Naval Warfare Centers

SEAPOWER THROUGH ENGINEERING

TOPIC LEARNING OBJECTIVES

Upon successful completion of this topic, the student will be able to:

1. Identify the reporting relationships between the Navy's Systems Commands (SYSCOMS), warfare centers and divisions.
2. Select the statements that best describe the missions of NAVAIR and NAVSEA warfare centers, divisions, Office of Naval Research (ONR) and Naval Research Lab (NRL).
3. Identify the technical leadership areas for each warfare center division and NRL.
4. Recognize the major customers of warfare centers.
5. Recognize the reporting relationship between ONR and NRL.

STUDENT PREPARATION

Student Support Material

1. None

Primary References

1. https://www.navsea.navy.mil/Home/Warfare-Centers/
2. http://www.navair.navy.mil/
3. https://www.navwar.navy.mil/
4. NAVSEA Warfare Centers Technical Capabilities Manual

Additional References

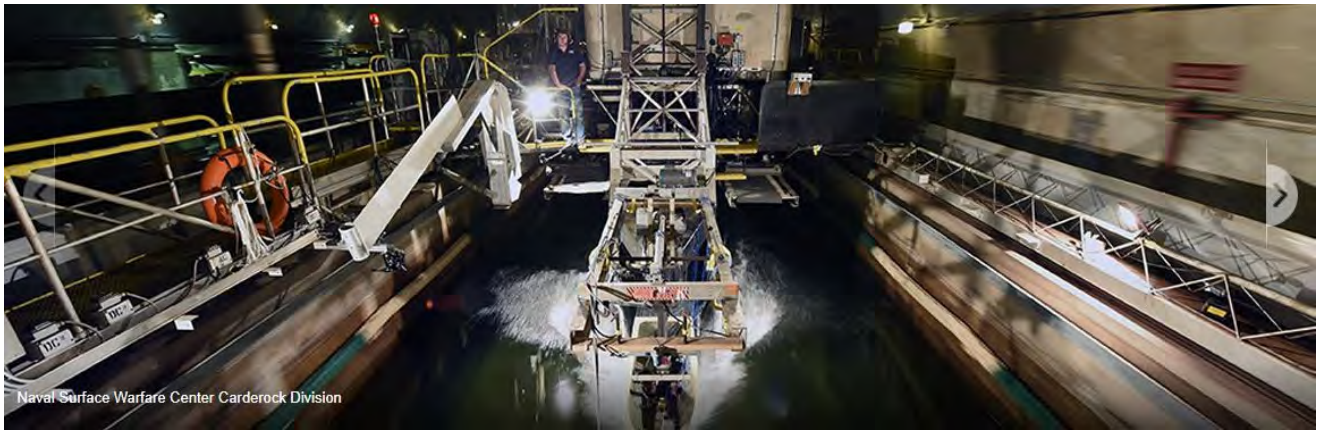
1. None

Overview

- Roles of the Warfare Centers
- Reporting relationships
- Mission statements and leadership areas
- Major customers
- Office of Naval Research (ONR) and Naval Research Laboratory (NRL)

Roles of the Warfare Centers

- Do the things that industry:
  - Won't do
    - Not profitable, do not want the liability
  - Shouldn't do
    - Technical authority, certification (e.g., shock tests)
  - Can't do
    - Specialized facilities (e.g., ranges/equipment)



Providing critical technical expertise to ensure current and future program success and fleet readiness

Roles of the Warfare Centers

- To make naval technical programs successful
  - Provide technical advice and engineering leadership
- To help determine and develop the capabilities that the Navy and Marine Corps need
  - As Government's trusted technical advisors, assist leadership in decision-making
- To verify the quality, safety, and effectiveness of platforms and systems
  - Exercise technical authority through rigorous systems engineering processes to promote the safety and effectiveness of our ships and systems
- To help design, develop, and field solutions for urgent operational fleet needs
  - Able to deliver an array of responsive options and services for warfighter needs
- To provide a bridge between warfighters and the technical community
  - Translate warfighter needs into technical requirements

