

Naval Surface Warfare Center, Carderock Division

AMERICA'S FLEET STARTS HERE



Command Overview

Naval Surface Warfare Center, Carderock Division

CAPT Mark Vandroff
Commanding Officer, NSWCCD

June 12, 2018

Dr. Paul Shang
Technical Director (Acting), NSWCCD

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Carderock's History

1896:
Experimental model basin established



HR 7542 June 10, 1896
"Established a model tank...for investigating and determining the most suitable and desirable shapes and forms...for U.S. naval vessels... (And)...for private ship builders...provided that the cost be defrayed..."

1967:
Consolidation with Marine Engineering Lab (Annapolis)



2015:
Realignment-
NAVSES becomes
NSWC Philadelphia
Division

1890s 1900s 1910s 1920s 1930s 1940s 1950s 1960s 1970s 1980s 1990s 2000s 2010s



HR 10135 Feb. 24, 1937
"...For U.S. vessels, including aircraft and the investigation of other problems of ship design..."

1937:
Carderock site approved



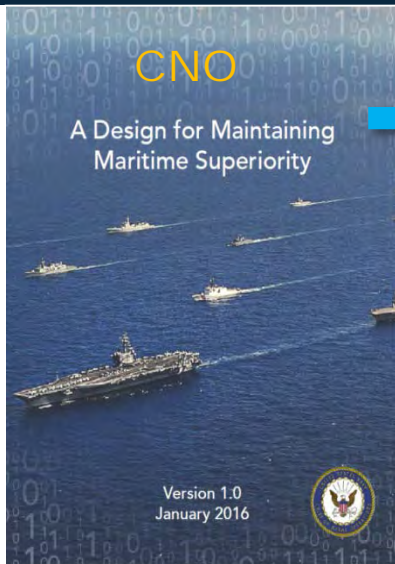
1995:
Consolidation with Naval Ship Systems
Engineering Station (NAVSES/Philadelphia)



2013:
Maneuvering & Seakeeping basin renovated

Long history of supporting maritime RDT&E

Strategic Alignment



4 LINES OF EFFORT

- Strengthen Naval Power
- Achieve High Velocity Learning
- Strengthen our Navy Team
- Expand, Strengthen our Network of Partners

FORCE BEHIND THE FLEET

- On-time delivery of ships & submarines
- Culture of affordability
- Cybersecurity
- People
- High Velocity Learning

NSWC Carderock STRATEGIC FOCUS AREAS

- Modern Knowledge Transfer
- Procurement Planning & Execution
- Workforce Development
- Unmanned Vehicles / Autonomous Systems
- Ship / Platform Design and Integration
- Additive Manufacturing
- Culture of Innovation
- Cybersecurity



