NUWC Industry Day

Ranges, Engineering, and Analysis Department (Code 70)

June 14, 2016

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**Navy Undersea Warfare Ranges**

**Capability Roadmap Development**

**Understanding, Awareness, Visibility**

**Opportunity**
- Total Ownership Cost
- Leveraging R&D, T&E and Training

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**Non-MRTFB T&E RANGES**
- SESEF (Shipboard Electronic System Evaluation Facility)
- KMISS (Kwajalein Missile Impact Scoring System)
- Dodge Pond
- Acoustic Research Detachment (ARD) Complex
- Seneca Lake
- STAFAC (South Tongue of the Ocean Acoustic Measurement Facility)
- Lake Glendora
- SEAFAC (Southeast Alaska Acoustic Measurement Facility)
- Keyport
- Underwater Explosion (UNDEX) Test Pond
- Dabob Bay
- South Florida Ocean Measurement Facility (SFOMF)
- Nanoose
- NBSWTF (Narragansett Shallow Water Test Facility)
- Combatant Craft and Boats RDT&E Complex
- Deep Submergence Test Facility

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**CURRENT CAPABILITY**
- Undersea Tracking
- Surface Tracking
- KMISS
- Air Tracking
- Radar Cross Section
- Marine Operations
- Electro-Magnetic
- Air Operations
- Targets
- Electronic Warfare
- Environmental
- Info Operations
- Next Gen Naval Capabilities
- 1st Gen Naval Capabilities

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**REQUIREMENTS**
- Air Comms
- Undersea Comms
- Cyber
- Acoustic Measurement
- Live Virtual Constructive
- Marine Operations
- Weapons Analysis Facility
- Radar Cross Section
- Remote Operations
- Electro-Magnetic
- Threat Emulation (Targets, Torpedoes, CM, UUV, Environment)
- Air Operations
- Mobile Set to hit ASW Target
- Electronic Warfare
- Autonomy
- Info Operations
- Next Gen Naval
- Security

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**FUTURE PLANS**
- UUV Support Infrastructure
- Cyber
- Threat Emulation (Targets, Torpedoes, CM, UUV, Environment)
- Live Virtual Constructive
- Mobile Set to hit ASW Target
- Weapons Analysis Facility
- Remote Operations
- Next Gen Naval Capabilities
- Threat Emulation (Targets, Torpedoes, CM, UUV, Environment)
- Autonomy

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Range Mission Functions: ASW, ASUW, Info Ops / Electronic Warfare, Mine Warfare, Special Ops

Lifecycle Scope: Research and Development, Rapid and Standard Prototyping, System Test and Evaluation, Tactics Development, Training

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*Initial Operating Capability FY19

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Minimize Duplication and Maximize Capability Across Undersea Warfare Ranges

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Mission
Ranges, Engineering and Analysis Department

Mission: We deliver full-spectrum undersea T&E and fleet training capabilities by providing world-class instrumentation, facilities, engineering and analysis.

• Facilities and Services:
  – Atlantic Undersea Test & Evaluation Center (AUTEC)
  – Shipboard Electronics Systems Evaluation Facility (SESEF)
  – ASW Test
  – Survivability
  – Independent Product Assurance
  – Acoustic Testing (Dodge Pond and Seneca Lake)
  – Industrial Services Enterprise

• Undersea Range Management and Technology Development:
  – AUTEC Program Management
  – Range System Development Business Unit
  – Technical Project Officer for Range International Exchange Agreements

Support for Navy Acquisition, Certification and Readiness
Vision

Today's Navy

Deep-Water Training Ranges

- Fixed, Large Area Deep-Water Ranges
- Remote Processing
- Post Event Feedback
- Small Area Portable Ranges
- Marine Mammal Monitoring

Next Navy (+5-10 yrs)

Current Focus

Build shallow water tracking ranges for both training and test & evaluation. Maintain/modernize existing deep water tracking ranges

