Platform & Payload Integration
Department Code 40

Department Overview
April 2016

Distribution A - Approved for Public Release
Agenda

- Mission & Vision
- Code 40: Today’s Navy, Next Navy, & Navy After Next
- Our Product Line
- Roles & Responsibilities
- End-to-End Payload Integration
- Code 40 in the Virtual Submarine
- Code 40 Science & Technology
- The Virginia Payload Tube Facility
- Code 40 Organizational Structure
- Our People
- Funding Profile
- Code 40’s Strategic Thrusts
- Contracts Overview
Code 40
Platform & Payload Integration Department

**Our Mission:**

Provide Full Spectrum Life Cycle Technical Leadership and Knowledge Base for Submarine Missile/Payload Integration, and USW Launcher Systems

**Our Vision:**

Remain relevant by sustaining our Technical Capabilities and upholding our reputation as the Navy’s subject matter experts in the definition, development, and life cycle support of undersea warfare launcher systems, submarine tactical missiles, and submarine payload integration to ensure current and future US Navy technical superiority

**Our Cornerstones:**

- Teamwork
- Communication
- Integrity

Our skilled workforce and unique facilities keep us relevant!
NPT Core Mission Area: 
Platform & Payload Integration

Today’s Navy

Effective Ready Forces
- Developing, Integrating, Providing Life Cycle Support for Launcher & Payload Systems
- Maintaining World Class Test Facilities and Analysis Tools
- Providing Middleware Expertise
- Cooperative Foreign Military Sales Support
- Maintaining technical authority, responsibility and accountability in USW launchers, payload and tactical missile integration

Potential Game Changers/ Disruptive Technologies
- Directed Energy
- Wireless Communications and Power Interfaces
- Underwater Cloaking
- External Weapon Clips
- Weapon Cache Autonomy
- Distributed C2
- Long Range Undersea Comms
- Immersive Imagery
- Advanced Material Coatings for Shock and Biofouling Mitigation

Next Navy (+5-10 yrs)

Current Focus
Expanding current launcher and payload system capabilities with a focus on providing critical Anti-Access capabilities while leading the transformation of advanced undersea payload integration and deployment

Evolutionary Enhancements
- Expand vital land-based facilities and technical capabilities
- Evolutionary Weapon Integration
- Decoy and Deception Payloads
- Unmanned Vehicle Launch and Recovery
- Expand Cooperative Foreign and Domestic Collaborations

Navy After Next (+20 yrs)

Vision of the Future
Modular, cascaded undersea launcher and payload systems enabling greatly expanded undersea domain effects which are scalable and deliverable from manned and unmanned platforms and environments

Revolutionary Capabilities
- Novel Launch and Recovery Systems with Wireless Interfaces
- Sustain Integration & Interoperability with Distributed and Autonomous Systems
- Scalable Universal Encapsulation
- Cascaded Payload Development
- Transformational Weapons Integration to Expand Mission Portfolio and Use Available Volume Most Efficiently

Distribution A; Approved for Release: distribution is unlimited
The Code 40 Product Line

- **Submarine Launcher Systems**
  - Torpedo Tubes
  - Launchway/Shutter Doors
  - Ejection Systems (Ram Pump, Turbine Pumps)
  - Vertical Launch System (VLS)
  - Weapon Handling / Stowage Systems – Torpedo Room
  - Control Panels
  - Internal/External Countermeasure Launchers
  - Trash Disposal Unit
  - Torpedo Mounted Dispenser (TMD)
  - VA Payload Tube (VPT), VA Payload Module (VPM)

- **Submarine Launched Tomahawk Missile**
  - All-Up-Round & Capsule
  - Test Missiles (TOTEM) / Support Equipment
  - TOMIS – Tomahawk Management Information System

- **Encapsulated Harpoon Weapon System (FMS)**
  - All-Up-Round & Capsule
  - Test Missiles / Support Equipment
  - Encapsulated Harpoon Command & Launch Subsystem

- **Electronic Missile Simulators – MK 101 and MK 112**

- **Surface Ship Tubes (SVTT MK 32, TWS/CAT)**

- **Hatches, Trunks and Closures**

- **Hydrodynamic, Shock, and System Safety Analysis**

- **TEMPALT Development**
**Code 40’s Roles & Responsibilities**

**Missiles/Precision Strike Division**

*Code 401*

- ISEA for Submarine Launched Tomahawk All-Up-Round (AUR)
- ISEA/DA/AEA for Tomahawk Capsules and Peculiar Support Equipment
- ISEA for Submarine Launched Tomahawk All-Up-Round (AUR)
- TDA/ISEA/SIA/AEA/DA for Encapsulated Harpoon Weapon System
- TDA/ISEA/AEA/DA for Tomahawk Missile AUR Electronic Simulators