Provide technical leadership to the Navy

Overview

- Roles of the Warfare Centers
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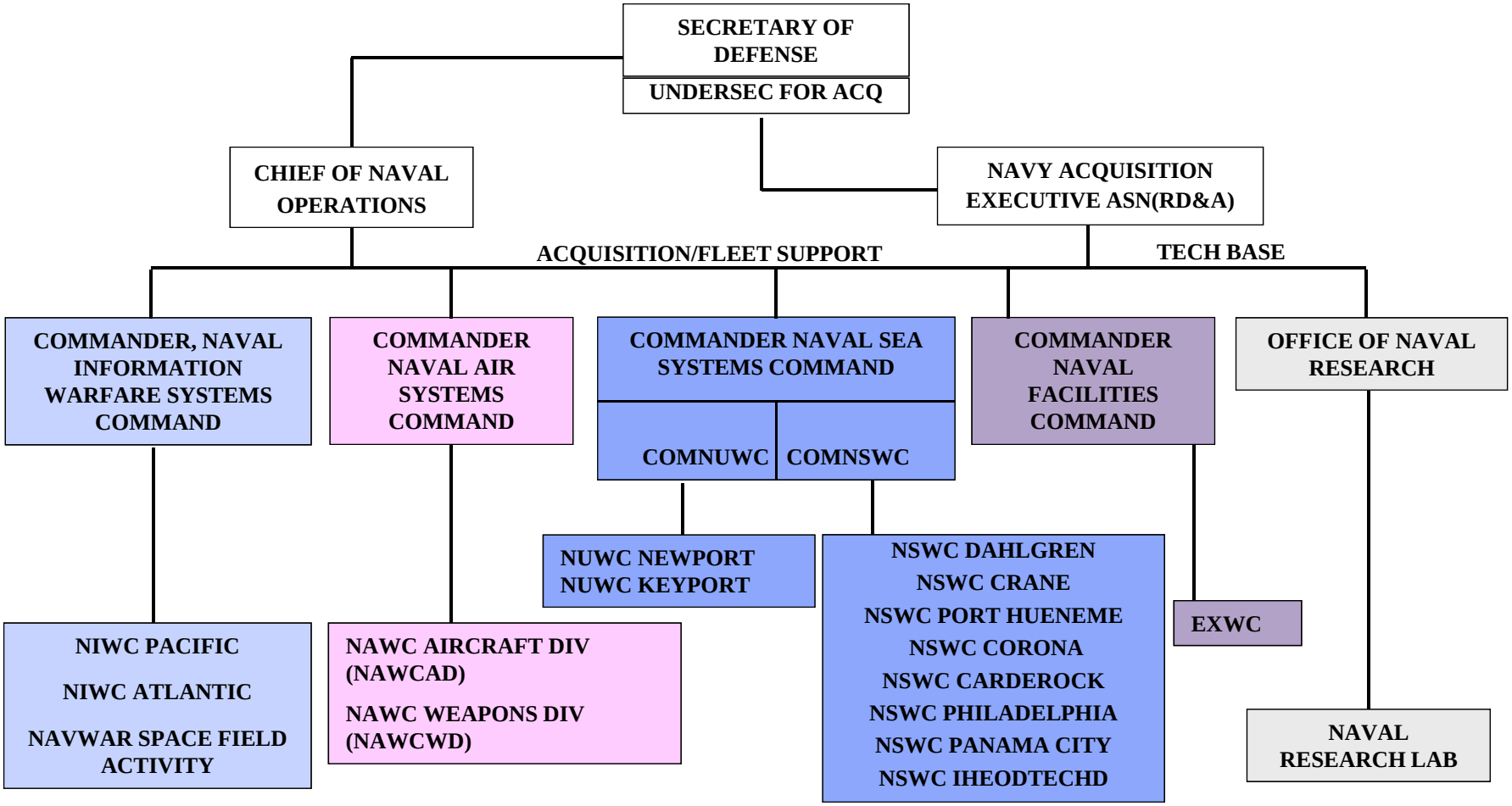
Warfare Centers & Laboratories: Reporting Relationships



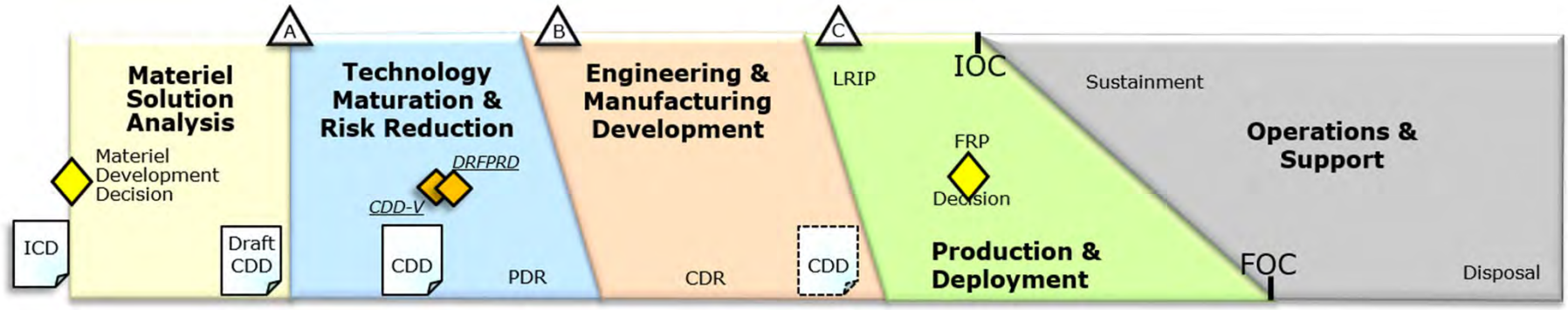
Engineering and Expeditionary Warfare Center (EXWC)