Vision of the Future

Navy After Next (+20 yrs)

Potential Game Changers/Disruptive Technologies

• CHALLENGES
  - Acquisition & Replacement Cost for Fixed Ranges
  - Loss of Acoustic Spectrum
  - Demand for Larger Operating Areas
  - Swarming & High Speed vehicles

• DISRUPTIVE TECHNOLOGIES
  - Vector Sensors
  - Single Crystal Transducers
  - High Accuracy Time and Position from Pingers
  - Self-Surveying Hydrophones
  - Non Cooperative & Passive Tracking
  - Easily Deployable Ranges

• STRATEGIC LEVERAGING
  - Test Bed for DNS; Advanced Sensors
  - Adapt DNS & other technologies for Range Use

Enhanced Range Technologies

- Shallow Water Capability
  - Undersea Shallow Water Training Range (USWTR)
  - Narragansett Bay Shallow Water Tracking Range (NBSWTR)
- Continuous (24/7) Marine Mammal Monitoring on Navy Ranges (M3R)
- Improve Acoustic/Non-acoustic Detection, Classification, and Tracking Capability for Vehicles on Range
- Deployable Ranges

Track/Simulate Future Threats

- Realistic Threat Scenarios (Live Virtual Constructive)
- Range Simulates Location/Environment of Interest
- Improve Precision Navigation Capability for Undersea Assets to Enable Low-error Tracking
- Track Multiple (swarming) Vehicles on Range
- Develop Remote Support Capabilities for Unmanned Undersea Systems (UUS)
  - Energy Depot
  - Communication/Data Depot
  - Take Range to Ship

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Code 70 Personnel Profile

Educational Profile

- Advanced Degree: 111
- Non Degree: 87
- Associates: 53
- Bachelors: 14

Civilian Total: 265

Workforce Profile

- Mechanical Engineer: 54
- Electrical Engineer: 36
- Biologists/OE: 32
- Computer Sci/Math: 40
- Other: 32
- Tech: 36
- Clerical: 7
- Admin: 2

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Code 70 Operates
Major NUWC Test Facilities

• Narragansett Bay Shallow Water Test Facility
  – Newport, RI

• Survivability Testing Facility
  – Newport, RI

• Shipboard Electronics Systems Evaluation Facility (SESEF)
  – Mayport, FL and Norfolk, VA

• Dodge Pond Acoustic Measurement Facility
  – Niantic, CT

• Seneca Lake Acoustic Test Facility
  – Dresden, NY

• Atlantic Undersea Test & Evaluation Center (AUTEC)
  – West Palm Beach, FL Headquarters
  – AUTEC Ranges, Andros Island Bahamas

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Atlantic Undersea Test and Evaluation Center (AUTEC) Program Management

• Mission: Support Developmental and Operational T&E threshold decisions for USW systems

• Capabilities include:
  – Underwater tracking
  – RF tracking
  – Acoustic measurement
  – Acoustic stimulation

• Support for Fleet assessment and readiness exercises

• Support for simultaneous T&E operations and Fleet training exercises

• Management and oversight of:
  – Maintenance and Operation
  – Improvement and Modernization
Narragansett Bay Shallow Water Test Facility

Research & Development (R&D) Capabilities

• Realistic environments in protected low-loss risk locations for testing of advanced underwater weapons systems and vehicles

• Underwater Tracking Capability

• East Coast torpedo exercise, recovery, and towed array testing support
Seneca Lake Acoustic Test Facility

- Sonar and acoustic parameter measurement for single element transducers to complex arrays
- Statistical and spectrum analysis
- Instrumented calibration
- Heavy lift capability
- Unique to the Navy
- Canal access to the ocean
- Low ambient noise conditions
- Test depths to 600 feet
- Target response measurement capability
R&D Capabilities

