Industry Day
May 1, 2017

Command Overview

Naval Surface Warfare Center Carderock Division

CAPT Mark Vandroff
Commanding Officer, NSWCCD

Dr. Joseph T. (Tim) Arcano, Jr.
Technical Director, NSWCCD

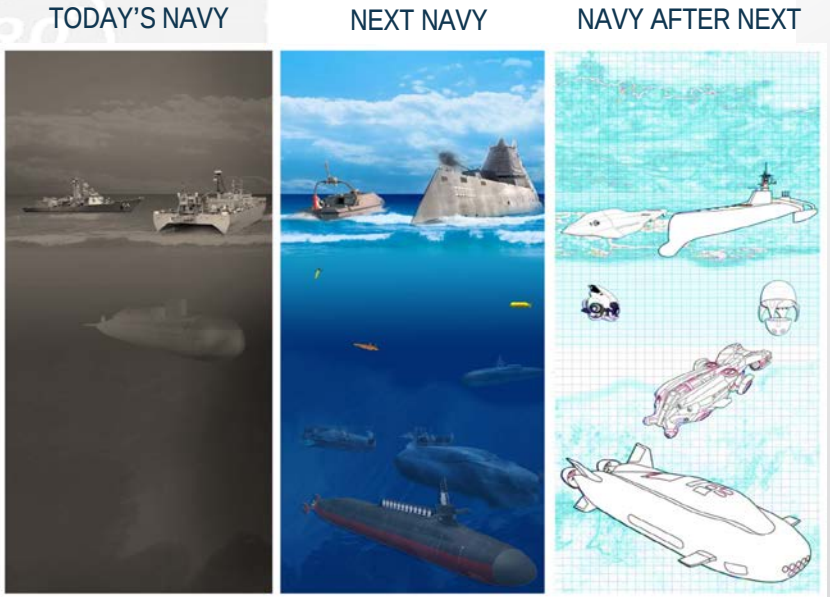
Mission & Vision

NAVSEA WARFARE CENTERS Carderock

Mission

Provide full-spectrum research and development, test and evaluation, analyses, acquisition and Fleet support for the Navy's ships, ship systems and associated Navy logistics systems.

- *Provide technical capabilities for surface / undersea vehicles and associated systems*
- *Develop and apply S&T*
- *Support the maritime industry*



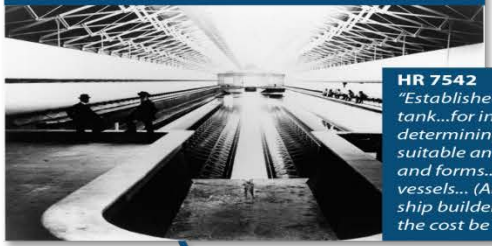
Vision

Lead innovative and cost-effective solutions for advanced ships, ship systems and technical solutions to the warfighter to keep our Fleet at sea.

Our History

NAVSEA WARFARE CENTERS
Carderock

1896:
Experimental model basin established

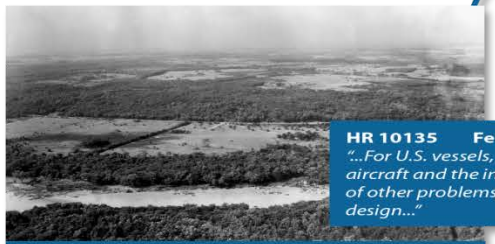


HR 7542 June 10, 1896
"Established a model tank...for investigating and determining the most suitable and desirable shapes and forms...for U.S. naval vessels... (And)..for private ship builders...provided that the cost be defrayed..."

1967:
Consolidation with Marine Engineering Lab (Annapolis)

2015:
Realignment- NAVSSES 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..."

