Unmanned Maritime Vehicle (UMV) Test & Evaluation Conference

Future Technology Development and Assessment for UUV Acquisition

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Autonomous Systems and Technology Department
- T&E is part of an integrated technology development and acquisition strategy
- Early, effective use of Modeling and Simulation and HIL testbeds will add significant “value” and simplify the T&E process.
- Creative solutions can be utilized to reduce cost
Demonstration UUV’s

T&E of Payloads on UUV Testbeds
- Early Awareness of Fleet Integration Issues
- Common Interfaces and Modular Payloads
- Applicable UUV Standards

21UUV
- ~200 In-Water Runs
- Acquisition Program Risk Mitigation
- Vision Based Navigation, Camera Suites, Photo Mosaic’s
- Side Scan Sonar Imagery
- “Electric Torpedo” Testbed and Weapon Launch from MTV
- Autonomous Controller Experiments

MARV - Mid-sized Autonomous Research Vehicle
- Technology Demonstrations for Various S&T Programs
- Low Speed Control and Hover Payload (Thruster Based) Demonstrations
  - Imaging Sensor Evaluation
  - Homing and Docking Demonstrations

MTV - Manta Test Vehicle
- ~100 In-Water Runs
- Multiple UUV and Weapon Launch
- Advanced ISR Suites – RADINT, SIGINT, Optics, IR
- Deployed ASW Systems
- Advanced Networked Communications
- Advanced Autonomy

12.75” Diameter
FY04 In-Water
8 Ton Displacement

21” Diameter
12” Diameter
8 Ton Displacement

12.75” Diameter
UUV M&S Full Spectrum Capability
End-to-End Modeling & Simulation Framework

- Future links to Fleet synthetic training environments
- Enable experimentation and exercise collaboration, distributed networked environments
- Socialization of new technology
- Test & Evaluation in support of Sea Trial.

- Assess new concepts and technologies
- Naval & joint CONOPS development
- Provide advanced (TT&Ps)
- Requirements study, analysis of alternatives (AoA)
- Performance prediction, “what-if”, Monte Carlo
- Investment decisions on UUVs.
- Reliability modeling
- Analyze design change impact on program

- Risk Reduction,
- Engineering trade studies
- ICD development & validation
- Contractor system validation
- HWIL/sub-system/end-to-end system simulation

Fleet | Government labs | Warfare Centers | Academia | Industry
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Cost-effective | Distributive | Collaborative | Re-usable | Extensible | Composable | Persistent
HWIL Testbed – Supports Mission Planning, Diagnostics, and Effective Testing

- Propulsion/Effector Module
- Vehicle Control, Autonomy, Navigation Module
- Energy Module
- Payload/Sensor/Comms Module

**Key:**
- Discrete I/O, Serial, analog, digital
- 100 base T Data Network
- Vehicle Component
- Main Power Bus
- Conditioned Power lines, specific voltages needed for subsystems, payloads
- Simulated Subsystem (hardware or software)

**Note:** Support subsystems will be in each section, but will vary between modules. Examples are leak detectors, pressure sensors, pingers, etc.

**Note:** Minimal interfaces between sections will facilitate hardware modularity.
Creative use of Existing Navy Assets: ASW Targets

- Provided 1073 training events with Mk 39 EMATT for FY 04
- Provided 314 training events in support of 446 customers with Mk 30 Mod 1 for FY 04
- Received IOC approval letter for Mk 30 Mod 2
  - Production Contract Awarded (FY05)

Targets as UUV Mission Enablers?

Partners: EMATT - Sippican Inc.
Mk 30 Mod 2 - TBD
Sponsor: PMS404
Expendable Mobile ASW Training Target (EMATT)

- State of the Art Electronic Suite
- Dynamics
  - Submarine Realistic Turn Rates
  - Run Speeds: 3-8 Knots
- Autonomous Evasion (AE)
  - AE Cued by Torpedoes, Sonobuoys, Dipper, & Surface Ship
- Range Tracking Pinger Function
  - Addition of Mk 84 Long Ping Format
    for Shallow Water