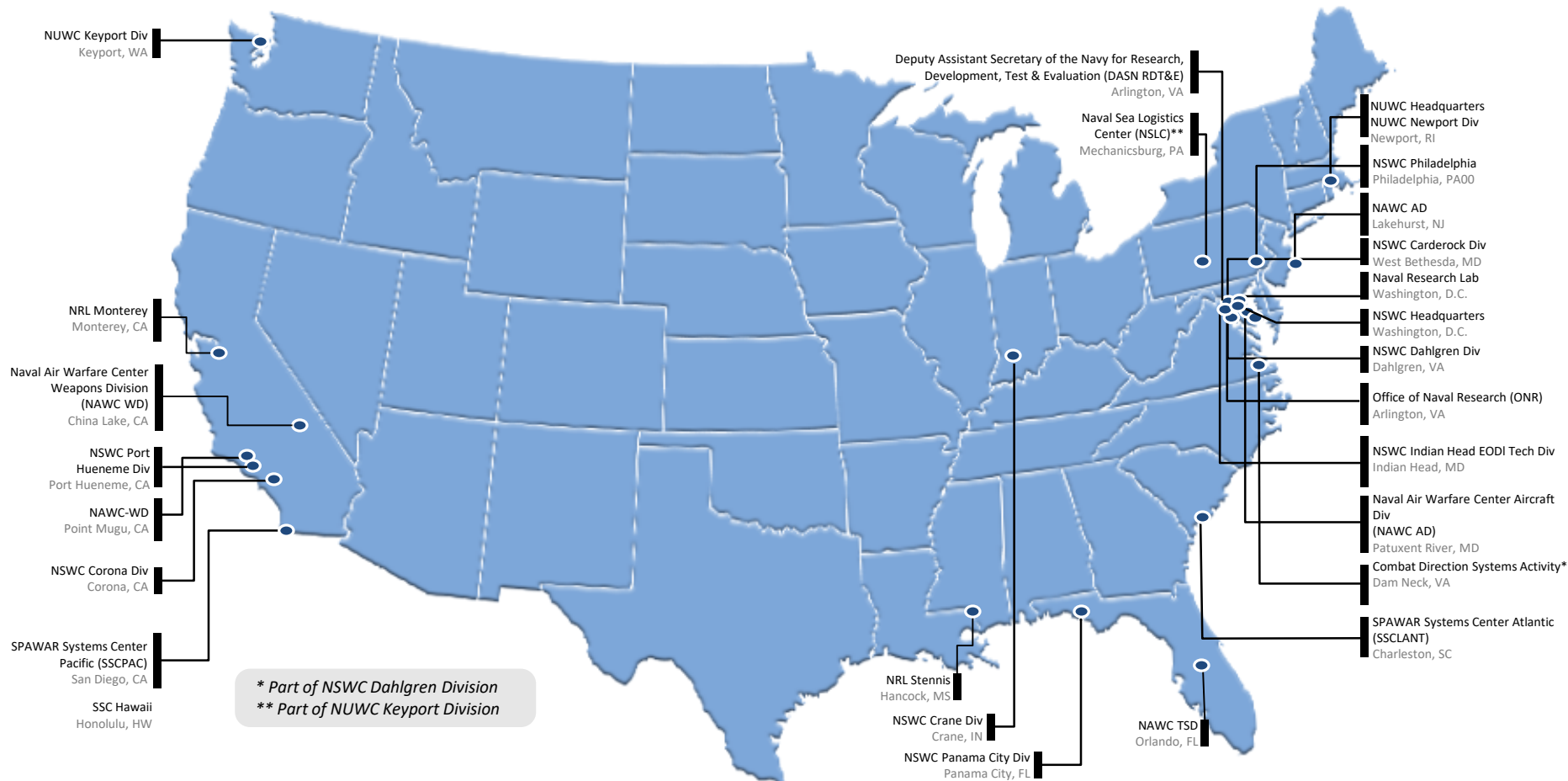
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One Team – Expanding the Advantage through Collaboration



Naval Research & Development Establishment (NR&DE)



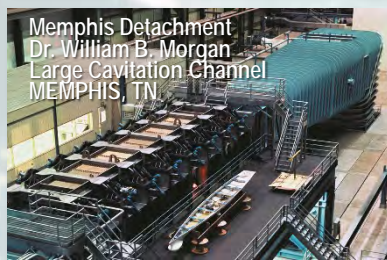
Quick Facts

- ❑ Diverse and highly educated workforce with 25,000 scientists, engineers, and technicians (with more than 2,000 Ph.D.s)
- ❑ 20 commands across the NAVAIR/NAVSEA Warfare Centers, SPAWAR Systems Centers, ONR and NRL
- ❑ Conducts RDT&E for the DoN to discover, develop, transition and field technologically superior naval warfighting capabilities.
 - Examples: prototype development, demonstrations and experimentation to accelerate the fielding of new operational concepts, technology and systems innovations.
- ❑ Unique RDT&E facilities and test ranges

UNCLASSIFIED

Aggressive Research, Development, Test & Evaluation for reliable real world solutions