- Acoustic Measurement Facility
  - Pressure test capability to 500 psi
  - 33 acre fresh water pond with 50 ft operating depth
  - Very quiet ambient noise levels below sea state 0, frequency from 50 Hz to 500KHz
  - Close proximity to Division Newport
  - Test all types of:
    - Transducers
    - Arrays
    - Domes
    - Baffles
    - Towed Line Arrays
    - Other underwater electro-acoustic devices
Shipboard Electronics Systems Evaluation Facility (SESEF)

• Technical Design Agent (TDA) – 7 locations near major homeports operated and maintained to provide real-time electromagnetic (EM) and RF signal analysis - Norfolk VA, Mayport FL, San Diego CA, Port Angeles WA, Hawaii, Japan and Rota Spain (FY15)
  – Norfolk and Mayport facilities are operated by Division Newport

• Identify and assist in correction of deficiencies in the ship’s combat systems electronics suite.

• Determine system operational performance and material readiness following new construction and overhaul.

• Validate engineering designs

• Support Inspection & Survey (INSURV)

• Provides significant Fleet cost savings
  – Technical assists
  – Tactical Air Navigation (TACAN) Certifications
Survivability Testing Facility

- Laboratory simulation of naval shipboard environments (shock, vibration, temperature and humidity, hydrostatic pressure, salt fog)
- Temperature and humidity environmental test chambers of all sizes ranging from bench-top to full walk-in.
- 19 Hydrostatic Pressure Tanks, up to 13,500-psi. Tank sizes including 5-foot diameter, 12 feet deep, and 30-inch diameter, 30 feet long.
- All standard Navy high-impact shock machines
- Two unique low-impact shock machines:
  - Linear Bi-axial Impact Machine (LBIM) used to qualify isolated deck-mounted equipment.
  - Chirp machine used for low-frequency high displacement transient shocks.
- Instrumentation & data acquisition for laboratory & field tests.
- Materials testing
Industrial Services Enterprise

- Full-service manufacturing & engineering facility
- Prototyping & production
- CAD/CAM design and modeling
- CNC and manual machines
- Fleet support in manufacturing & Installations

- Dedicated space for:
  - Painting
  - Powder-coating
  - Welding
  - Sheet-metal fabrication
  - Engraving
- Torpedo Recovery Team/Equipment Depot
Metrology and Calibration Facility

- Calibration and repair of electronic and mechanical test instrumentation for NUWCNPT, AUTEC, the Fleet and regional Coast Guard vessels
Undersea Tracking Ranges

Roles

• Technical Design Agent (TDA) for Undersea Tracking Ranges
• Acquisition Management (DAWIA Certified)
  – Program Management & Contracting
  – Systems Engineering and Lead Systems Integrator
• Range Systems Development
  – Applies corporate technical knowledge across programs & products
• Range Technology Research and Development
• Range Operational Management
  – AUTEC and Narragansett Bay
  – Portable Systems
• Ocean Systems Support Activity
  – System Sustainment and Product Upgrades
  – Trouble Report Resolution and Customer Support
  – Integrated Logistics Support, Quality Assurance, Configuration Management, Testing and Certification
  – Cybersecurity
Major Range Development Programs

• Undersea Warfare Training Range (USWTR)
  – Customer: NAVAIR PMA-205
  – 500 nmi\(^2\) instrumented range for the Atlantic Fleet’s use in training
  – 60 nmi offshore Jacksonville FL

• Kwajalein Missile Impact Scoring System (KMISS)
  – Customer: USAF
  – Missile splash detection system at US Army Reagan Test Site

• AUTEC I&M Projects
  – Customer: NAVAIR 5.0C
  – Shore Electronics System Replacement
  – In water Sensor System Replacement
Advanced Instrumentation Systems Technology (AIST) T&E Needs

- **Time, Space, Position and Information (TSPI)**
  - High accuracy and continuous TSPI for high speed/high dynamic and GPS-degraded environments

- **Advanced Sensors**
  - Miniature and hardened for harsh environments

- **Advanced Energy & Power**
  - Next generation fuel cells, as well as power harvesting techniques