Overview

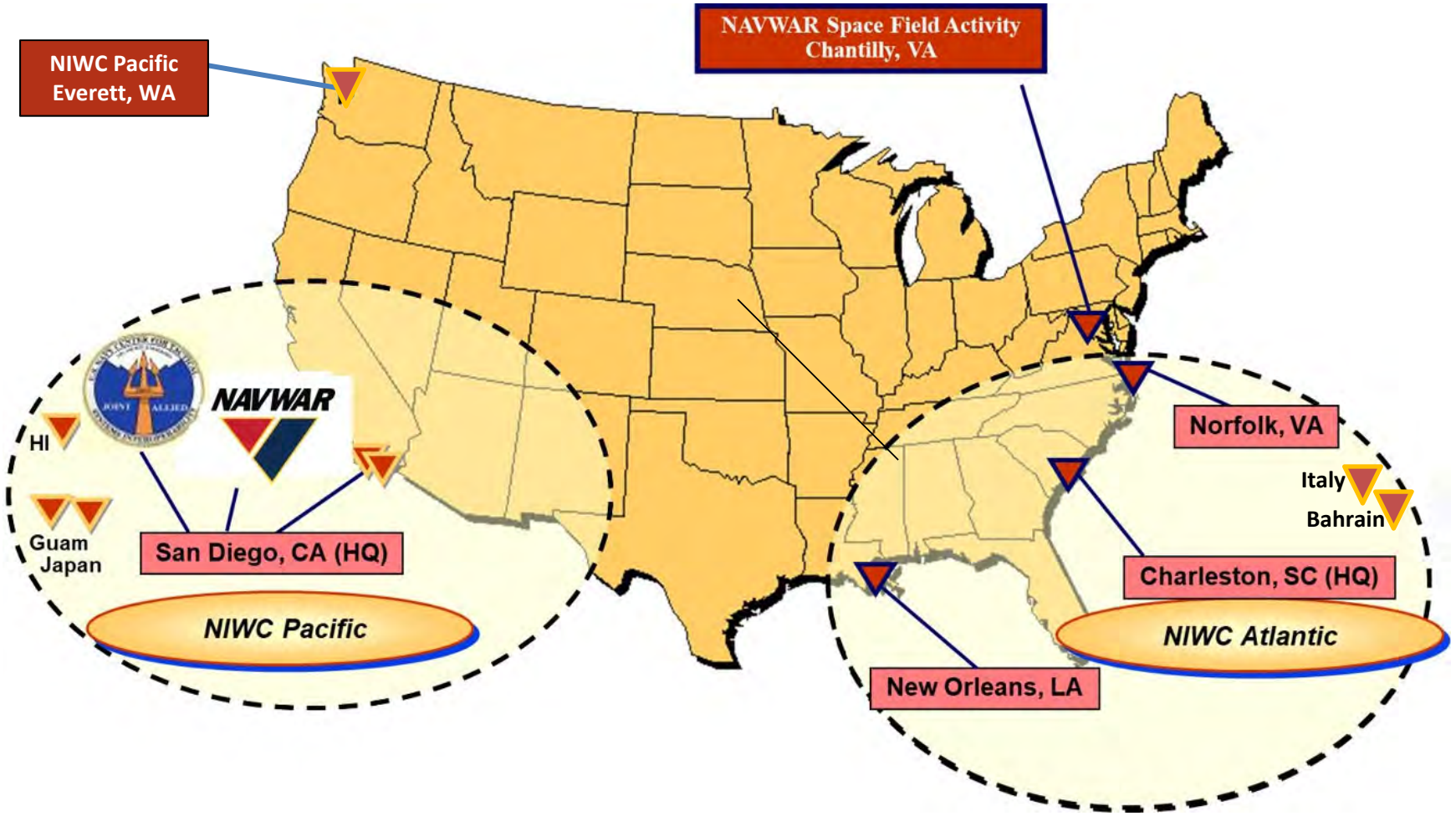
- Roles of the Warfare Centers
- Reporting relationships
- Mission statements and leadership areas
- Major customers
- Office of Naval Research (ONR) and Naval Research Laboratory (NRL)

Warfare Center Missions

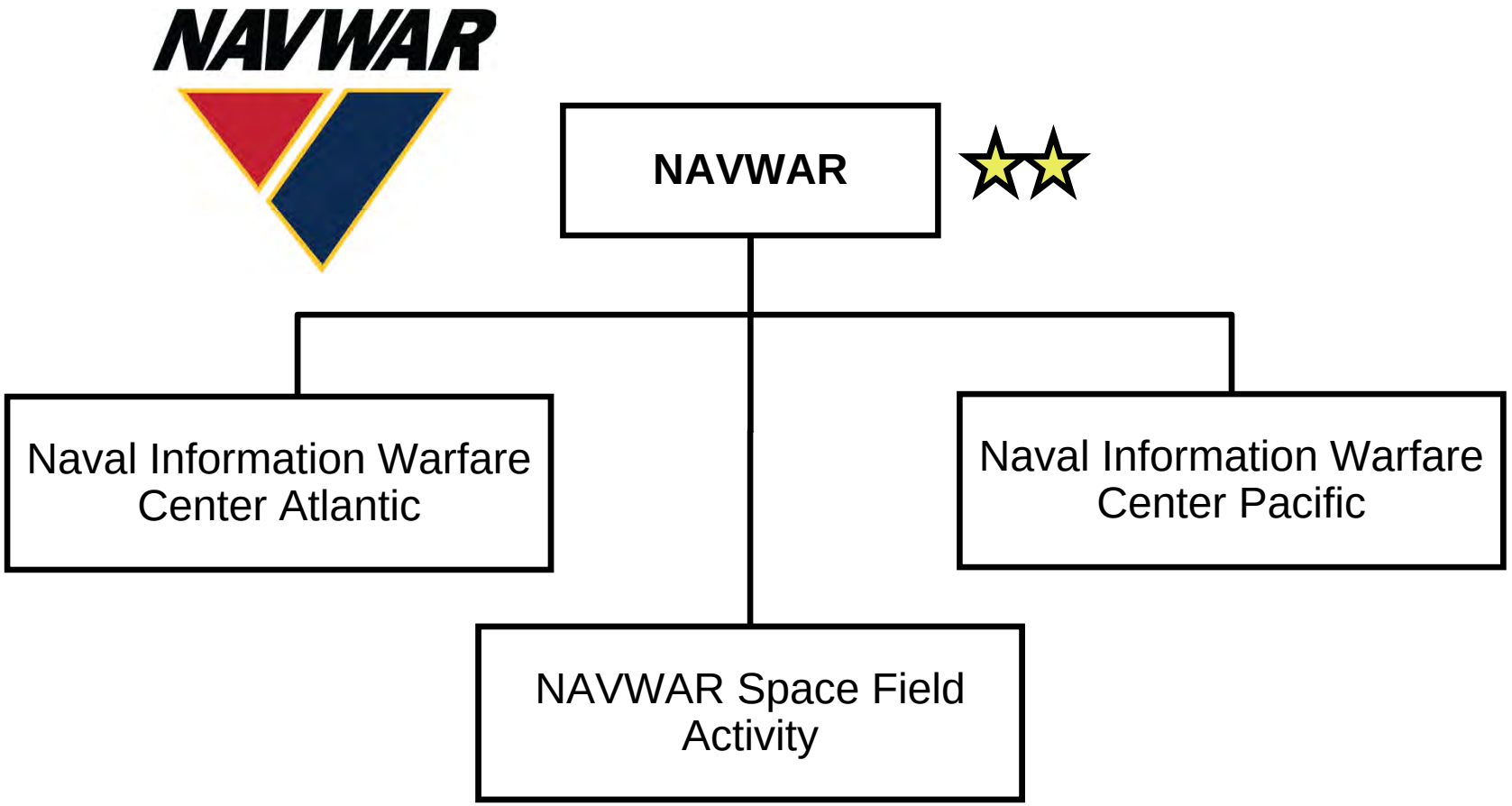
- To be the Navy's full spectrum research, development, test and evaluation (RDT&E), engineering, and fleet support centers for platforms, vehicles, systems, and facilities associated with a particular warfare area
  - NAVWAR: C4I systems and Information Assurance (IA)
  - NAVAIR: Aircraft and aircraft systems
  - NAVSEA: Ships and ship systems
  - NAVFAC: Facilities



