NUWC Industry Day

Ranges, Engineering, and Analysis Department (Code 70)

October 22 & 23, 2018

Distribution Statement A: Approved for Public Release; Distribution is Unlimited
Who We Are / What We Do
Code 70 Vision: The recognized leader for undersea test and evaluation and fleet training.

Code 70 provides a full spectrum of engineering resources to enhance undersea warfare through the application of simulation-based design, range development, engineering analysis and design, prototype fabrication, test and evaluation, readiness and training in both simulated and in-water environments.

Range Facilities
- Atlantic Undersea Test and Evaluation Center (AUTEC)
- Seneca Lake Acoustic Test Facility
- Shipboard Electronic Systems Evaluation Facility
- Narragansett Bay Test Facility
- Survivability Testing Facility
- Industrial Services Enterprise / Cal Lab
- Dodge Pond Acoustic Test Facility
- NATO FORACS

Technical Expertise
- Fixed & Portable Range Development
  - Underwater Tracking
  - Ocean Engineering
  - Acoustic Survey
  - International Programs
- Computational Science & Engineering
- Marine Species Monitoring & Modeling
- Reliability, Availability & Maintainability
- Independent System Safety
- Waterside Security

AUTEC | SENECA LAKE | SESEF | NBTF
SURVIVABILITY | ISE | DODGE POND | NATO FORACS
FIXED RANGES | PORTABLE RANGES | COMPUTATIONAL S&E | MARINE MAMMALS
RAM | SAFETY | WATERSIDE SECURITY | USWTR
**NPT Core Mission Area: Undersea Ranges**

**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

**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

**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

**Navy After Next (+20 yrs)**

**Vision of the Future**

Ranges will meet fleet training needs by minimizing tracking error and by simulating threats & environment of interest

**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

**Ref:** A Cooperative Strategy for 21 Century SeaPower

- Protect the maritime commons
- Respond to crises
- Defeat aggression
- Anti-access area denial

- Centralized Range Operation Centers
- Remote display/control capability
- Data & decision making ability from central location
- Reduce on-site infrastructure and IA/cyber threats
- Common Range Product Line /Instrumentation
NPT Core Mission Area: Rapid Prototyping

Today’s Navy

Independent “Stove-Piped” Services

- Physics-based Modeling
  - Structural analysis
  - Fluid turbulence
  - Fluid/structure interaction
- Machine Shop/Industrial Services
  - Machining/Fabrication
  - Calibration Lab
- Environmental Qualification Testing
  - Land-based Shock, Vibration, Humidity & Thermal testing
- Waterfront
  - UUV launch/recovery
  - Diver support

Potential Game Changers/Disruptive Technologies

- CHALLENGES
  - 3D Printing Material Props
- DISRUPTIVE TECHNOLOGIES
  - Isogeometric Analysis
  - Additive Manufacturing
- STRATEGIC LEVERAGING
  - C70 branches include all necessary disciplines
  - Joint Warfare Center Prototyping/Manufacturing Collaboration Working Group

Next Navy (+5-10 yrs)

Current Focus

Integrate disciplines/capabilities across Code 70

Integrated Rapid Prototyping

- Solid Modeling
  - Design for manufacturing
  - Multi-physics analysis
- Prototyping
  - Additive manufacturing
  - Traditional Manufacturing
- Testing
  - Survivability Lab
  - In-water demo

Standardize Rapid Prototyping Approach

- Develop a feasible rapid prototyping capability
  - Cost effective
  - Saves Time
- Obtain buy-in from TWHs
- Flexible Entry and Exit points
- Educate Project Managers and engineers on how to maximize benefit

Navy After Next (+20 yrs)

Vision of the Future

Provide seamless integration across the design/analysis/fabrication/testing spectrum
Roadmap

Understanding, Awareness, Visibility

Non-MRTFB T&E Facilities
- SEAFAC (Southeast Alaska Acoustic Measurement Facility)
- STAFAC (South Tongue of the Ocean Acoustic Measurement Facility)
- SFOMF (South Florida Ocean Measurement Facility)
- NBTF (Narragansett Bay Test Facility)
- PCD Op-Area (Panama City Operating Area)
- Pacific North West Range Complex (PNWRC)
- SESEF (Shipboard Electronic System Evaluation Facility)
- Acoustic Research Detachment (ARD) Complex
- Seneca Lake/Dodge Pond
- Glendora Lake
- Combatant Craft and Boats RDT&E Complex
- Magnetic Silencing Facilities
- Submarine Strategic (Missile Launch/Scoring) T&E Complex
- KMISS (Kwajalein Missile Impact Scoring System)
- SEAFAC (Southeast Alaska Acoustic Measurement Facility)
- PMRF (Pacific Missile Range Facility)
- SCORE (Southern California Offshore Range)
- JSWTR (Jacksonville Shallow Water Training Range)

Opportunity
- Expand the Advantage
- Total Ownership Cost
- Leveraging R&D, T&E and Training

Current Capabilities

Undersea Range Objectives

Opportunity
- Expand the Advantage
- Total Ownership Cost
- Leveraging R&D, T&E and Training