Carderock: Where We Work



Carderock: What We Do

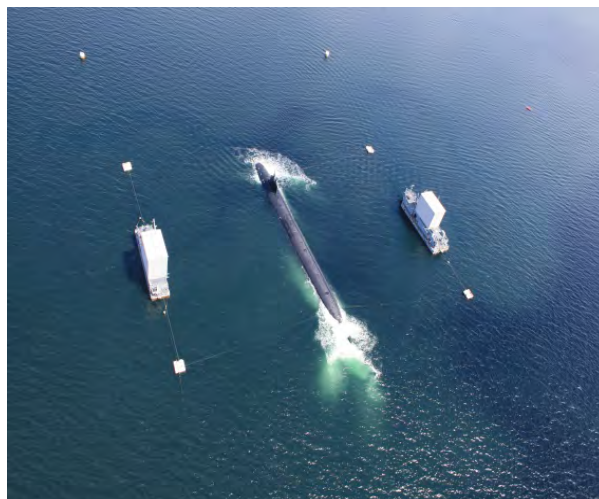
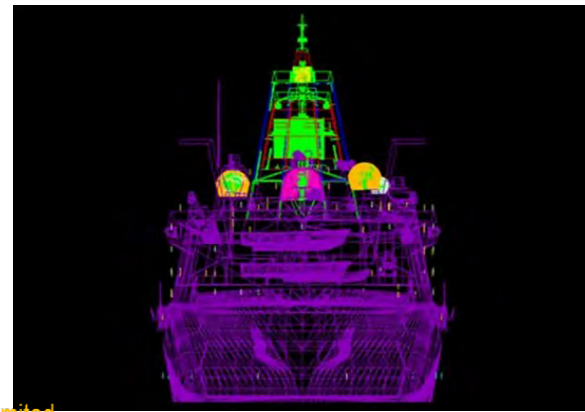
Science & Technology



Research & Development



Advanced Concepts & Designs



Acquisition & Construction

Test & Evaluation

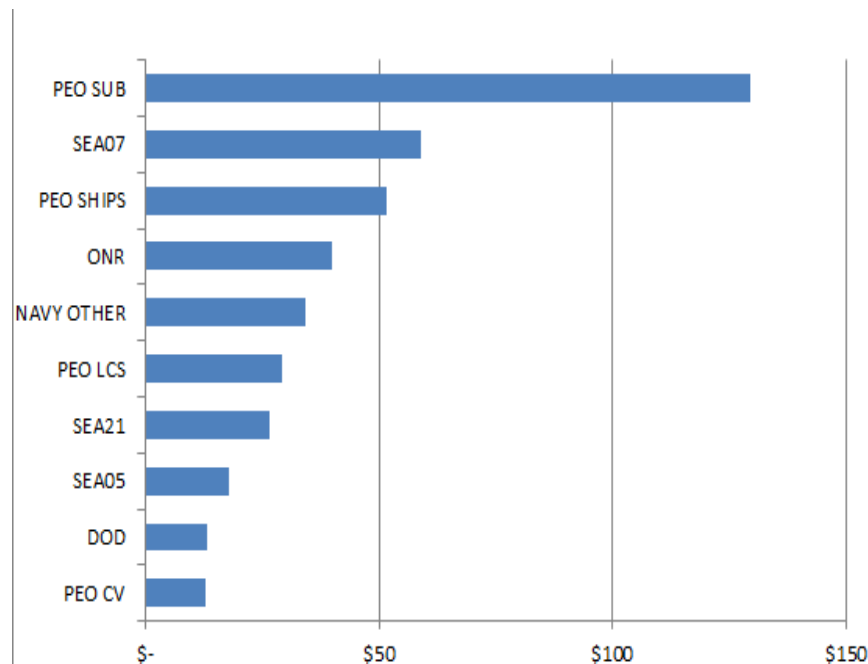
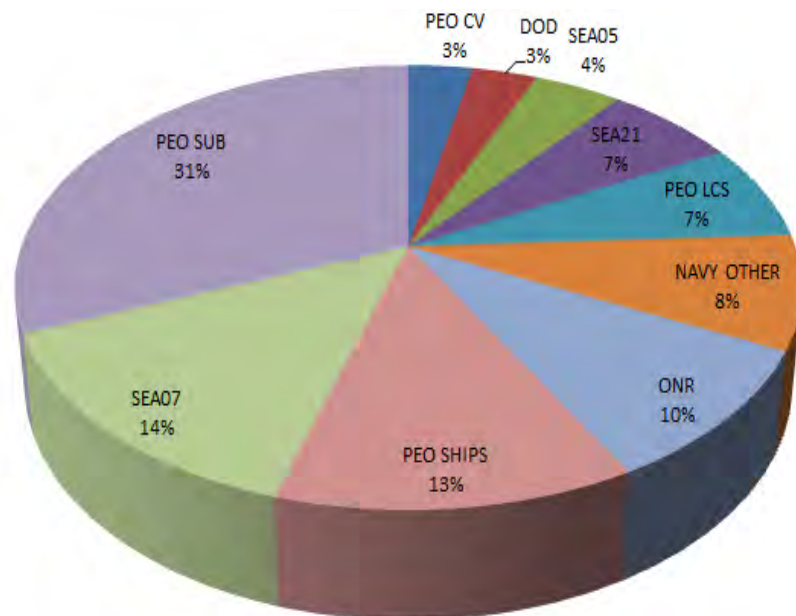
Modernization & In-Service Engineering

