

Naval Undersea Warfare Center

Division Newport



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Commanding Officer
NUWC Division Newport



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NUWC Division Newport

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Navy's Design for Maintaining Maritime Superiority



Strengthen Naval Power

Achieve High Velocity Learning

Strengthen Navy Team

Expand & Strengthen Our Network of Partners

EXPAND THE ADVANTAGE

NUWC Newport Division Strategic Alignment

**Undersea Superiority:
Today and Tomorrow**



MISSION

We design, build, deliver, and maintain ships and systems on-time and on-cost for the United States Navy

MISSION PRIORITIES

ON-TIME DELIVERY OF SHIPS & SUBMARINES

CULTURE OF AFFORDABILITY

CYBERSECURITY

PEOPLE

HIGH VELOCITY
LEARNING

MISSION

We provide research, development, test and evaluation, engineering, analysis and assessment, as well as Fleet support capabilities for submarines, autonomous underwater systems, and offensive and defensive undersea weapon systems, and steward existing and emerging technologies in support of undersea warfare.

FOCUS AREAS

PEOPLE

- Strengthen our Navy team and network of partners
- Achieve High Velocity Learning at every level

TECHNICAL AND BUSINESS READINESS

- Align our technical and business processes to maximize speed and agility

NEXT GENERATION UNDERSEA WARFARE

- Strengthen Naval power from the sea through innovation, collaboration and integration

CULTURE OF AFFORDABILITY | CYBERSECURITY

CULTURE OF AFFORDABILITY | CYBERSECURITY | CULTURE OF AFFORDABILITY | CYBERSECURITY

CULTURE OF AFFORDABILITY | CYBERSECURITY

CULTURE OF AFFORDABILITY | CYBERSECURITY | CULTURE OF AFFORDABILITY | CYBERSECURITY



Division Newport's Innovation Engine

Narragansett Bay Test Facility Virginia Payload Tube Facility

NUWC Newport

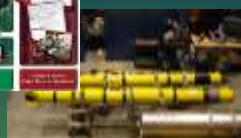
Fleet Battle School

Facilities

SSN Secure



AUV Development Laboratory



AWESUM



Innovative Solutions

Challenges

- Navy Guidance
- ONR
- Leadership Challenges
- Stakeholder and Fleet Interactions
- Future Concepts Steering Group
- Council of Innovation



USW Innovation Hub

Workforce Development

- 219
- Tech Explorers
- NUWC University
- Lecture Series
- Advanced Degrees and Certifications

- Mentoring
- Research
- External Courses
- Rotational Assignments

Processes

- Hackathons
- Systems Engineering
- Prototyping
- Analysis
- Modeling and Simulation



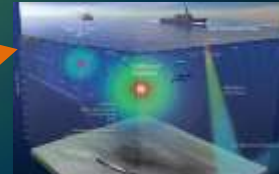
URCIs



Cyber Challenge



USW Monitoring



FMAUV



Advanced Buoyant Cable Antenna





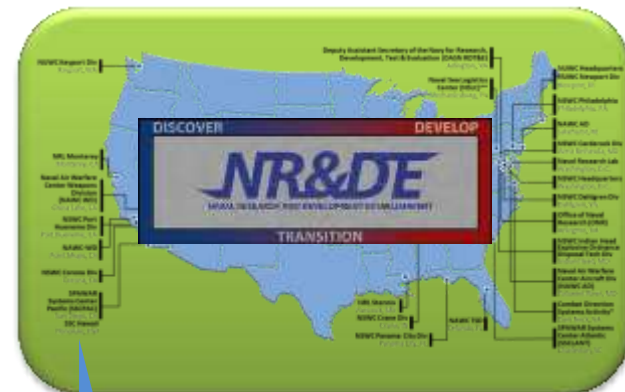
Strategic Alignment

Drivers

Today's Navy/ The Navy in Operation

Customer Tasking
from PEOs, Urgent
Fleet Needs

Division Strategic Guidance



Enabling Technologies



- Promote NR&DE Collaboration
- Develop/shape workforce
- Increase Innovation / S&T Opportunities
- Revitalize Infrastructure
- Develop war room to provide situational awareness into USW strategy, challenges, opportunities and Division activity