- **Non-intrusive Instrumentation**
  - Advanced data acquisition and processing components designed to be embedded within the system under test

- **Range Environmental Encroachment**
  - Technologies to mitigate impact to test range operations

- **Human Performance Measurement & Assessment**
  - Technologies to assess the human-machine interface, including improved methods to measure warfighter cognitive workload

Distribution Statement A: Approved for Public Release; Distribution is Unlimited
FY16 Funding Profile
Funding by Sponsor

TOTAL FUNDING PROFILE - $97 MILLION

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FY16 Funding Profile

Funding by Appropriation

TOTAL FUNDING PROFILE - $97 MILLION

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Current Code 70 Major Service Contracts

• Pacific Architects and Engineers, Inc. (PAE)
  – AUTEC Maintenance and Operations (M&O)
    • Scheduling and conduct of test programs on range
    • Operation and maintenance of range instrumentation and test support systems
    • Performance of all base operations functions at AUTEC on Andros Island

• Purvis Systems, Inc.
  – AIST Program Support

• Systems Resource Management, Inc. (SRM)
  – Industrial Services Enterprise Technicians and Machinists

• MAR Range Services
  – Seneca Lake/Dodge Pond M&O Support
  – Calibration Lab Technicians
  – Calibration Equipment Transportation

• Fathom Research, LLC
  – Narragansett Bay Diving Services
Current Code 70 Major Service Contracts (continued)

• Seaward Services, Inc
  – NBSWTF M&O Support
  – Operational Support Services for Ocean Testing

• Eclipse Group, Inc
  – Operational Support Services for Ocean Testing

• GSTEK, Inc
  – SESEF
    • M&O Support on site at Norfolk, Mayport and Rota
    • Training at the other sites

• L3 MariPro
  – In-water Sensor (IWS) System Maintenance, Repair and Upgrade for Undersea Ranges

• KMS Solutions, LLC
  – Engineering Support Services

• Cascadia Research Collective
  – Marine Mammal Tagging Services
Contractor Personnel Profile

- 18.8% Engineers/Scientists
- 59.4% Technicians
- 3.0% Admin/Business

Does not include AUTEC Contractors

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Projected Major Services Contracts
FY16-FY18 ($M)

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# Code 70 Projected Contracts FY16-FY18

<table>
<thead>
<tr>
<th>Contract #</th>
<th>Title</th>
<th>Current Contract Value (w options)</th>
<th>Incumbent</th>
<th>Seaport</th>
<th>Follow-On</th>
<th>Current Contract Type</th>
<th>Expected RFP Release</th>
<th>Strategy</th>
</tr>
</thead>
</table>
| N66604-13-D-0983  
| N66604-14-D-0065 | NBSWTF M&O                                | $6M                               | Seaward Services              | N       | Y         | CPFF                  | Dec 2016             | Unrestricted |
| N66604-05-C-1277 | AUTEC M&O                                 | $830M                             | PAE                           | N       | Y         | CPFF                  | July 2017            | TBD       |
| 4136 N412      | Industrial Services Enterprise            | $11.8M                            | SRM                           | Y       | Y         | CPFF                  | March 2017           | SBSA      |
| 4081 N402      | Seneca Lake/Dodge Pond Support            | $6.2M                             | MAR                           | Y       | Y         | CPFF                  | Sept 2017            | SBSA      |
| 7737 N401      | SESEF Support                             | $4.4M                             | GSTEK                         | Y       | Y         | CPFF                  | May 2018             | SBSA      |

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Summary

• The Ranges, Engineering, and Analysis Department operates a number of ranges, facilities and service centers
  – Contracts are used for M&O support

• Undersea Range System Development and Engineering Support to Other Departments
  – Contract for General Engineering Support, System Safety and Cybersecurity

• Inwater Sensor System contracts
  – Maintenance/Repair/Upgrade for existing systems
  – New IWS systems for new and existing locations