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TASKING

Major Customers and FY17 Budget



Business

Cost reimbursable and direct cite:

\$661 Million

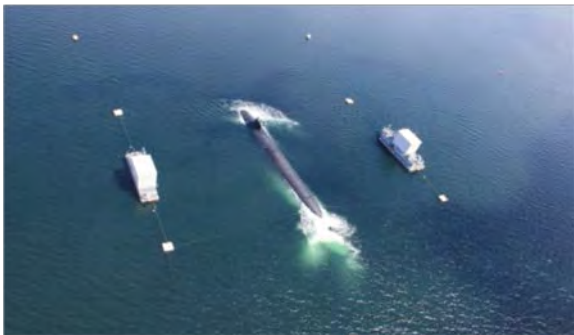
	REIMURSABLE	DIRECT CITE
FY17 Actual	\$499 Million	\$162 Million

FY16 \$620M Actual / FY17 \$661M Actual / FY18 \$686M Projection

Technical Departments



Platform Integrity Department (Code 60)



Signatures Department (Code 70)



Naval Architecture and Engineering
Department (Code 80)

60

Platform Integrity Department



Envision, Design & Realize the Future Fleet | Sustain the Current Fleet

SCIENCE & TECHNOLOGY



- ▶ Cutting edge materials and metallurgy characterization (ceramics, magnetostrictive, metamaterials)
- ▶ Investigation of novel electrochemical energy sources for DoD
- ▶ Material Characterization of Additive Manufactured parts for shipboard use
- ▶ Modeling and simulation (M&S) for material sciences

RESEARCH & DEVELOPMENT



- ▶ Advancement of shipboard waste systems
- ▶ Innovative materials for signatures, ballistic protections, corrosion resistance, and biofouling
- ▶ Development of analytical tools for M&S of structural and shock assessments
- ▶ Fracture and fatigue analyses on novel welds and materials

TEST & EVALUATION



- ▶ Advanced numerical simulations for ship and submarine vulnerability assessments
- ▶ Live Fire Test and Evaluation (LFT&E) for Surface, Submarine, and USMC vehicles
- ▶ Qualification and testing of submarine pressure hulls
- ▶ Testing and certification of electrochemical energy sources and novel materials for Naval systems
- ▶ Full Scale rough water trials of Navy ships for sea loads

ACQUISITION SUPPORT



- ▶ Program Office support in the areas of Survivability, Structures, Materials, and Environmental
- ▶ Development and acquisition of Mobile, Cleaning, Recovery and Recycling System (MCRRS)
- ▶ Specification development and procurement of Navy dosimetry equipment
- ▶ Principle for Safety services for Navy acquisition programs

FLEET SUPPORT

- ▶ On-site Corrosion Control Assist Team (CCAT) to train and provide tools to Ship's Force
- ▶ Composite patch repair of aluminum Navy ships
- ▶ Forensic and failure analyses on parts, structures, and energy sources
- ▶ In-situ material evaluations of aluminum structures
- ▶ Production of signature materials for Navy submarines

FACILITIES



Explosive Test Pond



Deep Submergence Tanks



Structural Evaluation Facility



Ship Materials Technology

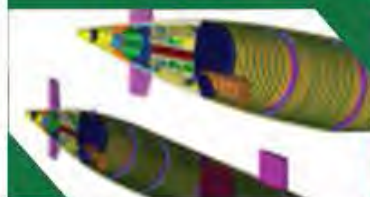
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Ship Signatures Department: Signatures Product Lifecycle



Envision, Design & Realize the Future Fleet | Sustain the Current Fleet

SCIENCE & TECHNOLOGY



- ▶ Basic & Applied Research
- ▶ Detailed understanding of Physics
- ▶ Modeling & Simulation
- ▶ Numerical & Analytical Model Development

RESEARCH & DEVELOPMENT



- ▶ Concept Studies
- ▶ Technology Development
- ▶ Small and Large Scale Model Experiments