Tomorrow's Navy/ The Navy in Construction

ONR, DARPA,
NR&DE Rapid
Prototyping, etc

Navy After Next/ The Navy in Planning

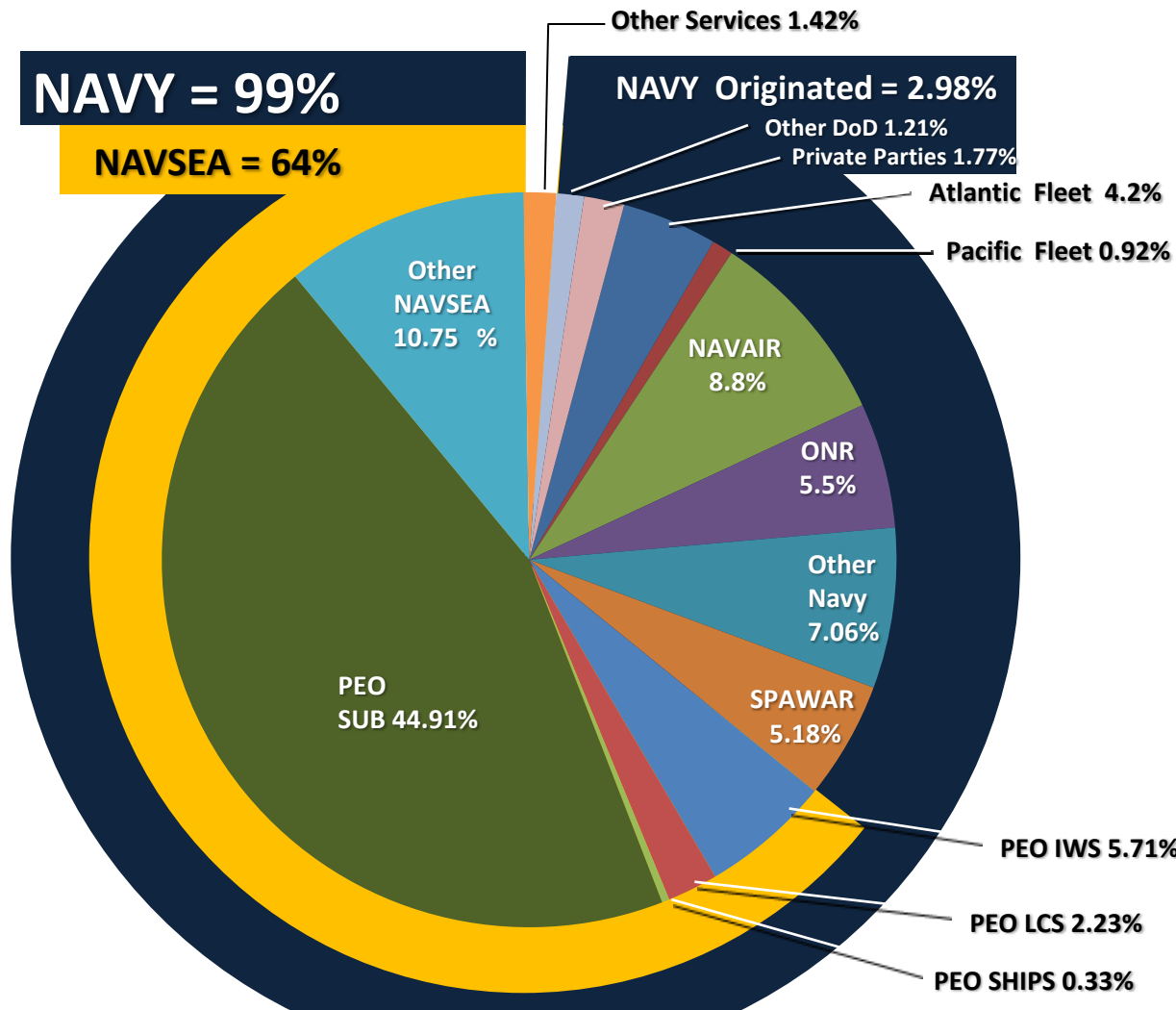
Future Capability
Requirements
from DoN S&T
and RDT&E
30-Year
Strategic Plan





NUWCDIVNPT Customers – All Funding

Our FY16 Customers
\$1,076M



We are a Navy Working Capital Fund Activity

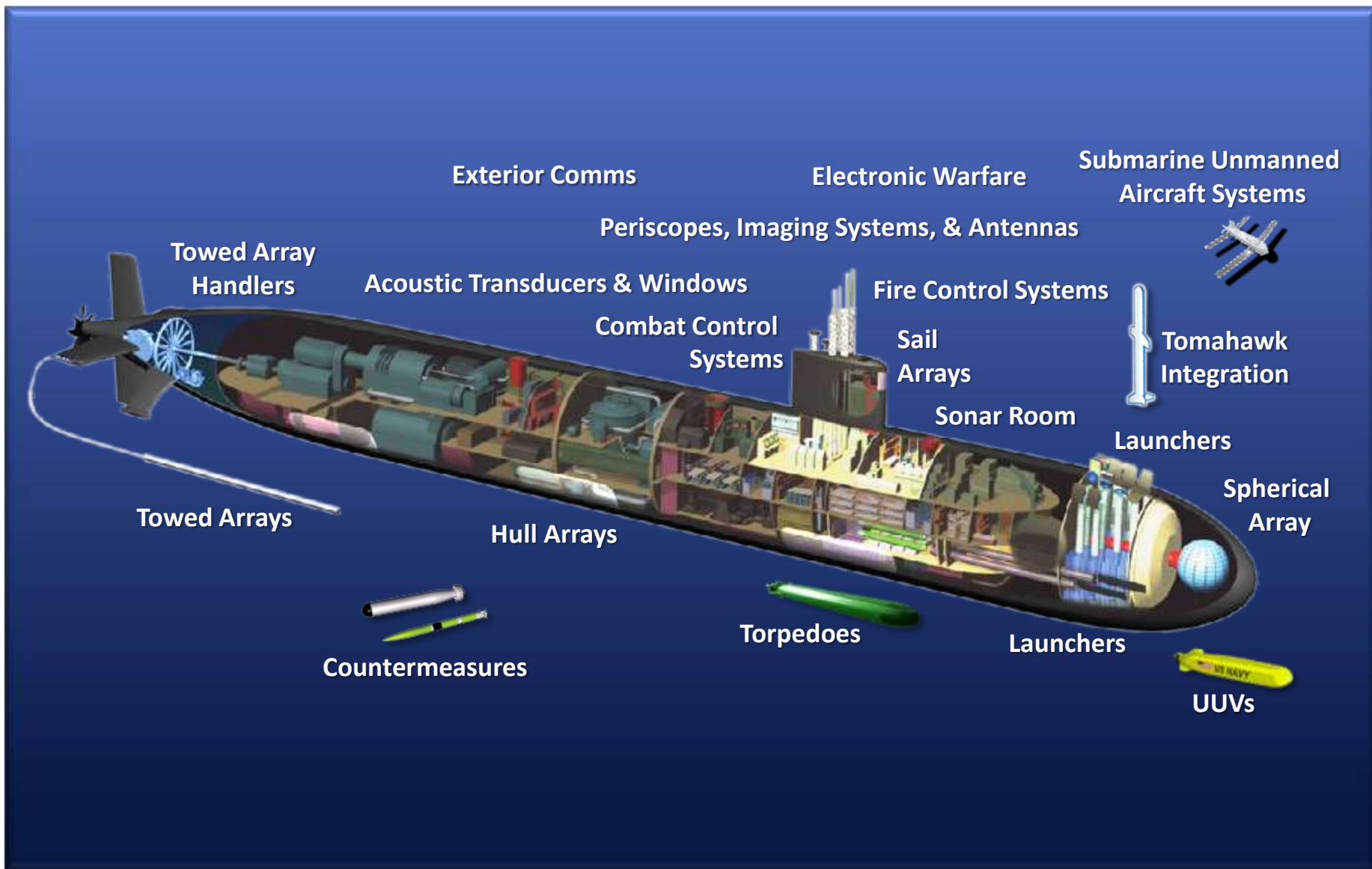
- We're not a congressional line item
- Customers decide whether to bring work to the Warfare Centers
- NUWC is accountable for efficient delivery of products and services