NAVWAR Activities



NAVWAR Activities



Naval Information Warfare Center Pacific

- Navy's premier Research, Development, Test, and Evaluation (RDT&E) laboratory supporting Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)
- Supports the development, acquisition, and fielding of leading-edge C4ISR systems for Navy, Joint, and Allied customers

Research, development, acquisition, testing, evaluation, and life-cycle support of C4ISR systems

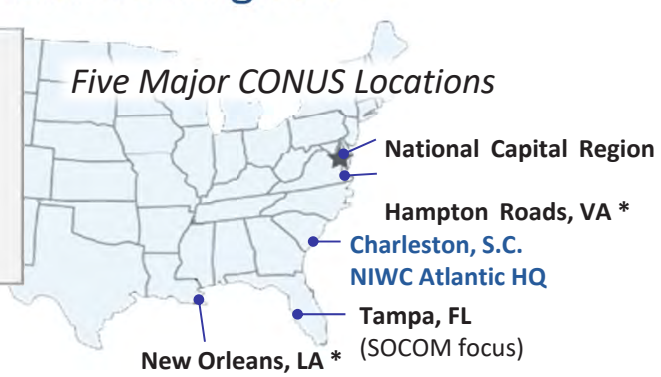
Naval Information Warfare Center Atlantic

- Primary NAVWAR provider for Joint and Homeland Security C4ISR solutions
- Developer and employer of life-cycle logistics support solutions in a web-enabled portal environment
- Navy provider of critical engineering and acquisition expertise for Navy/Joint commands
- Rapid integrator of C4ISR technology providing interoperability to the Navy, Federal Agencies, and the Joint Warfighter

Other Locations

CONUS	OCONUS
Fayetteville, NC	Stuttgart, Germany
Pax River, MD	Naples, Italy *
Kings Bay, GA	Bahrain *
Mayport, FL	
Groton, CT	

** Officer in Charge (OIC)*



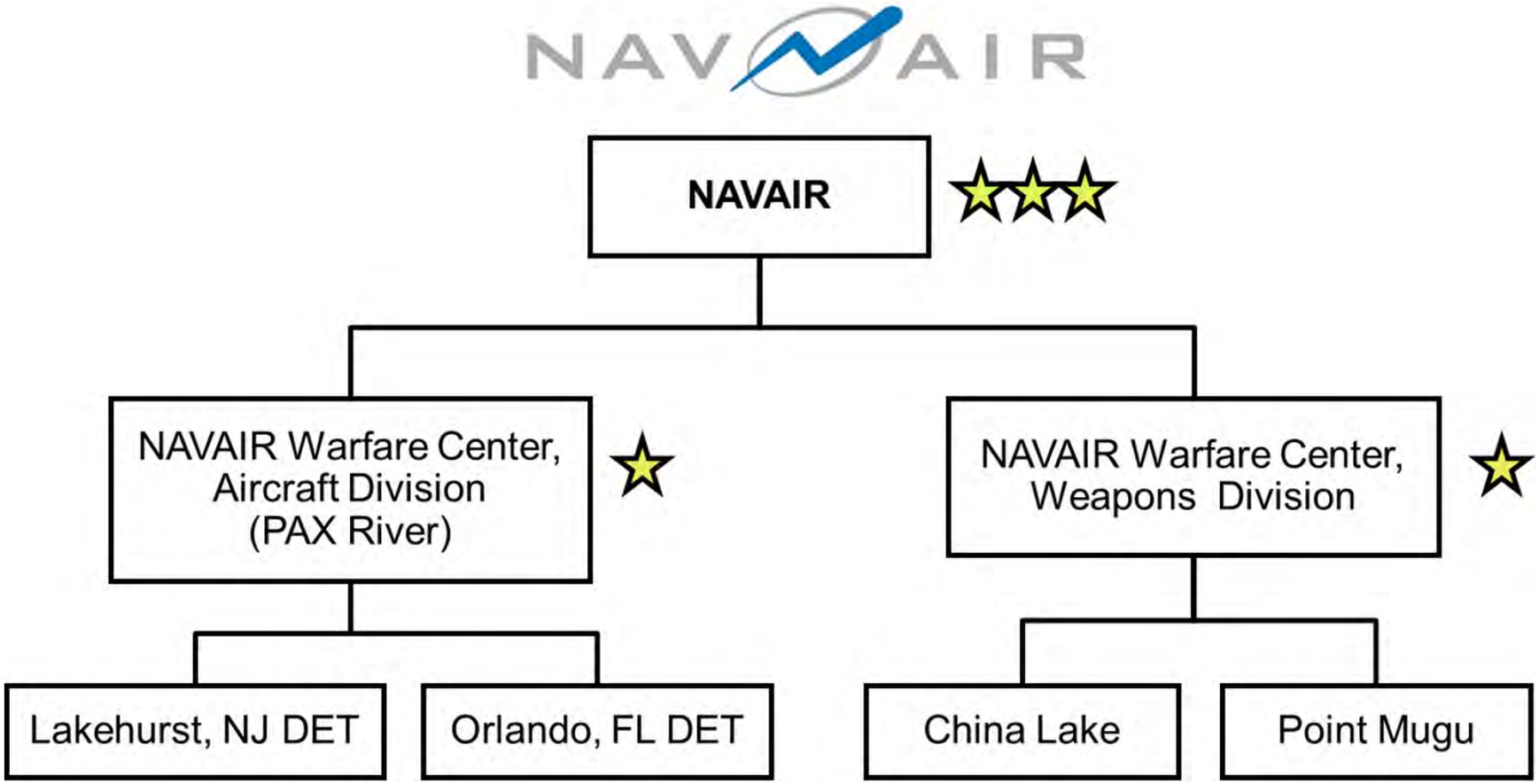
Focused on Enterprise IT solutions and cradle-to-grave support of C4ISR systems