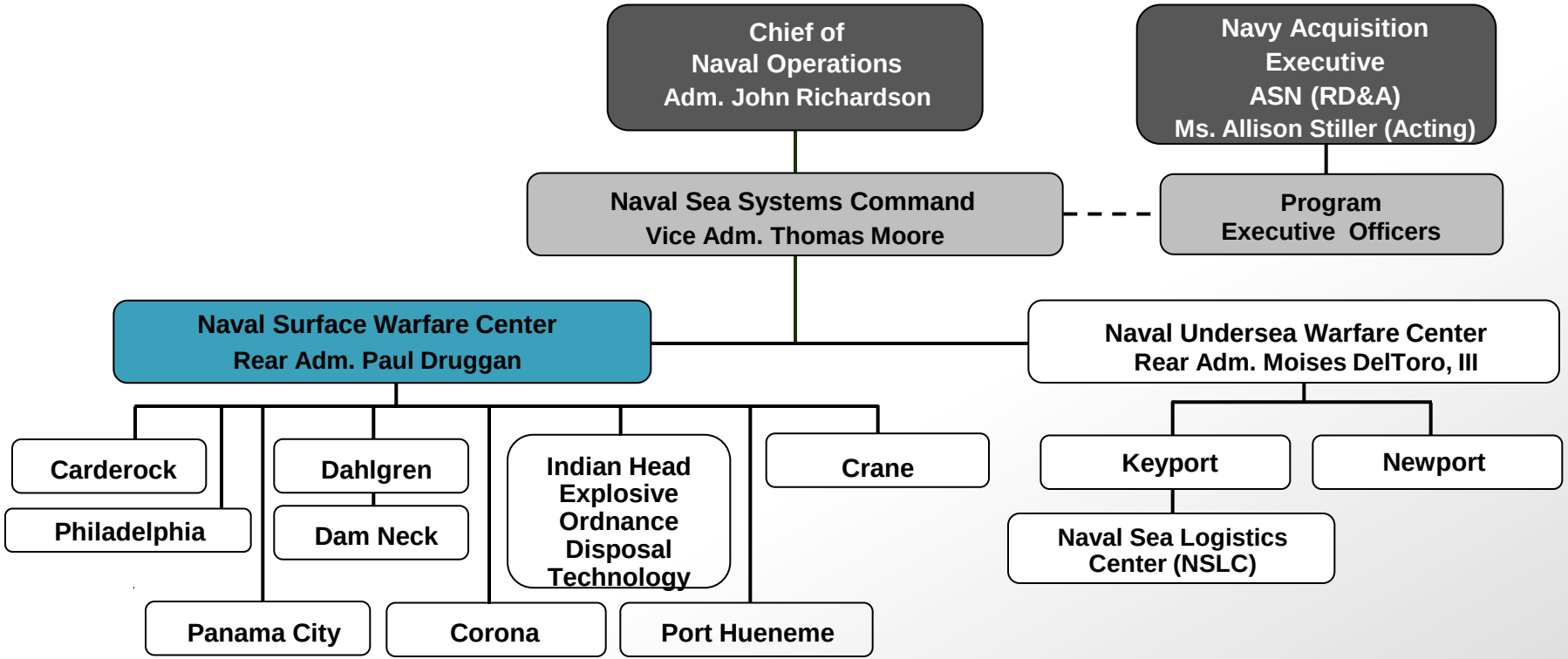
1937:
Carderock site approved

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

2013:
Maneuvering & Seakeeping basin renovated

Long history of supporting maritime RDT&E

Warfare Center Organization



Carderock Division Organization

NAVSEA WARFARE CENTERS Carderock

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Formal Supervisory relationship to Tech Codes
CO/DTD provide performance appraisal input