Undersea Instrumentation
- Fixed & Portable
- Underwater Comms

Above Water Instrumentation
- Air Tracking
- Surface Tracking

Data Enterprise System
- Situational Display
- Data Product Distribution
- Live Virtual Constructive

Electronic Maneuver Warfare
- Electronic Warfare
- Information Warfare
- Communications

Operations and Infrastructure
- Unmanned Systems Support
- Torpedo and Target Support
- Marine and Air Assets

Security and Surveillance
- Encroachment
- Physical
- Cyber

Signature Measurement
- Acoustic Measurement
- Electromagnetic Signature

Threat Emulation
- Torpedoes
- Countermeasures
- Mine Shapes

Lifecycle Scope: Research and Development, Rapid and Standard Prototyping, System Test and Evaluation, Tactics Development, Training
Undersea Tracking 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) Barking Sands Tactical Underwater Range (BARSTUR) Redevelopment and Modernization
  – Customer: NAVAIR PMA-205
  – Depths 1800-6000 feet
  – 120 nmi² instrumented range for the Pacific Fleet’s use in training
  – 42 hydrophones

• AUTEC I&M Projects
  – Customer: NAVAIR 5.0W
  – Shore Electronics System Replacement
  – In water Sensor System Replacement
FY18 Funding Profile

Funding by Appropriation

TOTAL FUNDING PROFILE - $110 MILLION
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
  – Operational Support Services for Ocean Testing

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

• Meston Marine Services
  – NBSWTF M&O Support

• 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
Current Code 70 Major Service Contracts (continued)

• ACUCAL Inc.
  – SESEF Calibration Support

• Marine Ecology & Telemetry Research
  – PacFleet Marine Mammal Survey

• SAIC
  – Codes 85 & 75 Joint Contract -- Administrative Support

• Electrosoft
  – AUTEC Navy-ERP Consulting
Contractor Personnel Profile

Does not include AUTEC Contractors
Projected Major Service Contracts FY19-21 ($M)
## Code 70 Projected Contracts FY19-FY21

<table>
<thead>
<tr>
<th>Contract #</th>
<th>Title</th>
<th>Current Value (w options)</th>
<th>Incumbent</th>
<th>Seaport</th>
<th>Follow-On</th>
<th>Current Contract Type</th>
<th>Estimated RFP Release</th>
<th>Strategy</th>
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<tbody>
<tr>
<td>14-C-0191</td>
<td>NBSWTF Diving Support Contract</td>
<td>$637K</td>
<td>Fathom Research, LLC</td>
<td>N</td>
<td>Y</td>
<td>FFP</td>
<td>June 2019</td>
<td>TBD</td>
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<td>18-P-2929</td>
<td>AUTEC Business Software Development</td>
<td>$248.5K</td>
<td>Electrosoft Services Inc.</td>
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<td>N</td>
<td>FFP</td>
<td>July 2019</td>
<td>SBSA</td>
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<tr>
<td>18-P-2187</td>
<td>PACFleet Marine Mammal Tagging</td>
<td>$308K</td>
<td>Foundation for Marine Ecology and Telemetry Research</td>
<td>N</td>
<td>Y</td>
<td>FFP</td>
<td>June 2019</td>
<td>SBSA</td>
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<tr>
<td>4081-N401 &amp; 4081-N403</td>
<td>Calibration Lab Support</td>
<td>$2.5M</td>
<td>MAR Range Services</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Mar 2019</td>
<td>SBSA</td>
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<tr>
<td>4109-N416</td>
<td>AIST</td>
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<td>Purvis Systems</td>
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<td>7795-N401</td>
<td>Code 70 Eng &amp; Tech Supt</td>
<td>$12.8M</td>
<td>KMS Solutions</td>
<td>Y</td>
<td>Y</td>
<td>CPFF / FFP</td>
<td>Jan 2020</td>
<td>SBSA</td>
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<td>7737-N401</td>
<td>SESEF M&amp;O Support</td>
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<td>GSTEK Inc.</td>
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<td>CPFF</td>
<td>Dec 2018</td>
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<td>17-A-0319</td>
<td>SESEF Calibration Support</td>
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<td>ACUCAL Inc.</td>
<td>N</td>
<td>Y</td>
<td>CPFF</td>
<td>July 2021</td>
<td>SBSA</td>
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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
• In-water Sensor System contracts
  – Maintenance/Repair/Upgrade for existing systems
  – New IWS systems for new and existing locations
Contact Information

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• (401) 832-5024
BACK UP
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
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
Code 70 Personnel Profile

**Educational Profile**
- Advanced Degree: 101
- Non Degree: 55
- Associates: 14
- Bachelors: 125

Civilian Total: 265

**Workforce Profile**
- Mechanical Engineer: 46
- Electrical Engineer: 46
- Biologists: 28
- Computer Science and M: 7
- Other: 28
- Admin: 42
- Tech: 38
- Wage Leader: 1

Civilian Total: 295
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
FY18 Funding Profile

Funding by Sponsor

TOTAL FUNDING PROFILE - $110 MILLION

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