Spectrum of Customers

- Fleet
- Program and resource sponsors
- Scientific sponsors
- Intelligence community
- Defense industry
- Non-defense industry
- Foreign Navies

Provide Best Value to Our Customers

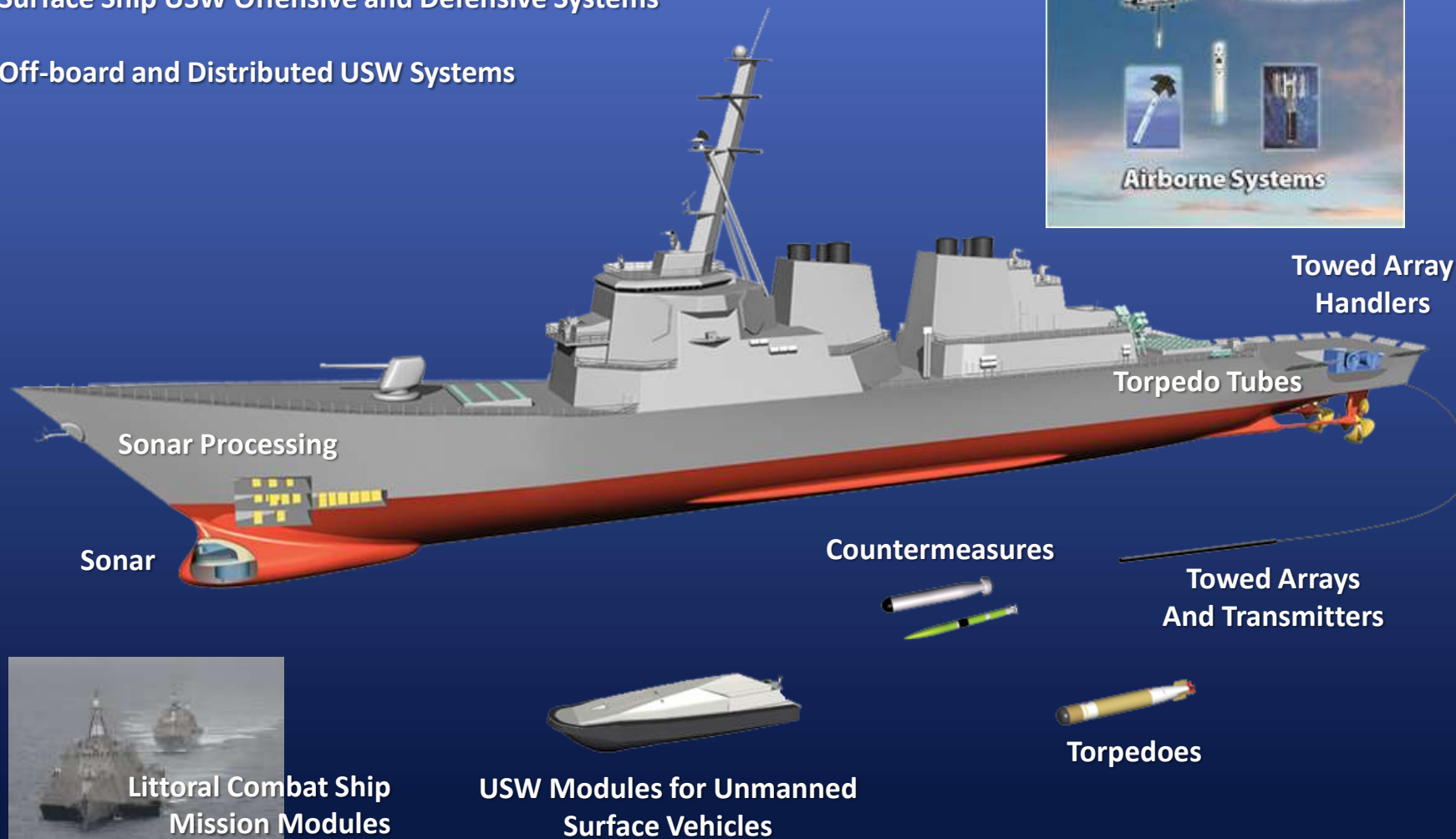
Division Newport Providing Expertise in Submarine Technology