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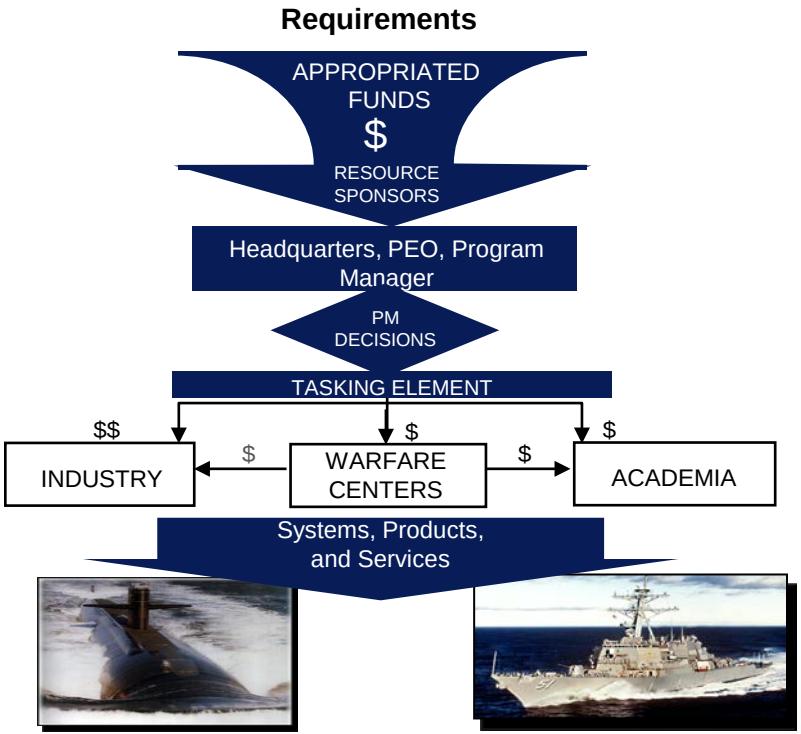
As of Feb. 2017

Carderock Sites Where We Work

NAVSEA WARFARE CENTERS Carderock

Warfare Centers Business Model



Navy Working Capital Fund business model:

1. **Ensures full cost recovery**
   - 100% of WC costs are reimbursed/funded by customers
   - Funded orders must be received before work begins
2. **Ensures total cost visibility**
   - In-house labor billed at stabilized rates, allowing customers to budget for costs
   - Common costing template provides consistency in estimates
   - Tasking well defined, includes clear deliverables / milestones
   - All tasking screened through Work Acceptance and Assignment process
3. **Contractual in nature**
   - Published Technical Capabilities guide assignment of work to appropriate Division
4. **Ensures workforce size is determined by funded tasking**

Working Capital Fund is a Fee-for-Service Business Model

SBIR / STTR Overview

NAVSEA WARFARE CENTERS Carderock

- NAVSEA **Small Business Innovation Research (SBIR)** program uses small businesses to meet federal research needs, and enables participation by socially- and economically-disadvantaged businesses.

- NAVSEA **Small Business Technology Transfer (STTR)** program requires small business to partner with a university, a Federally-Funded Research and Development Center (FFRDC), or a qualified non-profit research institution.

- For more information on participating in NAVSEA SBIR / STTR, visit www.navysbir.com/, www.navsea.navy.mil/Business-Partnerships/SBIO/ or contact NAVSEA Small Business Office at 202-781-3965.

SBIR / STTR buy research & development, not parts or services

NAVSEA
WARFARE CENTERS
Carderock

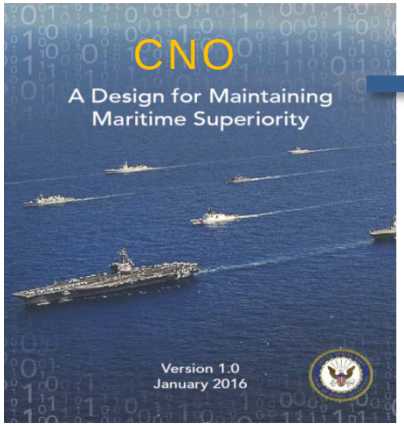
Technical Focus

Dr. Joseph T. (Tim) Arcano, Jr.

