NDIA ExWAR MIW Panel
U.S. NAVY Mine Warfare Programs
PEO USC, PMS 495

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Major Program Manager
16 October 2018
PMS 495 Program Portfolio

- ALMDS
- COBRA
- MK-103
- MK-104
- MK-105
- SQQ-32V(4) HFWB
- AQS-24B
- AQS-24C
- AN/SLQ-37 (V)4 Sweep
- AN/SLQ-38
- AN/SLQ-48
- AN/ASQ-235 Archerfish
- AN/ASQ-232A SeaFox
- AN/SQQ-60 SeaFox
- Barracuda
- JABS
- OPMA
- MOC
- NSAM
- PINS
- MEDAL EA
- NAVITTAR
- CDM
- Hammerhead
- Quickstrike (JDAM)
- Quickstrike Extended Range
- Quickstrike Mod 3
- AN/SPU-1/W MOP
- NAVITTAR
- Hammerhead
- Quickstrike (JDAM)
- Quickstrike Mod 3
- AN/SPU-1/W MOP

DISTRIBUTION A. Approved for public release: distribution unlimited.
Legacy Systems Highlights

- **AQS-24B High Speed Synthetic Aperture Sonar**
  - Laser upgrade and test to complete this summer
  - Kit procurement planned for FY19
  - RIMPAC: HM 14 successfully completed 35 missions 62 tow hours, 29 June –02 August 2018

- **AQS-24C Volume Search Sonar**
  - First delivery expected 1QFY20

- **SSQ-94 Trainer (Mine Countermeasures Trainer)**
  - 2.0 Install completed in FY18
  - 2QFY18 first installs of 3.0 completed
  - 12 3.0 software installs planned in FY19
  - Version 3.1 under development

- **SQQ-32(V)4 Sonar**
  - Completed multiple installations of the AN/SQQ-32 (V)4 Through-The-Sensor (TTS) software and 10 gigabit switch upgrades (Mar 2018)
Legacy Systems Highlights

- **SLQ-37/38 Minesweep Systems**
  - Overhauled all Advanced Acoustic Generators (AAGs) and Infrasonic Advanced Acoustic Generators (IAAGs) (Apr 2018)
  - FMS Interest

- **SLQ-48 Mine Neutralization Vehicle**
  - Exceeded threshold Ao through-out FY17. On time delivery of 2 MNS overhauled vehicles.

- **SLQ-60 SeaFox Mine Neutralization System**
  - Delivered MK62 MOD2 Combat Rounds. (Mar 2018)
  - Ordered additional MK62 Combat Rounds in FY19 to meet inventory objective
MCM Recently IOCd Systems

• Coastal Battlefield Reconnaissance and Analysis (COBRA) (AN-DVS-1) Block I
  – IOC, July 2017
  – Completed Initial Operational Test and Evaluation in 2018. Commander, Operational Test and Evaluation Force reported COBRA Block I was operationally effective, operationally suitable, and cyber survivable operating within its intended system of systems.

• Airborne Laser Mine Detection System (ALMDS) (AN/AES-1)
  – IOC, Oct 2016
  – RIMPAC: HSC 21 successfully participated in SOCAL exercise, July 2018

• Airborne Mine Neutralization System – Archerfish (AMNS) (AN/ASQ-235)
  – IOC, Nov 2016
  – RIMPAC: HSC 21 conducted 13 destructor launches over 7 flights July 2018
Mines Portfolio

- **QUICKSTRIKE MK 62/MK63/MK65**
  - Target Detection Device and Adapters contract competitively awarded to SECHAN 4QFY18

- **QUICKSTRIKE Joint Direct Attack Munition (JDAM)/QUICKSTRIKE Extended Range (ER)**
  - Conducted QS-J Water Impact Testing on 25 Apr 2018
  - Operation Demo Valiant Shield 18
  - Conducted QS-ER software and wing kit functionality test on 10 Apr 2018
  - Aerial Delivery Improvement: increased standoff, precision, safety

- **Clandestine Delivered Mine (CDM)- Phase I**
  - In prototype testing
  - End-to-end testing 2QFY19
  - Phase I delivery FY20

- **HAMMERHEAD**
  - New Program-started in 2018
  - Prepositioned, encapsulated torpedo
  - CAPTOR replacement
  - Modular architecture approach to allow for future technology insertions
  - Classified RFI release expected FY19
Mine Countermeasures
Strategic Vision

Enabling Technologies

• Automated Target Recognition
  ➢ Multi-Modal
  ➢ Multi-Sensor Fusion

• System Autonomy
  ➢ Mission Evaluation & Re-planning

• Over-the-Horizon Capability
  ➢ MCM Data Link
  ➢ MCM C2 Link

• Standardized Common Interfaces

Enabling Capabilities

• Artificial Intelligence/Machine Learning
  (Planning, Detection, Classification & Decision Aids)

• Remote Vehicles/Devices
  (Autonomous/Semi-Autonomous)

• Vessels and Aircraft of Opportunity

Opportunities for Industry to invest in developing needed critical enabling technologies to Mine Warfare

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QUESTIONS?
USV Systems Vision
Enhanced, Efficient Capabilities

Key Enablers
- Endurance
- Autonomy & Precision Navigation
- Command, Control, & Communications
- Payloads & Sensors
- Platform Integration (L&R, etc.)