TEST & EVALUATION



- ▶ Signature Measurement
- ▶ Systems Development
- ▶ Advanced Signal Processing
- ▶ Source Localization
- ▶ Full-Scale Trials

ACQUISITION SUPPORT



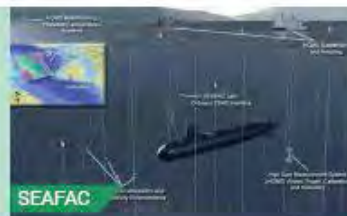
- ▶ Threat Analysis and Requirements Development
- ▶ Silencing System Design and Development
- ▶ Ship Acquisition & Construction Engineering
- ▶ Technical Warrant Holder Support

FLEET SUPPORT



- ▶ Direct Fleet Support
- ▶ SHIPALTS/TEMPALTS
- ▶ On-Board Acoustic Measurement Systems
- ▶ Fleet Training Systems

FACILITIES



80

Naval Architecture & Engineering Department



Envision, Design & Realize the Future Fleet | Sustain the Current Fleet

SCIENCE & TECHNOLOGY



- ▶ Technology development
- ▶ Modeling and simulation
- ▶ Tool development

RESEARCH & DEVELOPMENT



- ▶ Center for Innovation in Ship Design (CISD)
- ▶ Concept exploration and design studies
- ▶ Ship systems integration
- ▶ Cost analysis
- ▶ Seakeeping assessments
- ▶ Manufacturing and affordability

ACQUISITION SUPPORT



- ▶ Embedded support in PEOs for ship and submarine design
- ▶ Engineering managers for Tech Warrant support
- ▶ Collaboration with shipyards
- ▶ Acquisition engineering support
- ▶ Ship preliminary and contract design

TEST & EVALUATION



- ▶ Full-scale trials
- ▶ Performance validation
- ▶ Model scale testing

FLEET SUPPORT



- ▶ SHIPALTs
- ▶ Technology insertion
- ▶ In-service weighted stability assessment

