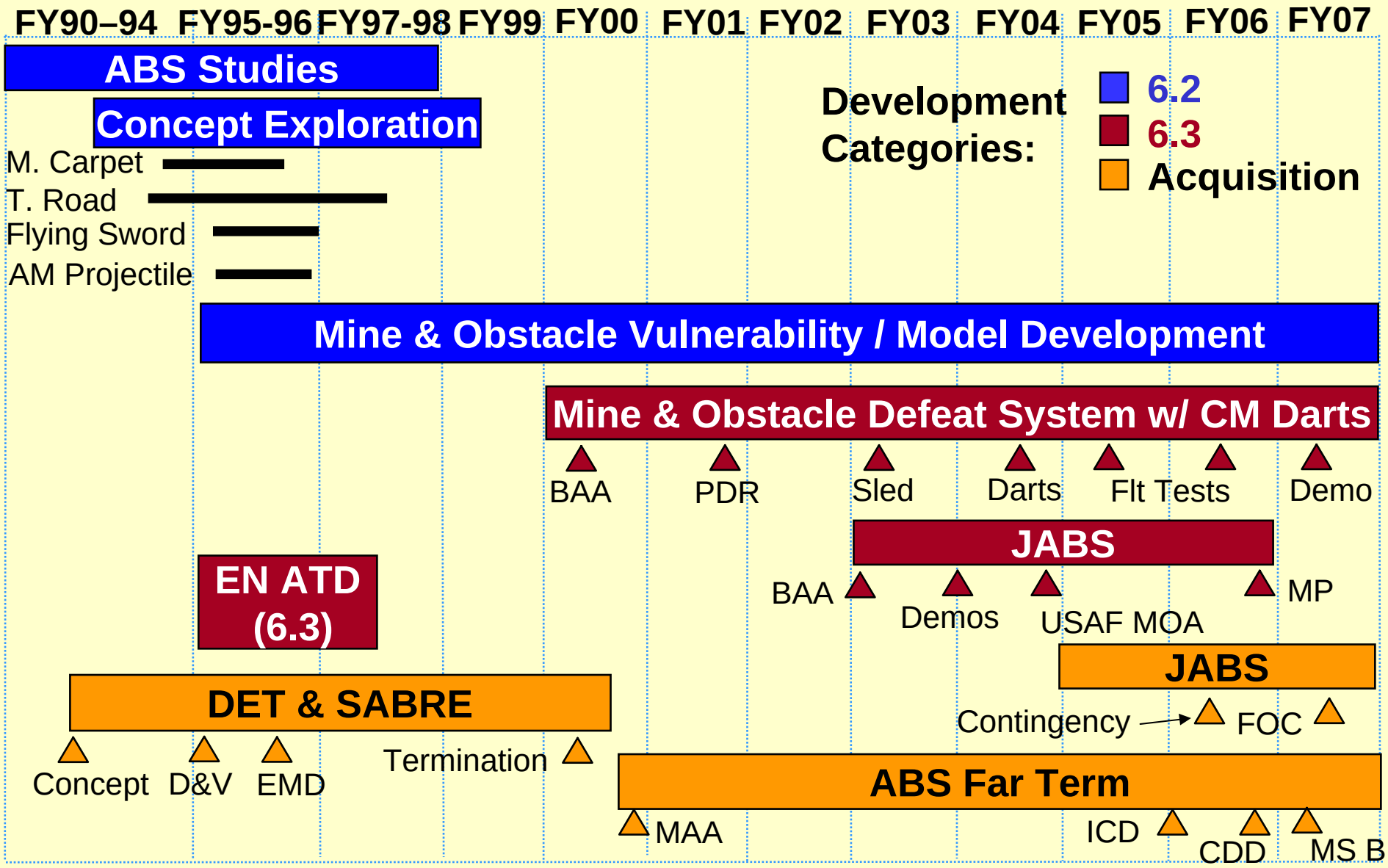
- ABS Program / PMS-495

Warfighting Payoff

- Location accuracy for assets
- Improve TLE

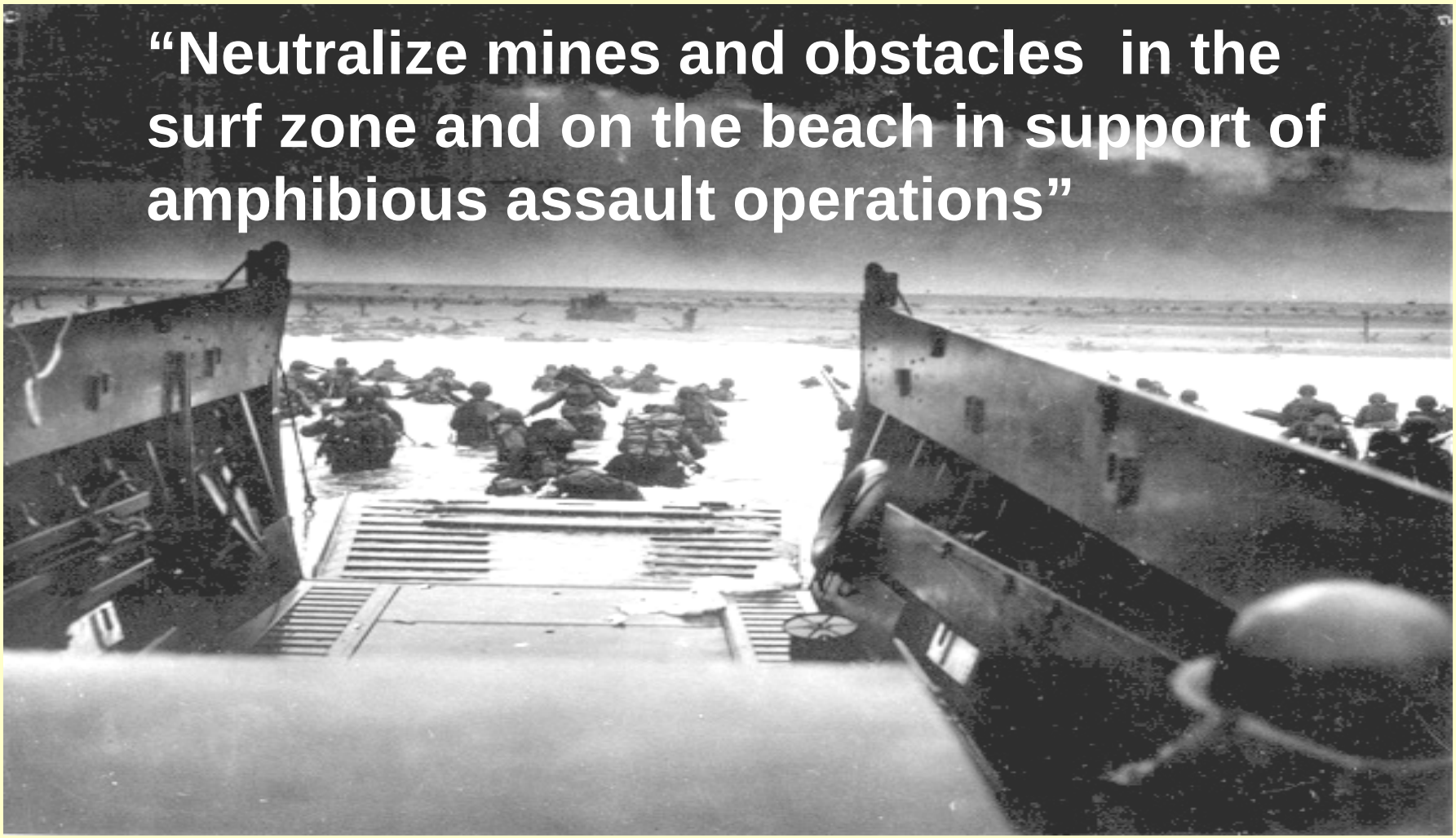


Mine and Obstacle Breaching Concept, Development, Transition



Assault Breaching Systems (ABS) Program

Assault Breaching Systems Mission Statement



Mission Need

"We can ill afford to move 3,000 miles to theater and be stymied by mines and obstacles in the last 3,000 yards."