NAVWAR Space Field Activity

- Background: The NSFA was established to coordinate naval space research activities within the National Reconnaissance Office (NRO)
- Mission: To provide line management staffing of naval space research at NRO
- Responsibilities: Facilitate interaction between the DoN and NRO; coordinate all naval space research, development and acquisition functions/activities

Network-centric operations and intersystem connectivity with coalition forces & traditional allies

NAVAIR Warfare Centers & Divisions



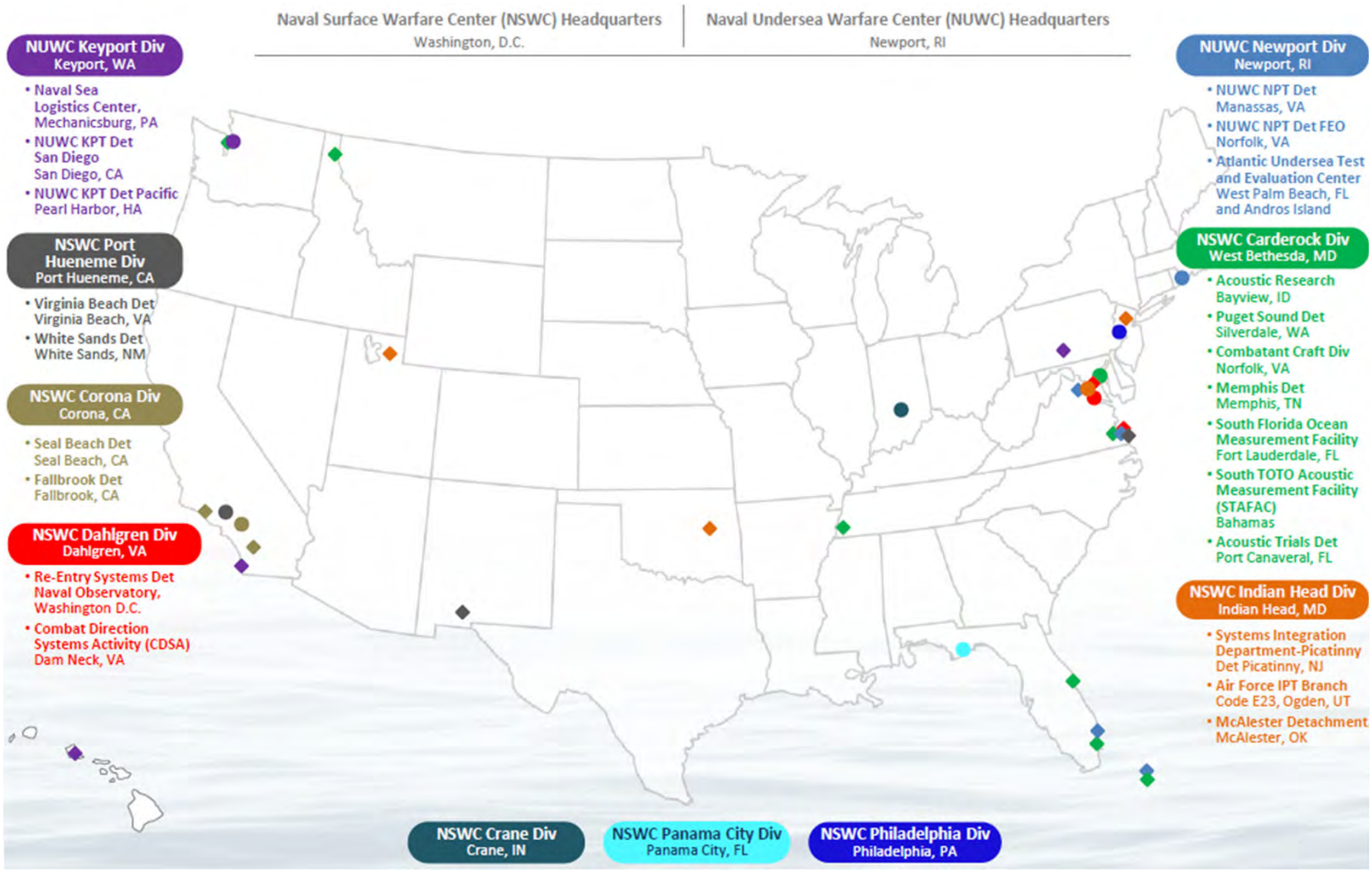
NAWC Aircraft Division (NAWCAD)

- Location: Patuxent River, MD
  - Detachments: Lakehurst, NJ and Orlando, FL
- Mission: To be the Navy's principal research, development, test, evaluation, engineering, and fleet support activity for ***Naval aircraft, engines, avionics, aircraft support systems, aircraft launch and recovery, and ship/shore/air operation***
- Technical leadership areas:
  - ***Airworthiness, engineering analysis***
  - ***Trainers/training development***
  - Test Pilot School
  - Test ranges
  - Carrier support and Aircraft Launch and Recovery Equipment (ALRE)
  - Propulsion systems