Division Newport Providing Expertise in Surface Ship Technology

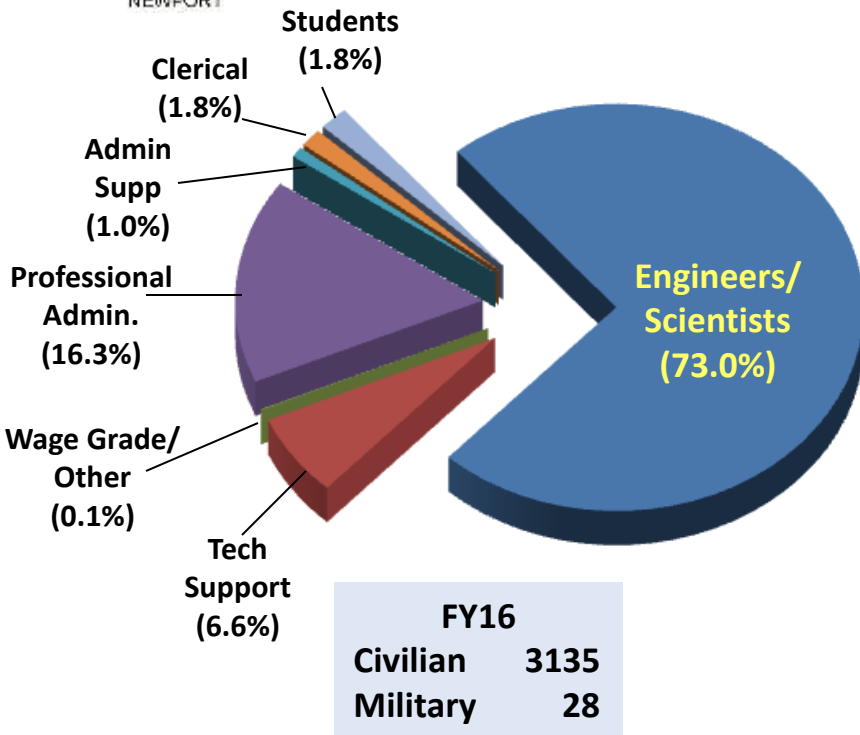
Surface Ship USW Offensive and Defensive Systems

Off-board and Distributed USW Systems





Our People



- **73% Of Our Workforce are Engineers and Scientists**
- **41% of Our Scientists and Engineers Have Advanced Degrees**
 - 150 PhDs (7%)
 - 770 Masters (34%)
- **An Award Winning Workforce**
 - 48 Winners in 16 Award Programs FY16



Total Employment by Classification

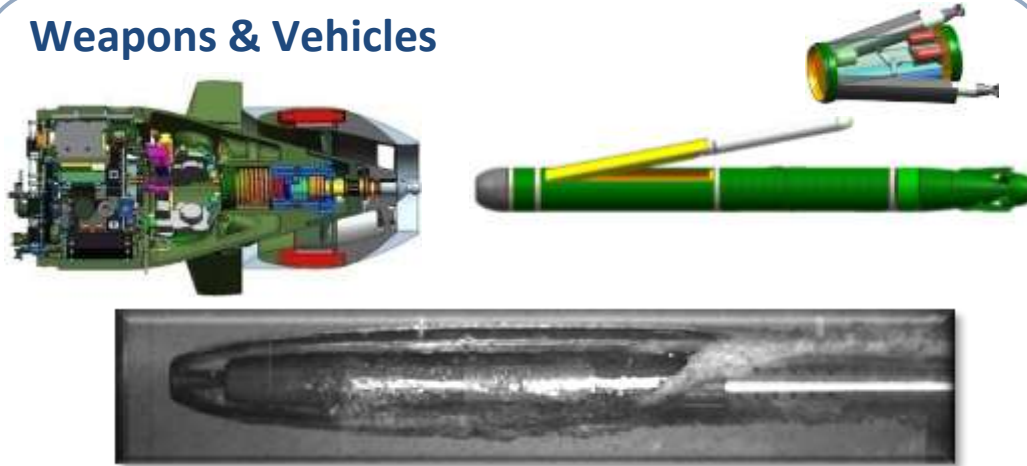
	Civil Service	Contract WYs	Est Overall Employment
Engineering/Science	2287	657	2944
Technical Support	206	678	884
Professional Administrative	510	671	1181
Administrative Support	26	79	105
Clerical	45	113	158
Wage Grade/Other	2	91	93
Students	59	0	59
Total	3135	2289	5424

Data as of 9/30/2016

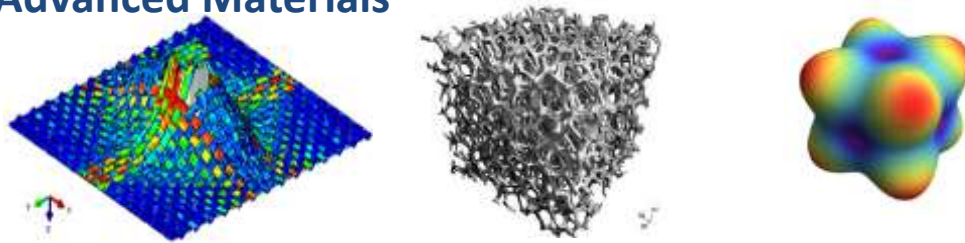
Externally recognized innovative workforce in place to support Undersea Warfare to maintain Maritime Superiority

Focusing on Innovation in USW

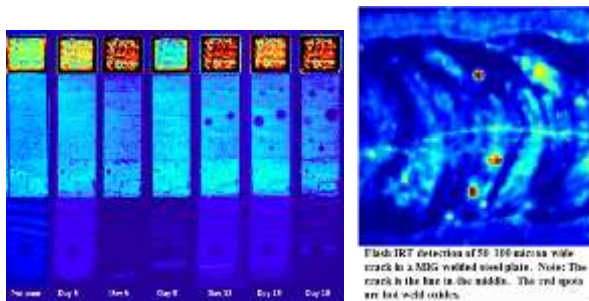
Weapons & Vehicles



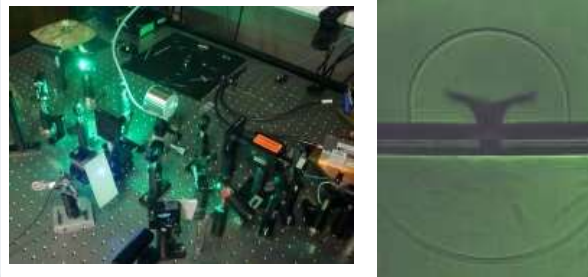
Advanced Materials



Non-Destructive Evaluation



Lasers & Optics



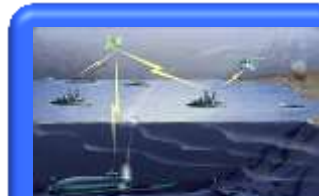
Biologically Inspired



Antennas



Division Newport Contributing to the Navy After Next



Theater Based Undersea Warfare Capabilities

- Wargames
- Innovation Events



Sensors & Sonar

- Distributed Sensing for Missions from Under the Sea



Platform & Payload Integration

- Transformational Weapons Integration to expand mission portfolio and use available volume most efficiently