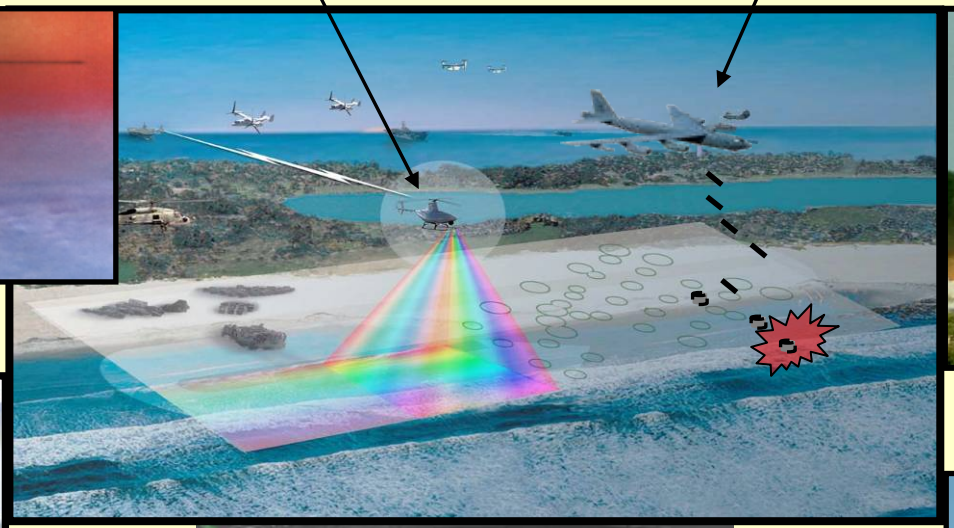
- General John Rhodes,
Marine Corps Combat Development Command

ABS System-of-Systems

COBRA Sensor on Fire Scout

Counter Mine/ Counter Obstacle (CMCO)

ISR&T Capabilities



JABS

AAV/EFV

Precision Navigation / Lane Marking

MODS

AN/DVS-1

COBRA Block I

Processing and Data Storage

Step Stare Gimbal with MSI Camera

Access Panels to Remove Mission Data

COBRA System Description
Block I, Spiral B

Ground Control Station

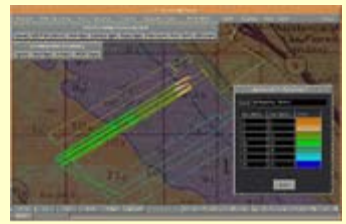
Airborne Control Processor (ACP)

COBRA PMA Station

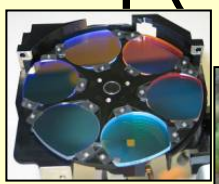
Tactical UAV

Payload Housing Group (PHG)