Efficient, Executable Progression of Capabilities onto Common USV Hull Forms

Large
(Class 4; Length >50m)
- Technology Maturation, CONOPs, & Payloads
- ISR
- EW
- ASUW
- SUW
- ASW

Medium
(Class 3; Length >12m and ≤50m)
- ASW
- EW
- SUW
- ASUW
- MCM
- Logistics

Small
(Class 2; Length >7m and ≤12m)
- MCM USV
- Armament
- Mine Hunt
- Mine Sweep
- Mine Sweep & Mine Hunt

Very Small
(Class 1; Length ≤7m)
- GARC Optionally Manned
- ADARO/MUSCL

FSCF USVs
TBD Hull Form(s)
- Launch on Remote
- UUV Launch
- MCM
- Counter Piracy
- Comm Relay

Endurance
- Fully Autonomous
- Coordinated Ops
- Operates OTH

MHU 1-4
w/ AN/AQS-24

USV w/Sweep (USS)

USV w/ Sweep or AN/AQS-20

ADARO/MUSCL

Current
Near/Mid
Mid/Far
UUV Systems Vision
Enhanced, Efficient Capabilities

Key Enablers
- Endurance
- Autonomy & Precision Navigation
- Command, Control, & Communications
- Payloads & Sensors
- Platform Integration (L&R, etc.)

Efficient, Executable Progression of Capabilities through Various UUV Systems

Extra Large (Pier Launch)
(Dia. >84in)

Large (Surface or Submarine Launch)
(Dia. >21in and ≤84in)

Medium (Surface or Submarine Launch)
(Dia. >10in and ≤21in)

Small (Man Portable)
(Surface or Submarine Launch)
(Dia. >3in and ≤10in)

ONR Innovative Naval Prototype

Experimentation

Endurance

Autonomy

Payloads

CONOPS Development

MIW

Payload Integration

ORCA

ONR Innovative Naval Prototype

SNAKEHEAD Ph1 Vehicle

MIW / IPOE

Battlespace Awareness

IPOE

Buried & Volume Mine Hunting

Battlespace Awareness

Knifefish

LBS-AUV

LBS-G

MIW / IPOE

Battlespace Awareness

IPOE

Buried & Volume Mine Hunting

Battlespace Awareness

Knifefish

LBS-AUV(S) RAZORBACK

P3I, Future Blocks/Mods

Mk18 Mod 1 (Swordfish)

Mk18 Mod 2 (Kingfish)

LBS-AUV

LBS-G

MIW / IPOE

Battlespace Awareness

IPOE

Sandshark

IVER

Efficient, Executable Progression of Capabilities through Various UUV Systems

ACCELERATE | INNOVATE | DELIVER
Recent Accomplishments

➢ Minehunting USVs (MHUs) continue to support Fifth Fleet training and operations
   • AN/AQS-24B upgrade integrated with MHU

➢ Unmanned Influence Sweep System (UISS) continues Development Testing
   • Completed over 800 hours of in-water testing to date
   • DT/OA planned through Nov 2018; Milestone C in FY19

➢ MCM USV + Minehunting continues development
   • 1st craft delivered July 2018; 2nd craft delivers Oct 2018
   • Payload Integration & Testing in FY19

➢ AQS-20C production units delivering
   • Delivery of 10 units planned through 1QFY19
   • Navy DT through 1QFY19

MHU Operations

Unmanned Influence Sweep System (UISS)

AQS-20C Testing and Delivery
Recent Accomplishments

Knifefish Testing

- Knifefish UUV will provide LCS and Vessels of Opportunity volume, bottom, and buried minehunting capability
  - Contractor Trials and Sea Acceptance Testing completed
  - DT-1 complete in Boston and South Florida
  - DT-2/OA planned for Nov 2018 – Feb 2019
  - Milestone C planned in 2QFY19
UxV Technology Enablers

➢ Endurance
  • Improved reliability and safety
  • Increased endurance and range
  • Support additional and more capable sensors

➢ Autonomy & Precision Navigation
  • Increased levels of autonomy and decision making
  • Increased accuracy and reliability

➢ Command, Control, and Communications (C3)
  • Safely, autonomously and reliably launch and recover
  • Improved Command, Control, and Communications

➢ Payloads and Sensors (ISR, Comms, etc.)
  • Increased capacity for sensors, payloads and systems
  • Increased capability, both individual and with other platforms

➢ Platform Integration (L&R, etc.)
  • Increased capability to L&R
  • Increased coordination with host platforms
Future of Mine Warfare

16 October 2018

Dr. Sam Taylor
PEO Unmanned & Small Combatants
Transition

• Legacy
  – Operator intensive
  – Well-understood capabilities/CONOPS
  – High sustainment costs
  – Platform dependence

• Modular Mission Force
  – Heavy use of offboard, unmanned systems
  – CONOPS still developing
  – Replacing capabilities, not systems
  – Platform agnostic

• Future Force
  – Robust, autonomous, offboard unmanned systems
  – Artificial Intelligence
  – New CONOPS
  – Platform agnostic
MIW is a Team Sport

➢ Collaboration across the Navy and with International partners

➢ Partnership with industry to develop, deliver, field, and sustain enduring MIW systems

➢ Reliance on industry, academia, and S&T community for innovative technologies, ideas and tactics

➢ Key MIW enablers:
  • Interoperability
  • Real time data links
  • Automatic Target Recognition
  • Reliability of Unmanned Systems
  • Cybersecurity and Information Assurance
Summary

➢ We need to think differently about mine warfare

➢ Unmanned systems unleash great potential

➢ MIW Singularity
  • AI – Machine-to-Machine learning
  • Data analytics

➢ Team Sport – we’re in it to win
Accelerate |

Innovate |

Deliver