**Launcher Systems & Payload Integration**

*Code 402*

- TDA & ISEA for Tactical Weapon Launch & Handling Systems Including:
  - Horizontal Torpedo Tubes
  - Torpedo Tube Control Panels
  - Internal Countermeasure Launcher
  - Vertical Launch System
  - Surface Vessel Torpedo Tubes
  - Trash Disposal Unit
  - VIRGINIA Payload Tube
  - VIRGINIA Payload Module including AEA
- TDA & DA for Payload (non-missile) launch and recovery performance for VPM
- TDA for Submarine Structural Closures & Trunks
- TDA for External Countermeasure Launcher
- TDA, ISEA,SIA & AEA for FMS Submarine Launcher Systems
End-to-End Payload Integration

- Payload System Design Development
- Payload Handling Studies & Stowage Design
- Shock Analyses
- Platform/Launcher System Interface Studies
- Hydrodynamic Analysis
- Ship's Operating Procedure Development
- System Safety Program Establishment
- TEMPALT/ORDALT/SHIPALT/OPALT Development
- Hardware Installation / Removal support
- TECHEVAL & OPEVAL
- CONOPS & Tactics Development
- Integrated Logistics Support
- Maintenance Planning
- Fleet/Operator Training
- Acquisition Support
- Cradle to Grave Life Cycle Support
- Electronic and Digital Interface
- Definition/Specification, Design and Control
- Hotel Services including Power Requirements and Distribution, Cooling, Environmental
- Platform/Shipboard Data Requirements (including Navigation, Time, Sensor Data)
- Manning (Attack Center, Torpedo Room, Module)
- Human Factors Integration
- Command and Control
- Land-Based Segment and System Level Testing (prior to TECHEVAL/OPEVAL)
- Safety (includes WSES, SSTRP)
- Information Assurance
- Operator and Fleet Documentation

What is Payload Integration?

“The successful integration of new and legacy payloads and their associated launcher, recovery and handling systems onto a platform considering all aspects of shipboard HM&E, electronic and digital requirements, mission need, operations, tactics, logistics, readiness, reliability, maintainability and cost.”
Leveraging the NUWC Virtual Submarine with Tactical Equipment and Links, the addition of the Virginia Payload Tube Facility provides a complete capability for End-to-End Payload Integration.
**Shock Loading of Composites**

- Computational Modeling

**Implosion**

- Tube in Tube Implosions
  - Implosion Mechanics
  - Composite Implosion

**Weld Sensitization Detection**

- Welding
- HAZ
- Stress Corrosion EAC
- Sensitized Material

**Additional Research**

- Implosion mitigation methodologies
- Hydrodynamic interactions of three dimensional geometries emerging from a body
- Polyurea coatings for blast mitigation
- Immersive Imagery

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VIRGINIA PAYLOAD TUBE FACILITY (VPTF)

FACILITY FOR FLEET SUPPORT, TEST AND EVALUATION, TROUBLESHOOTING, AND TRAINING ON VIRGINIA PAYLOAD TUBES

Capabilities

Virginia Payload Tube Shipboard Equipment and Arrangement:
- Support systems (hatch, mechanical, hydraulic, flood/drain, and air systems)
- Electrical and fiber optic cabling.
- Payload tube control panel with payload manager space

Capability to flood/drain-pressure underhatch volume.

Extensive data acquisition, simulation, and fault insertion capabilities.

NUWC Virtual Submarine Network Interface.

Supports Fitment and Operational Testing of Future Payloads.

Supports Future Submarine Designs
- Control panel upgrades.
- Block V Virginia payload module tube.

In-Service Engineering

Replication of Ship Functionality
- 87° clear bore tactical tube
- Hatch and mechanicals
- Electrical cabling
- Valves and system piping

Distance Support
- Rapid problem resolution
- Troubleshooting casualties
- Initiating corrective action
- Modernization/upgrade/alteration

Support Operational Activities
- Simulated launch analysis (TTF prep)
- End-to-End compatibility testing
- VPT alignment (missile) confidence test

Procedural Proof of Concept
- Ship Alterations (SHIPALT)
- Temporary Alterations (TEMPALT)
- MRC/VMA Procedures
- OD Procedural Validation

Payload Integration

Interfaces
- Weapon/payload control
- Configured for VPT, adaptable to VPM
- End-to-End connectivity with NUWC's virtual submarine network
- VIRGINIA Class Payload System Interface
- Control Document (PS-ICD)
- Adaptable for SSGN
- Middleware Design Development