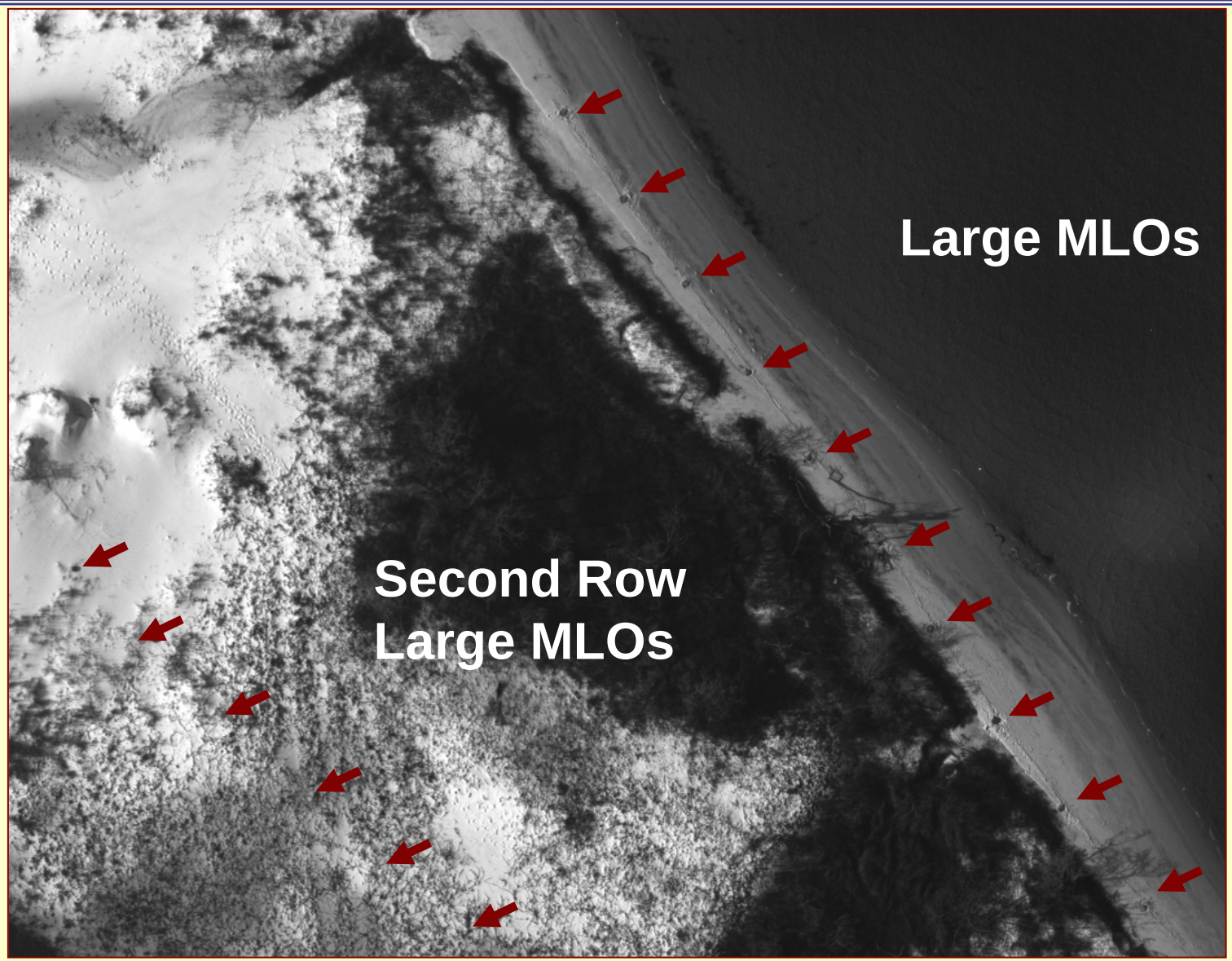
MEDAL



Airborne Sensor Group (ASG)



Eglin Sound Area A15 Target Fields

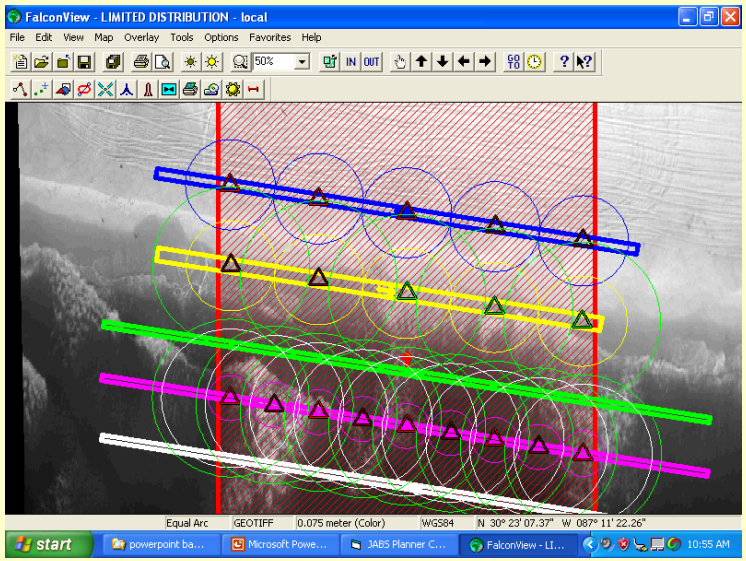


JDAM Assault Breaching System (JABS)

JABS Capabilities

- JABS leverages fielded JDAM weapon:
  - Effective vs. unburied mines / obstacles in the SZ & BZ
  - Limited lethality against buried mines
  - Day/Night Capability
  - Man out of the minefield
- MOA between USN-USAF
- JABS capability fielded through DOTMLPF Change Recommendation (DCR), approved by JROC May 06
- With accurate targeting information, JABS is the surf zone/beach zone breaching capability of today

Aim Points Sent to Air Force



Air Force Executes Mission

Countermine System (CMS)

Countermine System (CMS)

Description

The CMS consists of a precision guided weapon and mission planning software. The weapon will be delivered by USAF bombers and Navy TACAIR. The CMS will be effective against surface laid and buried mines in the surf zone (SZ) and beach zone (BZ).