Communications

- Stealthy communications to support interoperability



USW Imaging

- Multifunction masts combining communications, EW, and Imaging



USW Combat Systems

- On Demand System Upgrades
- Adaptive Task Management
- Automated Tactical Agents
- Flexible Payload Support

- ✓ Own the Best
- ✓ Grow longer arms
- ✓ Beat the adversary's "system"
- ✓ Protect our Strategic Assets and Threaten Theirs
- ✓ Get on the same page
- ✓ Get faster
- ✓ Be the Best*

* Commander's Intent for the United States Submarine Force and Supporting Organizations" - December 2015



Undersea Distributed Networked Systems

- Multi-Phenomenology Sensor Field
- Coatings: Biofouling & Anti-Corrosion



Ranges

- Indiscriminate Target Tracking
- Adaptive Signal Processing & Sensors
- Distributed & Autonomous Sensors
- Marine Mammal Behavior



USW Weapons & Autonomous Vehicles

- Undersea Autonomous Influence Convergence
- Autonomy
- Long Endurance Power Sys.
- Multi-Vehicle Collaboration
- Biomimetic Vehicles



Electronic Warfare

- Modular masts
- Multi-spectral imaging
- Panoramic imaging and display
- Advanced Human Machine Interface



Undersea Warfare Analysis

- Evolving National Maritime and Naval Strategies
- Design for USW
 - Resource constrained environment
 - Rapidly evolving threat capabilities



Cooperative Force Torpedo Defense

- Shorten kill chain
- Adaptive Systems and Technologies to Outpace the Threat
- Virtual Environment for M&S and Training



Focused on Innovative Solutions to USW Challenges Across the Spectrum

Contracts



Electromagnetic Sensor Facility



Executive Staff



Rapid Innovation Center



Combat Control Systems Laboratory



Virginia Payload Tube Facility



Submarine Bridge Trainer



Comptroller



Corporate Operations



USW CAFE



Shallow Water Test Facility



Naval Array Technical Support Center



AUV Development Laboratory



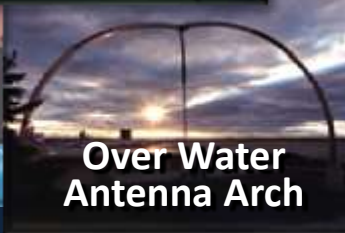
Weapons Analysis Facility



AUTEC Range



Over Water Antenna Arch



Undersea Warfare Systems Engineering



Virtual Sub



One Team



CYBER SECURITY END-TO-END EVALUATION

NUWCDIVNPT Campus Network Supports Vulnerability Insight & Certification in Development of Secure & Resilient Submarine Systems & Architectures

Cyber Defense



Systems Security
Engineering & Shipboard
Protection Tools

SSN SECURE



Shore-Based Submarine Warfare
Federated Tactical Systems (SWFTS)

Vulnerability Assessment



Trained & Skilled
Cyber Security Workforce

Collaboration Fuels Global USW Innovation

DoD Partners

- Stable, Long Term Investments
 - Stewardships
- High Risk, High Payoff R&D



Collaboration
Innovation

Academia

- Basic Research, Fundamental Ideas, Scientific Talent Pool
 - 33 Educational Partnership Agreements



Industry

- Demo/Validation, Production
 - 51 Cooperative Research & Development Agreements (CRADA)
 - 43 Small Business Innovation Research (SBIR) TPOCs
 - 36% Contracts to Small Businesses



Global Presence

- 254 Reps Worldwide
 - 236 at Detachments/On-Site Offices and In-Service Engineering Agents
 - 18 Field Team Reps



Foreign Military Sales

- 52 S&T Engagements in 11 Countries
- 76 FMS Cases in 16 Countries

Armament Cooperation Programs

Data Exchange Agreements

Technical Cooperation Programs

Cooperative Research and Development Programs

International Components





Division Newport's Global Presence

Detachments (Det), On-Site Offices (OSO), In-Service Engineering Agents (ISEA) and Field Team

254
reps worldwide

TOKYO (1)
ONR-G Asia

GUAM (1)
NSTCP (Det Guam)

AUSTRALIA (1)
HMS Stirling

WASHINGTON (14)
Det Bangor, OSO Keyport, Port Angeles, Trident Training Facility

CALIFORNIA (3)
SCORE, OSO Sylmar, OSO San Diego

HAWAII (8)
COMSUBPAC, COMPACFLT, NSTCP (Det Newport)

236 *Det, OSO and ISEA*
18 *Field Team reps*

CONNECTICUT (24)
RSG Groton, NSS, OSO Niantic, SLC, UWDC TAG, UWDC HQ

NEW YORK (4)
OSO Dresden

MARYLAND (2)
NAS Patuxent River

VIRGINIA (75)
Det Manassas, FEO Norfolk, OSO Williamsburg, OSO Virginia Beach, SWOS (Det Norfolk), CDSA Dam Neck, NGNN Shipyard, NWS Yorktown

PENTAGON, D.C. (13)
OPNAV, ASN/RDA DASN, SSP 23, RDSA, ONI

FLORIDA (50)
AUTC-Det West Palm Beach, OSO Mayport, OSO Okahumpka

GEORGIA (9)
OSO Kings Bay

BAHAMAS (49)
AUTC-Det Andros Island

Our Forward Presence Enables Rapid Response to Fleet Needs



Back-Ups



Birdseye View

- The Navy's only laboratory dedicated to full spectrum USW
- We have both military and civilian leadership
- We operate as a NWCF, not a separate line item in the Defense budget
- We are accountable for efficient delivery of products and services
- We are a Public Trust not a business