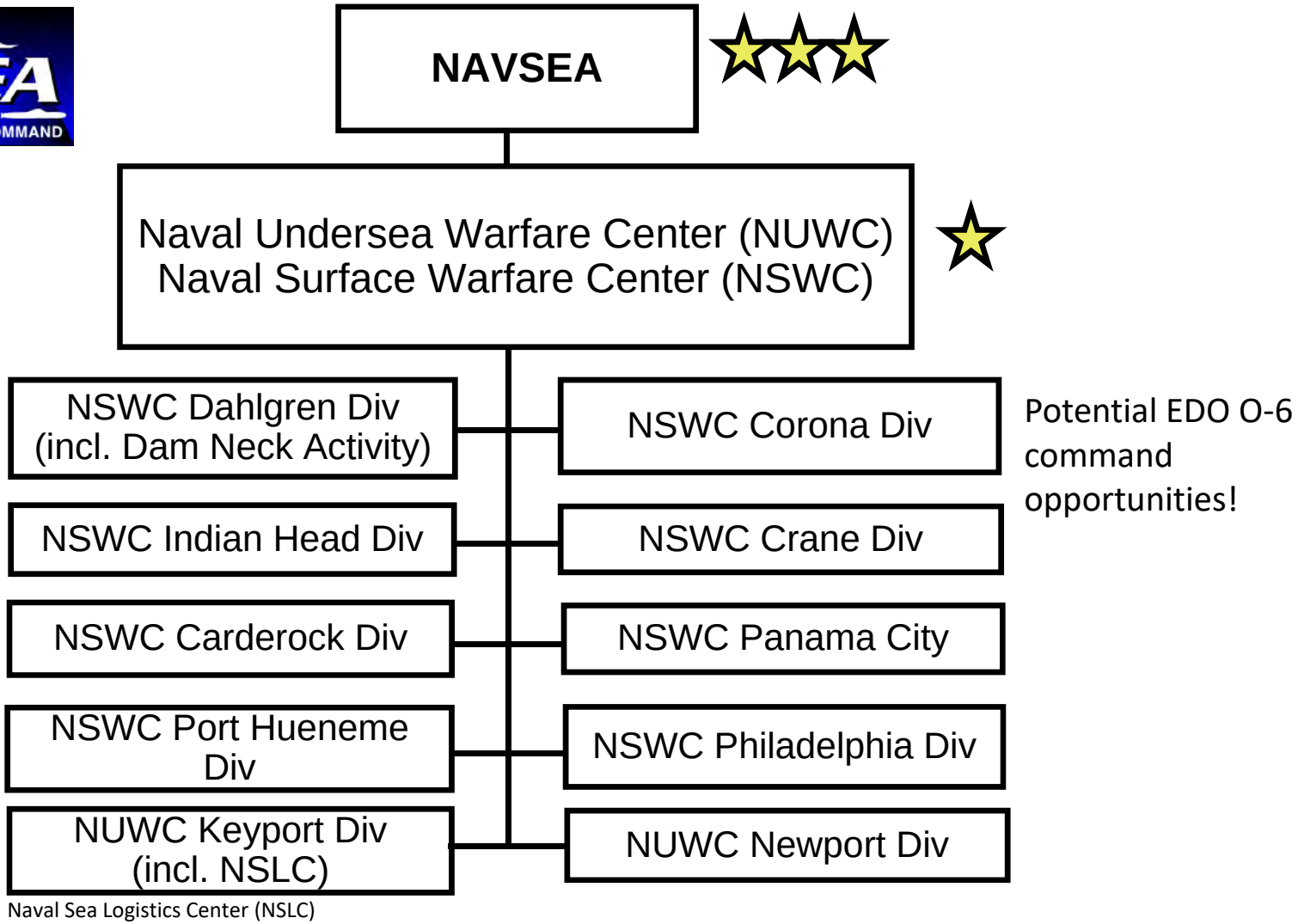
NAWC Weapons Division (NAWCWD)

- Location: China Lake & Point Mugu, CA
- Mission: To provide Navy and Marine Corps warriors with effective, affordable, integrated warfare systems, and life-cycle support to ensure battlespace dominance
- Technical leadership areas:
  - ***Perform RDT&E, logistics, and in-service support for guided missiles, free-fall weapons, targets, support equipment, crew systems, and electronic warfare***
  - Operate the Navy's western land and sea range test and evaluation complex
  - Integrate weapons and avionics on tactical aircraft

NAVSEA Warfare Center Divisions



NAVSEA Warfare Centers & Divisions



Potential EDO O-6 command opportunities!

Technical Capabilities

Technical Capability:

A blend of intellectual and physical assets provided by a cadre of technical *people* with knowledge, skills, experience and requisite *facilities* and *equipment* that yield technical products

Technical Capability characteristics:

- Form the basis for making consistent, national work assignment decisions
- Constitute Centers of Excellence *unique to each Division*, with alignment to Division missions
- Foster collaboration while minimizing duplication
- Provide a coherent framework to understand what we do
- Enable strategic alignment of products and services to naval objectives

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

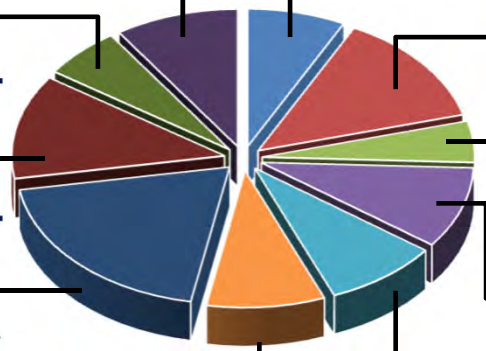
NSWC CARDEROCK DIVISION
17 TCs in **Naval Architecture and Marine Engineering** for surface & undersea vehicles and associated ship systems.

NSWC CORONA DIVISION
8 TCs in the **Performance Assessment** of weapons and combat systems independently from the unit level through force level.