FACILITIES



MASK
West Bethesda, MD



Tow Tank
West Bethesda, MD



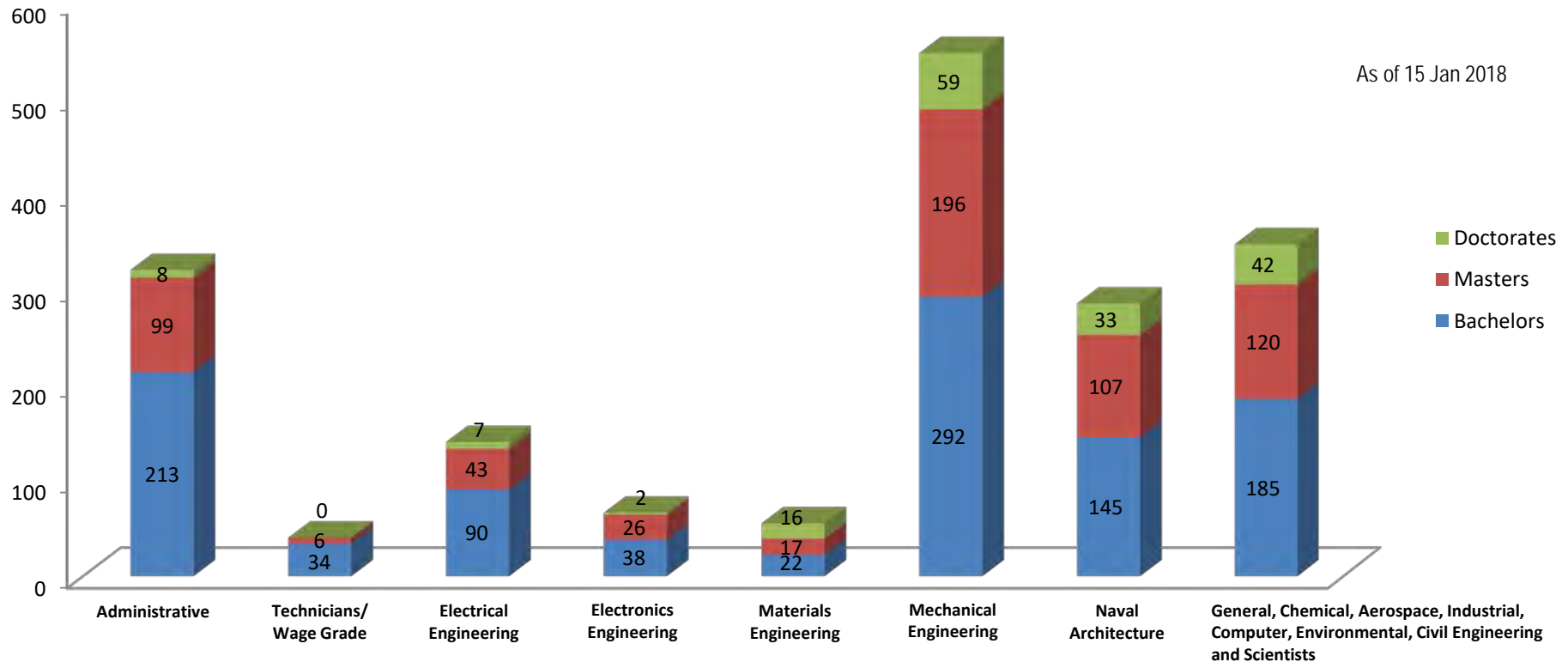
36-Inch Water Tunnel
West Bethesda, MD



Large Cavitation Channel (LCC)
Memphis, TN

Carderock Workforce

As of 15 Jan 2018



TOTAL EMPLOYEES	SCIENTISTS & ENGINEERS	ADMINISTRATIVE	TECHNICIAN & WAGE-GRADE	EDUCATION		
2,206	1,448	535	223	Bachelors	Masters	Doctorate
				1,019	614	167
				Non-Degree		406

Innovation Catalysts

NISE – Section 219 Funds

- Major innovation catalyst

12 active Educational Partnership Agreements (EPAs)

- Most recent – EPA with University of Maryland Baltimore County (UMBC) on July 27 for collaborations in the areas of:
 - *cybersecurity; additive / advanced manufacturing*

Patents (past 5 years)

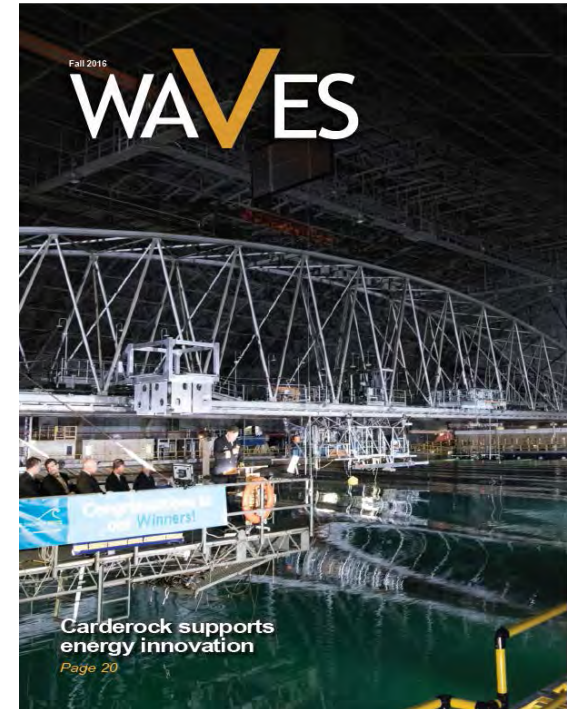
- 2011-2015: 126 issued; 116 applications filed; 120 disclosures submitted
- Carderock has earned 8 Rear Adm. Harold Bowen “Navy Patent of the Year” awards (most in Navy)

Cooperative Research and Development Agreements (CRADAs)

- 136 active; 44 new in FY16
- CRADAs with Maryland companies: Lockheed Martin, Northrop Grumman, Johns Hopkins Applied Research Laboratory, DRS Power & Control Technologies, Chesapeake Technology International Corp., and Herrick Technology Laboratories

Collaborations (undersea)

- SCO
- Shipyards
- NUWC Newport, NUWC Keyport
- NSWC Philadelphia
- UARCS (Penn State, Texas, Washington)
- OSD CREATE
- Industry



Summary



Science &
Technology

Research & Development
Prototyping

In-Service
Fleet Support

- NSWC Carderock Division provides critical support to today's Navy and tomorrow's fleet
- Dedicated, talented workforce and world-class facilities
- Active collaboration with industry, academia
- Integrated with local communities

We do things for the warfighter that industry can't, won't or shouldn't do