Technical Director, NSWCCD

Strategic Alignment

NAVSEA WARFARE CENTERS
Carderock

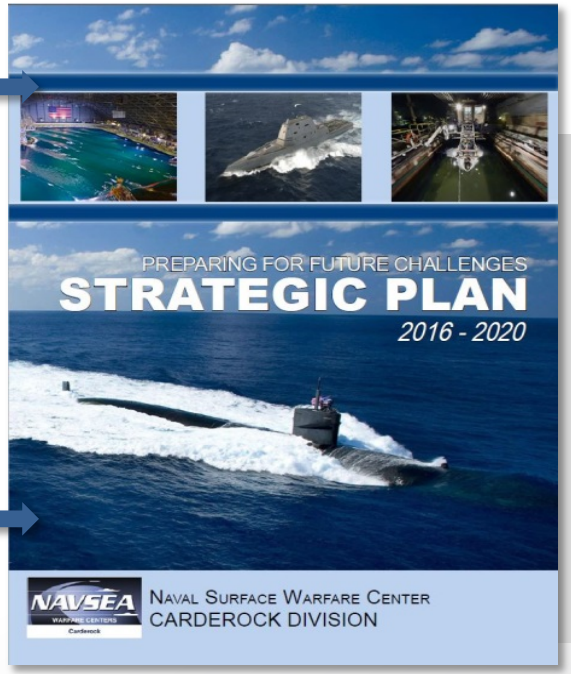


4 LINES OF EFFORT

- 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

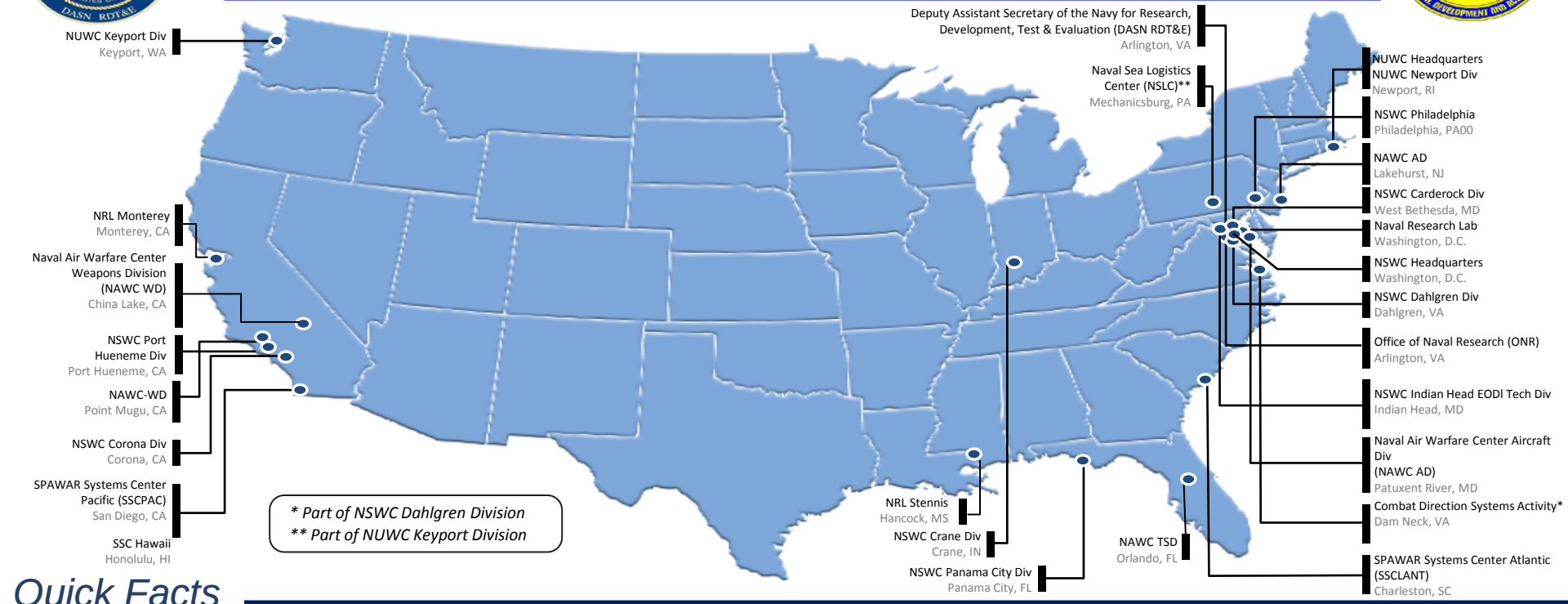


NSWC Carderock STRATEGIC FOCUS AREAS

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

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

Warfare Center Division Technical Capabilities

NAVSEA WARFARE CENTERS Carderock

Science & Technology (S&T) | **Research & Development (R&D)** | **Test & Evaluation (T&E)** | **Product Delivery** | **Fleet Support**