Support Payload Development
- Cost effectively supports advanced payload integration
- Procedural verification/qualification
- Mission experimentation via virtual submarine network
- Large Unmanned Undersea Vehicles & Novel Launch and Recovery Concepts

Training

Provide a Tactical Alternative for
- Fleet operational training
- CONOP development
- 1 and O-Level maintenance training

Distribution A, Approved for Release: distribution is unlimited
Civilian Total: 232*

Tech Support, 14%

Prof Admin, 12%

Clerical, 1%

Eng & Sci, 76%

“Our People”

32% of our Engineers and Scientists have Advanced Degrees & 3% have PhDs

* As of 8 April 2016
Platform & Payload Integration Department
FY15 Funding Profile

**FUNDING BY APPROPRIATION (FY15)**
- **SCN**: 25%
- **OMN**: 20%
- **OPN**: 20%
- **FMS**: 13%
- **RDTE**: 11%
- **WPN**: 6%
- **PRIVATE PARTY**: 3%
- **OTHER**: 2%

**FUNDING BY SPONSOR (FY15)**
- **PEO SUB**: 36%
- **PEO IWS5**: 4%
- **FLEET/OTHER NAVY**: 6%
- **NAVAIR**: 20%
- **NAVAIR PMA 201**: 8%
- **NAVAIR PMA 280**: 26%
- **PRIVATE**: 3%
- **OTHER**: 2%

**FUNDING BY PROGRAM (FY15)**
- **VA**: 28%
- **THAWK**: 26%
- **SUB PAY**: 11%
- **HARPOON**: 8%
- **WLHS**: 7%
- **SVTT**: 6%
- **VLS**: 6%
- **ECL**: 4%
- **OTHER**: 5%

**FY15 BUDGET $103M**

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Code 40 Strategic Thrust Areas

Technical and Business Readiness
- Align our organization to maximize effectiveness and efficiency
- Apply rigorous SE tools and processes
- Sustain a culture of Lean Thinking

Next Generation USW
- Develop and implement a Payload Integration Vision
- Mature enabling technologies for submarine payload integration
- Maintain and expand our Land-Based Facilities
- Expand business base in VIRGINIA Block Upgrades and OR
- Pursue targeted expansion of S&T

People
- Build and sustain a diverse and adaptable workforce
- Develop and Mature successful collaborative relationships

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Code 40
Contracts Overview
April 2016
Agenda

• Current Code 40 Major Service Contractors
• Current Outsourced Work-Years by Skill
• Projected Contract Dollars FY16 – FY18
• FY17 Projected Outsourced Services by Program
• FY17 Projected Outsourced Services by Skill
• Future of Code 40
Current Code 40
Major Service Contractors

BAE Systems
• Development and Analysis of New Systems and Payload Integration
• Engineering Services and Problem Resolution for Existing Systems
• Programmatic, Design and Documentation Support
• Fabrication, Assembly, Installation and Evaluation Services

Boeing Corporation
• Harpoon Missile Systems Support

Epsilon Systems Solutions
• Manufacturing, Fabrication, Repair and Installation Services
• Logistics, Alteration Data Package and Documentation Support
• Engineering, Design, Prototyping and Testing for Payload Integration

General Dynamics Electric Boat
• SUBSAFE/Level I Requirements
• Systems Engineering and Technical Analysis
• Mechanical and Electrical Engineering and Design
• Manufacturing, Installation, Test and Evaluation, and Repair Services
• Software Engineering & Programming Support
• Field Services, Fabrication and Logistics Support

Distribution A; Approved for Release: distribution is unlimited
Current Code 40
Major Service Contractors

Hydroid
- Remote Environmental Measuring Units (REMUS) Unmanned Undersea Vehicles (UUV) systems
- Engineering Services for:
  - Vehicle System Design Modifications
  - Software Development, Assessment and Update
  - Troubleshooting and Repair

McLaughlin Research Corporation
- Missile and Launchers Program and Financial Management Support
- Production Engineering Support
- Configuration Management Support
- Documentation, Training and Inventory Management Support
- Cruise Missiles Lab, Field Services and Logistics Support
- Launcher Facility Complex Support
- Acceptance Testing, Repair and Refurbishment Support
- Surface Vessel Torpedo Tube (SVTT) Support

Oceaneering International Inc - Marine Services Division
- SUBSAFE/Level I Requirements
- Systems Engineering and Technical Analysis
- Mechanical and Electrical Engineering and Design
- Manufacturing, Installation, Test and Evaluation, and Repair Services
Current Code 40
Major Service Contractors