Customers

- Fleet
- Navy Program sponsors
- Scientific sponsors
- Intelligence community
- Defense industry
- Non-defense industry
- Foreign Navies

Assets

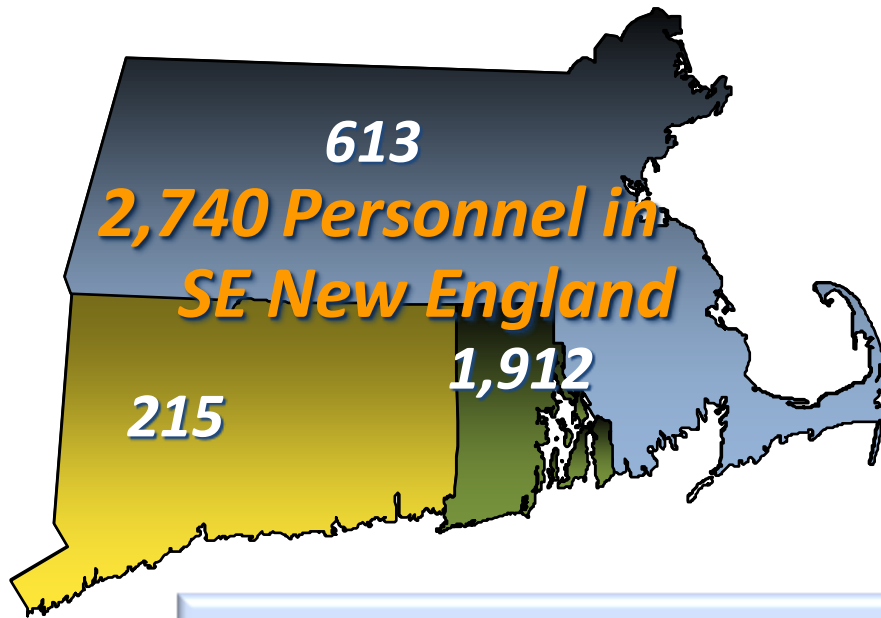
- 78 Buildings / 150 ATEC
- 895 Acres (190 Newport / 541 ATEC)
- \$1204M Asset Value (\$860M Newport / \$288M ATEC)
- Unique National Facilities

People

- 3135 Civilian employees
- 12 Technical Warrant Holders
- The nation's experts on USW
- Highly educated & dedicated to Fleet excellence
- 73% are Scientists & Engineers; 41% have advanced degrees

We're a \$1.1 Billion Organization that Produces Product not Profit

NUWC Impact On Southern New England



- 5,424 Total Work Years, (Gov't and Contracted)
- \$1,076M Total Funding
- \$679M to local economy for payroll, contracts, construction, and services purchased

Total Employment by Classification	Civil Service	Contract WYs	Est Overall Employment
Engineering/Science	2287	657	2944
Technical Support	206	678	884
Professional Administrative	510	671	1181
Administrative Support	26	79	105
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Department of the Navy



CNO

Chief of Naval Operations

SECNAV

Secretary of the Navy

OPNAV

SYSCOMS

FLEET

ASN (RDA)

60,000 Civilians



NAVSEA



NAVAIR



SPAWAR



NAVFAC



NAVSUP

NSWC

- Carderock
- Corona
- Crane
- Panama City
- Dahlgren
- Indian Head
- Philadelphia
- Port Hueneme

NUWC

- Newport
- Keyport

SUPSHIP

- 4 SUPSHIP

NSY

- 4 Public Shipyards

NRMC

- 5 Regional Maintenance Centers

SYSKOM-Affiliated
Program Executive
Offices
PEOs

- SUBS
- SHIPS
- CV
- IWS
- LCS



CNR



Systems Programs

ONR

- Information Electronics and Surveillance
- Ocean Atmosphere & Space
- Engineering Materials & Physical Science
- Human Systems
- Naval Expeditionary Warfare
- Industrial & Corporate Programs