NSWC CRANE DIVISION
10 TCs in **Electronic Warfare, Special Warfare Weapons and Devices, and Strategic Systems Components** and hardware.

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 DIVISION
10 TCs in **Energetic Systems and Energetic Materials and Capabilities** in ordnance disposal technology focusing on tools and personnel to counter IEDs.



NUWC KEYPORT DIVISION
16 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.

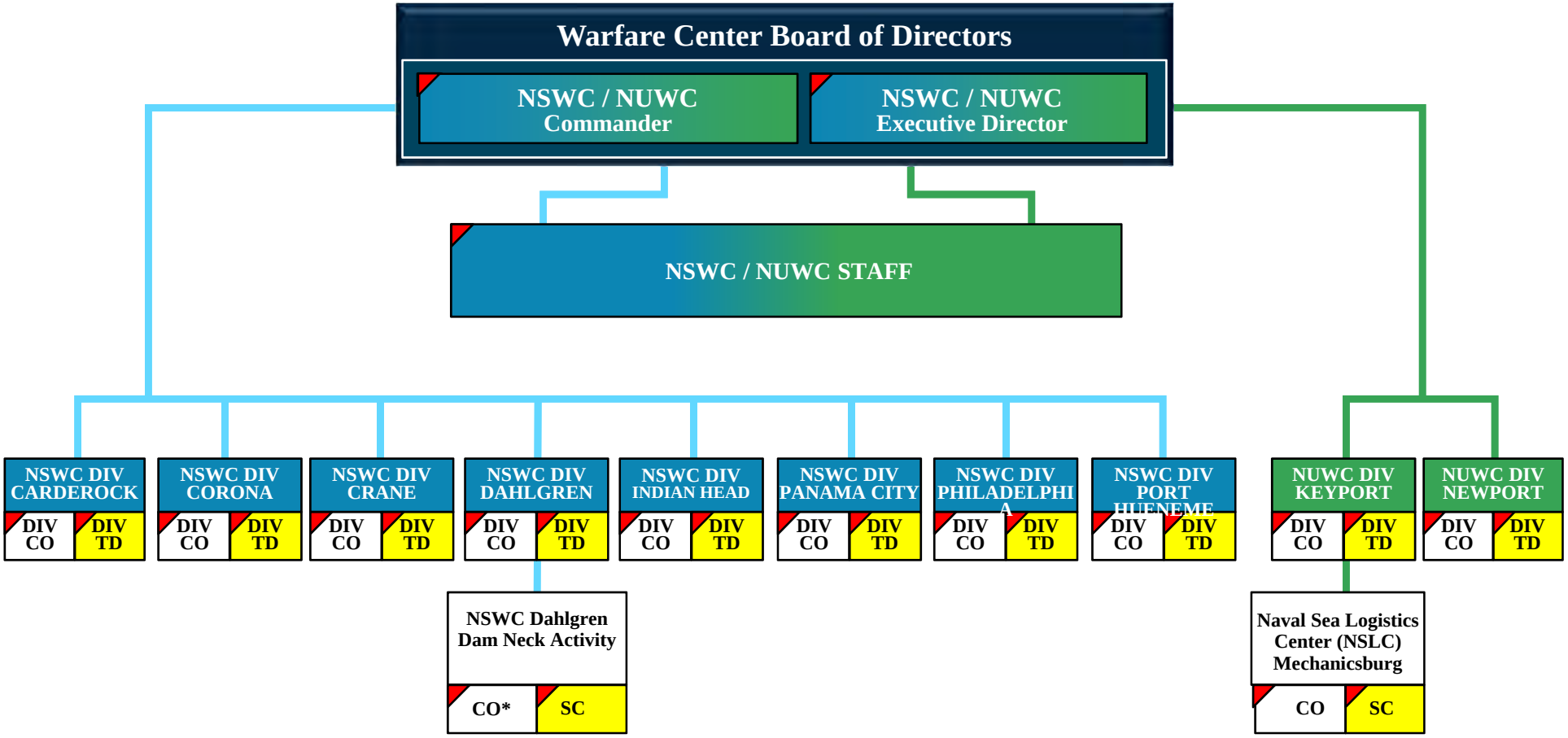
NUWC NEWPORT DIVISION
20 TCs for **USW Systems Development and Integration** for sensor systems, weapons, vehicles, and other payload systems, USW communications, training, and combat systems.

NSWC PANAMA CITY DIVISION
12 TCs for **Mine Warfare Systems and other Littoral Warfare Systems** including mines, special warfare systems, diving and life support systems.

NSWC PHILADELPHIA DIVISION
13 TCs for **Surface and Undersea Vehicle Machinery, ship Systems, Equipment and Material** (including cyber-security, comprehensive logistics, and life-cycles savings through commonality).

NSWC PORT HUENEME DIVISION
10 TCs for **Surface Ship T&E, In-service Engineering & Logistics and Integration** of weapons, combat and warfare systems as the primary interface with the surface fleet.

Warfare Center Organization



* O-5 Command

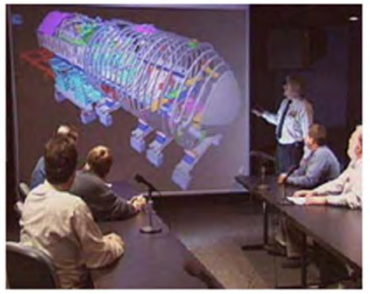
CO Commanding Officer
TD Technical Director
SC Senior Civilian

Naval Undersea Warfare Center

- Location: Headquarters in Newport, Rhode Island
- Mission: The Navy's full-spectrum RDT&E, engineering, and fleet support center for ***submarines, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare***
- Technical leadership areas:
  - Undersea warfare modeling and analysis
  - Submarine combat and combat control systems
  - Surface ship and submarine sonar systems
  - Submarine electronic warfare
  - Submarine unique on-board communication systems and communication nodes
  - Undersea ranges
  - Submarine electromagnetic, electro-optic and non-acoustic effects reconnaissance, search and tracking systems
  - Undersea vehicle active & passive signatures (except HM&E)
  - Submarine vulnerability and survivability (except HM&E)
  - Torpedoes and torpedo countermeasures