Systems Application International Corporation
- Missile Program Management Support
- Software Development and Systems Analysis Support
- Missiles Engineering Support Services
- Cruise Missiles Lab, Field Services and Logistics Support

Systems Engineering Applications Corporation
- Missile and Launchers Program Support
- Engineering, System Design and Development Support
- Missile Flight Test Program Support

Woods Hole Oceanographic Institute
- Remote Environmental Measuring Units (REMUS) Unmanned Undersea Vehicles (UUV) systems
- Develop and Demonstrate Techniques for Payload Launch and Recovery (Surface & Submarine)
- Tow Body Engineering and Design Support

Distribution A; Approved for Release: distribution is unlimited
Code 40
Outsourced WYs By Skill – FY16
Total WYs – 77.6
Projected Contract Dollars FY16 – FY18

- FY16: $7.2M (Hardware), $9.4M (Services)
- FY17: $6M (Hardware), $10.3M (Services)
- FY18: $7M (Hardware), $11.3M (Services)

Distribution A; Approved for Release: distribution is unlimited
FY17 Projected Outsourced Services Requirements - by Program

Code 40 is presently forecasting an increased resource demand in several of our technical efforts

• New Submarine Payload Integration Efforts
  – Next Generation Strike / ASuW Weapon
  – Next Generation Countermeasure System
  – Fleet Modular Autonomous Undersea Vehicle (FMAUV)
  – Large Unmanned Undersea Vehicles
  – Novel Launch and Recovery Concepts

• Advanced Launcher / Missile System Concepts
  – SSN (X) Payload Solutions & Analysis of Alternatives
  – SOF Ordnance Handling
  – Innovative Middleware Solutions

• Technical Design Agent (TDA) and In Service Engineering Agent (ISEA) Technical Support
  – VIRGINIA Class Blocks III, IV and V (VPT & VPM)
  – OHIO Replacement
FY17 Projected Outsourced Services Requirements - by Skill

Code 40 is interested personnel with the following skills to help meet its forecasted resource demand:

- **Science & Engineering Services:**
  - Systems/Test/Safety Engineers
    - Land-based and at-sea test support
  - Electrical/Mechanical Engineers
    - Design and drawing support, technical procedures and/or technical manual development / updates
  - Computer Engineers

- **Technical Services:**
  - Configuration Management Specialists
  - Waterfront Support; Weapon and Submarine Launch Systems
  - ILS Planning/Technical Documentation/ Supply Support

- **Administrative Services**
  - Program Management Specialists

- **Business Services**
  - Financial Analysts
## Projected Contracts

<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>
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<td>4083 N460</td>
<td>ILS Support</td>
<td>$9.5M</td>
<td>MRC</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Feb 2017</td>
<td>TBD (Sources Sought)</td>
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<td>4083 N459</td>
<td>MK 32 Surface Vessel Torpedo Tube (SVTT)</td>
<td>$12.7M</td>
<td>MRC</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Feb 2017</td>
<td>TBD (Sources Sought)</td>
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<tr>
<td>4018 N413</td>
<td>Development and Analysis of New Systems</td>
<td>$13.8M</td>
<td>BAE</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Dec 2016</td>
<td>TBD (Sources Sought)</td>
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<tr>
<td>4122 N430</td>
<td>Tomahawk Missile Flight Tests</td>
<td>$3.3M</td>
<td>Seacorp</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Mar 2017</td>
<td>TBD</td>
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<td>4018 N412</td>
<td>Harpoon FMS</td>
<td>$6.1M</td>
<td>BAE</td>
<td>Y</td>
<td>Y</td>
<td>CPFF</td>
<td>Sept 2017</td>
<td>TBD (Sources Sought)</td>
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## Projected Contracts (Con’t)

<table>
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<th>Expected RFP Release</th>
<th>Strategy</th>
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<tr>
<td>New</td>
<td>VACL Launch Control and Display Panel (LCDP) Fabrication</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
<td>Will be FFP</td>
<td>Oct 2016</td>
<td>TBD</td>
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<tr>
<td>New</td>
<td>MK21 Muffler End Caps</td>
<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>N</td>
<td>TBD</td>
<td>Jan 2017</td>
<td>TBD</td>
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</table>
The Future of Code 40

- Maintain our relevance and value in the field and on the waterfront as ISEAs

- Expand our role in Payload Integration

- Support VA Block Upgrades and OR

**KEY ENABLERS**

- An agile, adaptive, highly trained, diverse and proficient workforce
- Unique world-class land-based RDT&E facilities
- Rigorous and disciplined systems engineering process
- A collaborative work environment
- Our Cornerstones – Teamwork, Communication and Integrity