NRL

— Chain of Command
- - - Requirements/Programs

Unique Facilities



Naval Array Technical Support Center



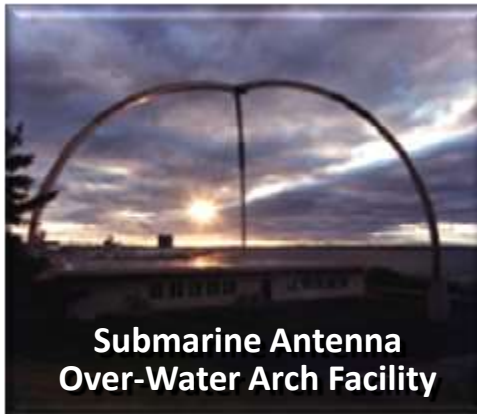
Electromagnetic Sensor Facility



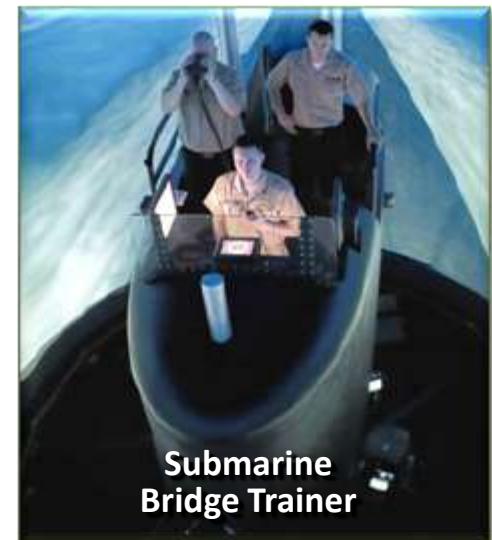
Combat Control Systems Laboratory



Maritime Undersea Sensors and Sonar Systems Complex



Submarine Antenna Over-Water Arch Facility



Submarine Bridge Trainer



Undersea Unmanned Payload Facility



Rapid Innovation Center



Undersea Warfare Collaboration & Analysis for Fleet Experimentation

Focused on Innovative Solutions to USW Challenges Across the Spectrum

Unique Facilities



Advanced Submarine
Launcher Facility



Survivability Test Facility



Undersea Warfare
Analysis Laboratory



Virginia Payload Tube Facility



Narragansett Bay Shallow-
Water Test Facility



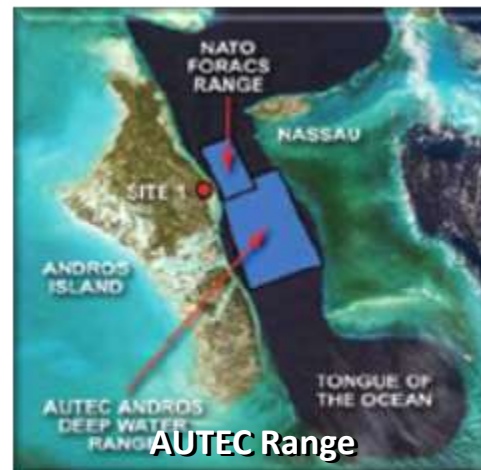
Acoustic Wind Tunnel



AUV Development
Laboratory



Cruise Missiles Laboratory



AUTEC Range



Weapons Analysis Facility

Focused on Innovative Solutions to USW Challenges Across the Spectrum

Virtual Submarine

Antennas & EM Sensors

Roof Top
Antennas:
• OE-538
• BRA-34
• HDR
• GBS
• Periscopes
• IEM

B1319



B68

ESM

ESM Test Bed

- AN/BLQ-10
- ICADF
- COTS ADF
- CESS



B1319

Radio Room

- Land Based Submarine Radio Room (LBSRR) B 1319
- Platform Integration & Test Lab B1319
- EHF Integration & Test Lab B68



B1319

Combat Control

Combat Control System Laboratory (CCSL)

- CCS MK1 / MK2
- AN/BSY1
- Navigation



Sonar

Advanced
Processing
& Display Labs

AN/BQQ-5
AN/BQQ-6



B1258

B1320

Periscopes

- Type 18
- PERIVU
- Photonics Mast



B1319

Secure Network (Secret System High, OC-3 155Mbps)

DS-3 (45 Mbps)

ISDN & T1

**Ships, Ranges,
and other
Land-Based
Facilities**

External Connectivity

- DREN
- SIPRNET
- ISDN
- WAIF
- DEP (Future)

Coalition

- Australia
- UK
- Canada

Industry

- EB
- Raytheon
- Lockheed/Martin
- Northrop Grumman

Groton

Underwater Tracking Ranges

- AUTC
- SCORE

Weapons

- Weapons Analysis Facility
- MK48
- ADCAP
- Tomahawk



- Weapons
- CM's
- Storm

B1346

The Bridge to the Fleet

NUWC
Division Newport

Science & Technology

Development

Acquisition Support

Fleet Support

~8%

~29%

~35%

~27%

End-to-End Perspective – over 695 Projects in FY16

Concept Development

Warfare Analysis (Modeling and Simulation)
Technology Development / Refinement
Prototyping / Proof of Concept
Requirements Definition
Test & Evaluation

Smart Buyer

Assessment of Alternatives / Modeling & Simulation
Technical Direction / Advisor
Development Support / IPT
Test & Evaluation

In-Service Engineering

Test & Evaluation
Operational Performance Assessment
Technical Assists
Maintenance Support
Training
Modernization Requirements

Technical Role in all Areas Allow Us to Fulfill Our Mission

An Undersea Warfare (USW) Bridge from Concept to Capability



Partnering with Industry and Academia to Put USW Solutions in the Hands of the Fleet

Division Newport Strategic Alignment

NUWCDIVNPT Strategic Goal: We will be the HOV lane for integrating manned and unmanned systems cross domain by 2020

- Strengthen Naval Power at and from Sea
- Achieve High Velocity Learning at Every Level
- Strengthen Our Navy Team for the Future
- Expand and Strengthen Our Network of Partners



- Execute with Excellence
- Shape and Maintain Technical and Business Capabilities
- Drive a Culture of Affordability
- Continuously Build and Shape a Capable Workforce
- Increase Cybersecurity in Warfare Center Products and Processes



EXPAND THE ADVANTAGE

- On-time Delivery of Ships and Submarines
- Culture of Affordability
- Cybersecurity
- Key Enablers
 - People
 - High Velocity Learning