Status

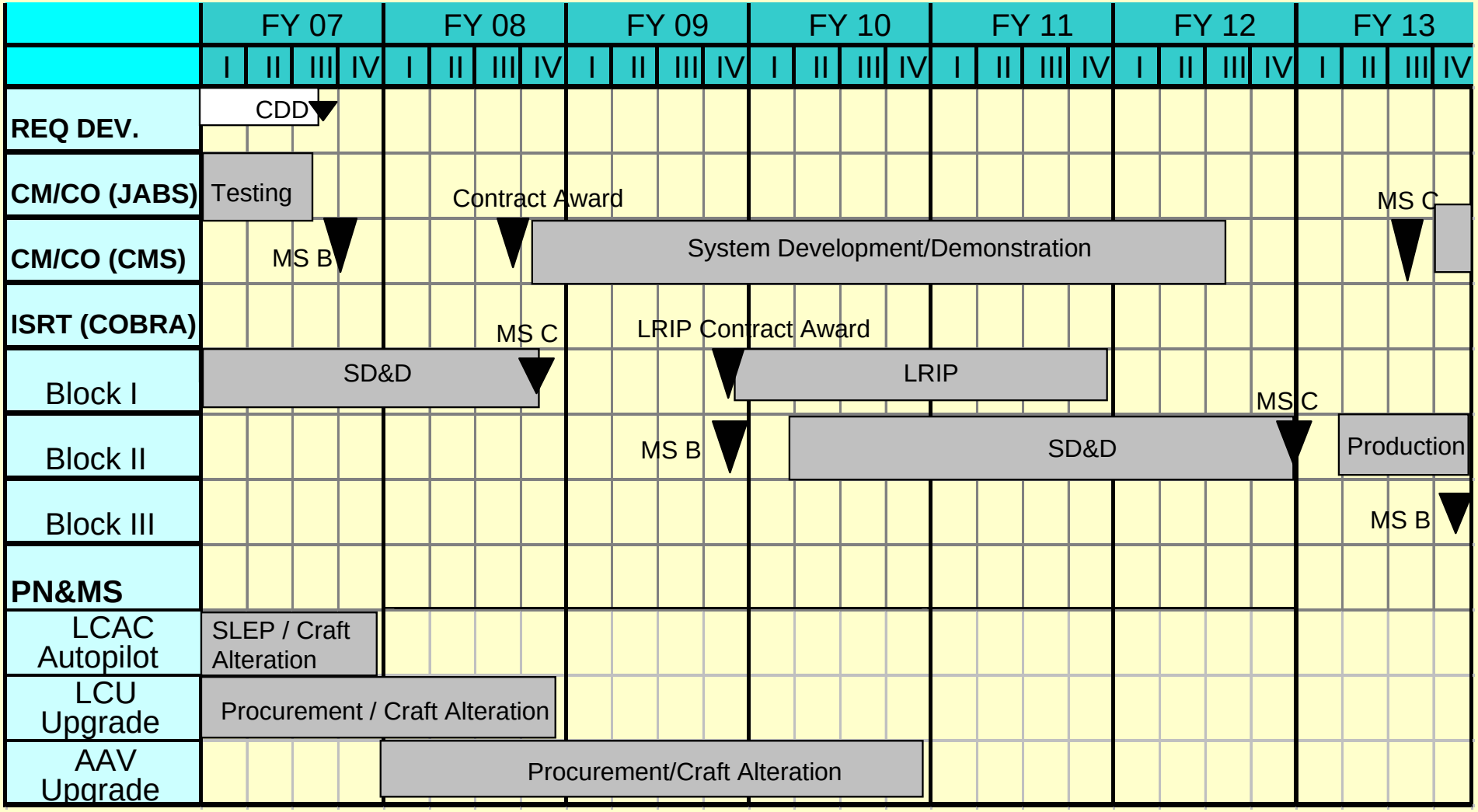
- Request for Proposals: 30 April 2007
- Proposals Received: 14 June 2007
- Contract Award Pending: May/June 2008

Precision Navigation and Marking

Precision Navigation and Marking System

Improve survivability and reduce the required lane size by visually / electronically marking lanes and providing electronic aids to facilitate maneuver.

ABS Schedule



Summary

- **Transitions Have Contributed to Closing Gap**
  - Minefield Breaching Weapons JABS & MODS
- **Current Technology Transition Agreements**
  - UAV-Based Mine Sensors
  - GPS Augmentation & Augmented Reality
- **Keys to Successful Transitions**
  - Close Coordination between OPNAV / ONR / PMS-495, Industry, Laboratory, and Academia
  - Clearly defined exit criteria
  - System-level demonstrations

Assault Breaching System Technologies

Revolutionary Research . . . Relevant Results

Presented to
9th Annual Science & Engineering Technology Conference / DoD Tech Exposition
15-17 April 2008

Mr. Brian Almquist
Ocean Engineering & Marine Systems
Office of Naval Research
(703) 696-3351 almquib@onr.navy.mil

LtCol Tim McLaughlin
APM for ABS
PMS 495 Mine Warfare Program Office
(202) 781-4457 tim.j.mclaughlin@navy.mil

JABS Flight Test

Back

JABS Surf and Beach Flight Test

Back

MODS Live Demo

Back

Sled Test

Back