16 TCs in naval architecture and marine engineering for surface & undersea vehicles and associated ship systems.

NSWC Carderock Division

7 TCs in the performance assessment of weapons and combat systems independently from the unit level through force level.

NSWC Corona Division

6 TCs in Electronic Warfare, Special Warfare weapons and devices, and strategic systems components and hardware.

NSWC Crane Division

NSWC Port Hueneme Division

9 TCs for T&E, in-service engineering & logistics and integration capabilities for surface ship weapons, combat and warfare systems as the primary interface with the surface Fleet.

NSWC Panama City Division

11 TCs for mine warfare systems, mines, special warfare systems, diving and life support systems and other warfare systems used in the littorals.

NUWC Newport Division

19 TCs for USW related sensor systems, weapons, vehicles, and other payload systems, USW communications, training, and combat systems.

NSWC Dahlgren Division

29 TCs in surface ship weapons system development and integration up to and including force level, missile defense, strategic systems and related areas of Joint and Homeland Defense.

NSWC Indian Head EOD Technology Division

7 TCs in energetic systems and energetic materials and capabilities in ordnance disposal technology focusing on tools and personnel to counter IEDs.

NUWC Keyport Division

13 TCs for Undersea Warfare (USW) Test and Evaluation (T&E), in-service USW systems integration and supportability, industrial base maintenance and material support for in-service and developmental USW systems.

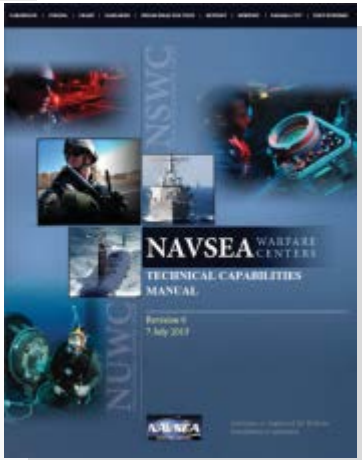
NSWC Philadelphia Division

11 TCs for surface and undersea vehicle machinery, ship systems, equipment and material (including cyber-security, comprehensive logistics, and life-cycles savings through commonality).

128 Technical Capabilities Define the Areas of Expertise for each Division

16 Technical Capabilities

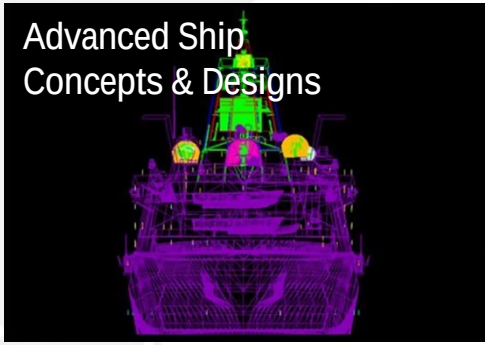
NAVSEA WARFARE CENTERS
Carderock



- CD01 Ship and Submarine Design and Integration
- CD02 Ship and Submarine Acquisition Engineering
- CD03 Ship and Submarine Systems Concepts, Technologies, and Processes
- CD05 Combatant Craft and Expeditionary Vehicles
- CD06 Unmanned Vehicles Naval Architecture and Marine Engineering
- CD07 Hull Forms and Fluid Dynamics
- CD08 Propulsors
- CD14 Surface, Undersea, and Weapon Vehicle Materials
- CD15 Surface and Undersea Vehicle Structures
- CD16 Alternative Energy and Power Sources R&D
- CD17 Liquid Waste Management, Science and Systems
- CD18 Solid Waste and Hazardous Material Management, and Radiation Technology Management, Science and Systems, and Ships and Subs Systems Safety
- CD20 Surface, Undersea and Expeditionary Vehicle Vulnerability Reduction and Protection
- CD22 Surface and Undersea Vehicle Underwater Signatures, Silencing Systems, and Susceptibility
- CD23 Surface and Undersea Vehicle Non-Acoustic Topside Signatures, Silencing Systems, and Susceptibility
- CD25 Radiation Detection Technology Research and Management