NUWCDIVNPT Strategic Focus Areas

People

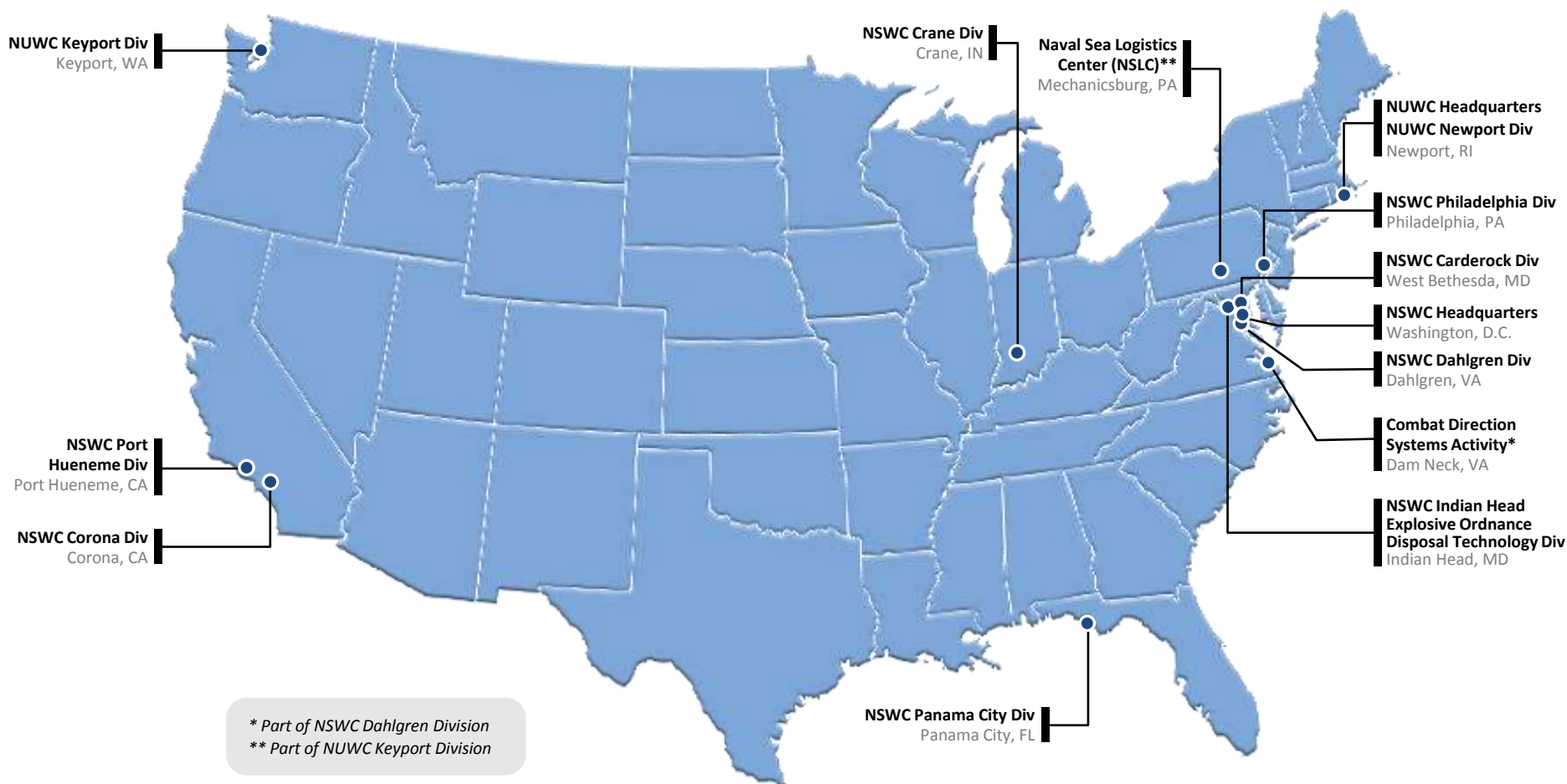
Technical and Business Readiness

Next Generation Undersea Warfare

- Ready undersea warfare (USW) forces
- Effective USW employment
- Future USW force capabilities



NAVSEA Warfare Centers



Warfare Center Quick Facts

- ❖ Diverse and highly educated workforce focused on innovation (~14,700 scientists, engineers, and technicians with over 600 Ph.D.s)
- ❖ 128 unique Technical Capabilities (TCs) across 10 Divisions
- ❖ Operates under the Navy Working Capital Fund (NWCF) business model
- ❖ Disciplined process for accepting and assigning the right work to the right WC Division based on TCs
- ❖ Size of the workforce is based on the funded workload
- ❖ Performs work our industry partners can't, won't or shouldn't do.
- ❖ Maintains more than 164 unique RDT&E facilities



NAVSEA Warfare Centers



DETACHMENTS

NUWC NEWPORT DIVISION

ATLANTIC UNDERWATER
TEST & EVALUATION CENTER
ANDROS ISLAND - BAHAMAS

ATLANTIC UNDERWATER
TEST & EVALUATION CENTER
WEST PALM BEACH - FLORIDA

NUWC KEYPORT DIVISION

PACIFIC DETACHMENT
PEARL HARBOR - HAWAII

SAN DIEGO DETACHMENT
SAN DIEGO - CALIFORNIA

NSWC CARDEROCK DIVISION

ACOUSTIC RESEARCH DETACHMENT
BAYVIEW - IDAHO

COMBATANT CRAFT DIVISION
NORFOLK - VIRGINIA

LARGE CAVITATION CHANNEL
MEMPHIS - TENNESSEE

NAVAL SUBMARINE TRAINING
CENTER, PACIFIC
PEARL HARBOR - HAWAII

PUGET SOUND DETACHMENT
SILVERDALE - WASHINGTON

SPECIAL TRIALS FACILITY
PATUXENT RIVER - MARYLAND

SOUTH FLORIDA TESTING FACILITY
DANIA - FLORIDA

NSWC CORONA DIVISION

NAVAL WEAPONS STATION SEAL
BEACH, DETACHMENT NORCO
SEAL BEACH - CALIFORNIA

NSWC CRANE DIVISION

FALLBROOK DETACHMENT
MARINE CORPS PROGRAMS
FALLBROOK - CALIFORNIA

NSWC INDIAN HEAD EODTECH DIVISION

EOD TECHNICAL SUPPORT DETACHMENT
INDIAN HEAD - MARYLAND

PICATINNY DETACHMENT
PICATINNY - NEW JERSEY

SPECIAL WEAPONS DEPARTMENT
MCALESTER - OKLAHOMA

NSWC PORT HUENEME DIVISION

WHITE SANDS DETACHMENT
WHITE SANDS - NEW MEXICO

VIRGINIA BEACH DETACHMENT
VIRGINIA BEACH - VIRGINIA