Carderock Sites What We Do

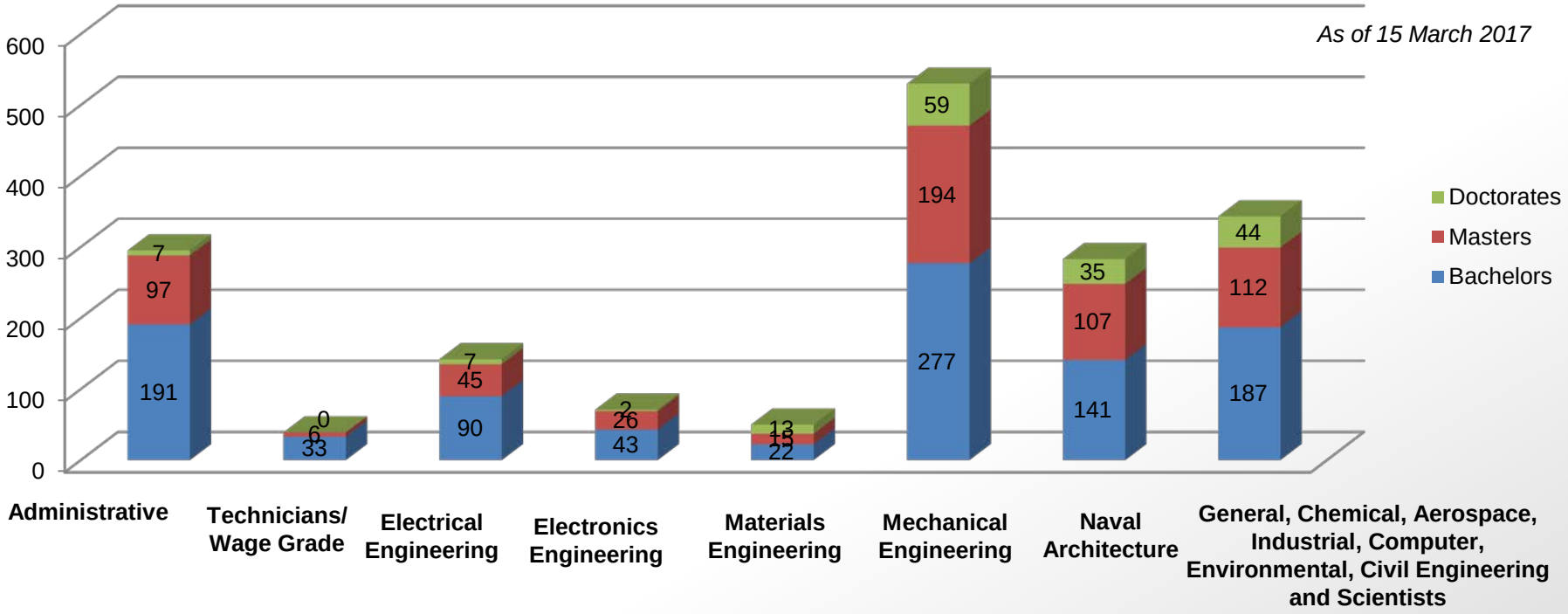
NAVSEA WARFARE CENTERS Carderock



Carderock Workforce

NAVSEA WARFARE CENTERS Carderock

As of 15 March 2017



TOTAL EMPLOYEES	SCIENTISTS & ENGINEERS	ADMINISTRATIVE	TECHNICIAN & WG
2,154	1,427	506	221

EDUCATION		
Bachelors	Masters	Doctorate
984	602	167
	*Non-Degree 401	

Technical Departments

Survivability, Structures, Materials and Environmental Department

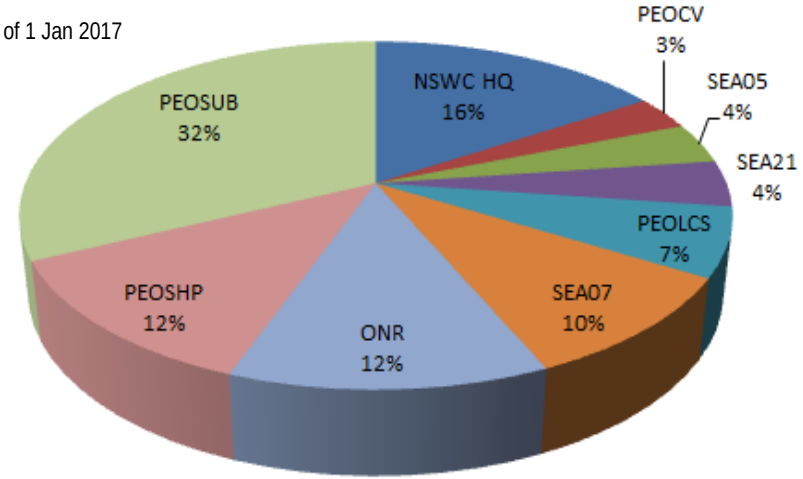
Signatures Department

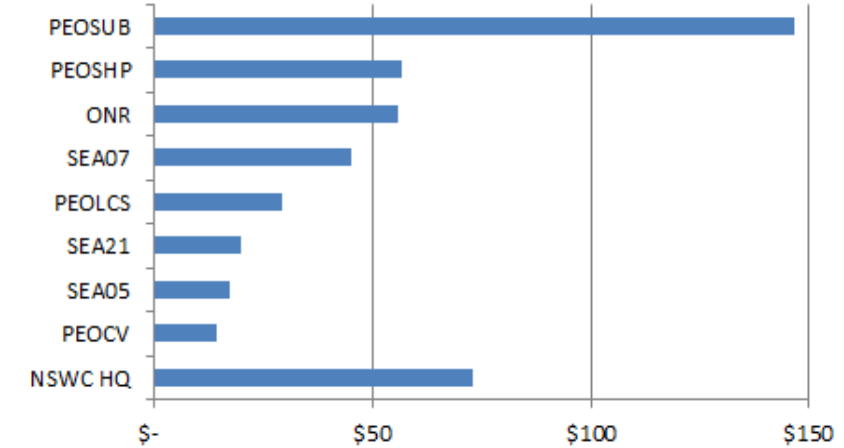
Naval Architecture and Engineering Department

Major Customers & Budget FY17

NAVSEA WARFARE CENTERS Carderock

FY17: As of 1 Jan 2017





* Other Includes: NELO, ONI
* DOD Other Includes: DARPA, OSD, MDA

Business
Cost reimbursable and direct cite:

$708 Million

FY16: As of 1 Jan 2017

REIMBURSABLE	DIRECT CITE
$566 Million	$142 Million

Major Programs Supported

- Columbia-Class
  (formerly Ohio-class replacement)

- DDG 1000 / DDG 51

- Virginia-Class

- Carriers

- Littoral Combat Ships (both variants)

- Stiletto
  (Technology Demonstrations)

- Amphibious and Auxiliary ships

- Unmanned Systems

Innovation Catalysts

NISE – Section 219 Funds

- Major innovation catalyst
- Technical Director's Innovation Challenge; Disruptive technology Lab; High-Energy Weapon Integration; Digital Design; Digital Manufacturing; Power and Energy

Cooperative Research and Development Agreements (CRADAs)

- 136 active; 44 new in FY16
- Research areas include: energy storage & conversion; additive manufacturing;
- situational awareness and deep-submergence capabilities

Navy Patent of the Year

11 active Educational Partnership Agreements

Patents (past 5 years)

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

Unique Facilities

NAVSEA
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As of Feb. 2017

Summary

- Support Our Deploying Forces
- Improving Acquisition Program Outcomes
- Cutting-edge Innovations

We envision the future Fleet, create it and help sustain it.

NSWC Carderock Division –

Where the Fleet Begins