NUWC Newport Division

- Location: Newport, RI
- Mission: Provide the technical foundation which enables the conceptualization, RDT&E, fielding, modernization, and maintenance of systems that ensure our Navy's undersea superiority



- Technical leadership areas:
  - Product-oriented research and advanced development
  - Undersea warfare modeling and analysis
  - Unmanned Underwater Vehicles (UUVs)
  - Torpedoes, torpedo launchers, and torpedo countermeasures (submarine and surface) – In-Service Engineering Agent (ISEA), Design Agent
  - Operational testing support (Operational Test and Evaluation Force (OPTEVFOR), Combat Systems Ship's Qualification Trials (CSSQT)) – Atlantic ranges
  - Operates Atlantic Undersea Test and Evaluation Center (AUTEC)
  - Submarine cybersecurity
- Early life-cycle focus

NUWC Keyport Division

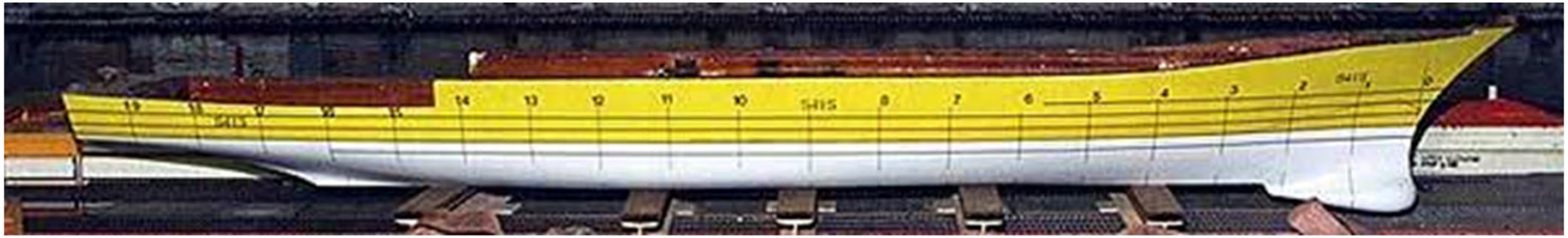
- Location: Keyport, WA
- Mission: Provide advanced technical capabilities for test and evaluation, in-service engineering, maintenance and industrial base support, fleet material readiness, and obsolescence management for undersea warfare
- Technical leadership areas:
  - Test and evaluation, training, National UUV Test & Evaluation Center (NUTEC), 3D UW tracking range, range alternatives
  - Life-cycle systems supportability (fielded equipment, systems and subsystems)
  - Fleet material readiness (material support, modernization, prototype development, testing)
  - Depot level torpedo repair, product proofing
- Post-production life-cycle focus

Naval Surface Warfare Center

- Location: Headquarters at Washington, DC
- Mission: Provide the right technology, the right capabilities, and the specialized research and development facilities ***to support all aspects of surface warfare***
- Technical leadership areas:
  - Ships and ship systems
  - Surface ship combat systems
  - Littoral warfare systems
  - Navy strategic weapon systems
  - Ordnance
  - Homeland & Force Protection (FP)
  - Surface warfare logistics & maintenance
  - Force level warfare systems

NSWC Carderock Division

- Location: West Bethesda, MD
- Mission: Provides RDT&E, fleet support, and in-service engineering for ***surface and undersea vehicle hull, mechanical and electrical systems (HM&E), and propulsors; provides logistics R&D***
- Technical leadership areas:
  - Hydromechanics: Hull form, resistance measurement, prop design, maneuvering, and seakeeping analysis
  - Surface and submarine survivability
  - Ship and submarine electromagnetic/optical signatures
- Early life-cycle focus



NSWC Philadelphia Division

- Location: Philadelphia, PA
- Mission: Provides RDT&E, fleet support, and in-service engineering for ***surface and undersea vehicle hull, mechanical and electrical systems (HM&E), and propulsors; provides logistics research and development (R&D)***
- Technical leadership areas:
  - Surface and submarine machinery R&D:
    - Power systems, ship automation control, dynamics and silencing, shipboard energy availability, and conservation, and electrical machinery integration
  - Machinery ISEA for various propulsion, electric and mechanical systems
  - Integrated Propulsion System (IPS) development
  - Control systems and Hull, Mechanical & Electrical (HM&E) cybersecurity
- Post-production life-cycle focus

NSWC Dahlgren Division

- Location: Dahlgren, VA
- Mission: Research, develop, test and evaluate, analyze, engineer, ***integrate and certify complex naval warfare systems related to surface warfare, strategic systems, combat and weapons systems***
- Technical leadership areas:
  - Surface ship combat systems software engineering: theater air defense, Aegis combat system, DDG 1000
  - Certifies each strike group for interoperability
  - Develop/certify all targeting & fire control systems for Trident submarines
- Early life-cycle focus

NSWC Dahlgren Division Dam Neck Activity

- Location: Dam Neck, VA
- Echelon V command reporting to NSWC Dahlgren
- EDO CDR command
- Technical leadership areas:
  - Software development and maintenance for surface combat systems (non-Aegis)
  - Joint testing and training through links with Norfolk Naval Base, Dahlgren, Pax River, and Wallops Island
- Post-production life-cycle focus
- Formerly CDSA Dam Neck

NSWC Port Hueneme Division

- Location: Port Hueneme, CA
- Mission: Provide test and evaluation, in-service engineering, and integrated logistics support for ***surface warfare combat systems and ordnance of the navy surface fleet***
- Technical leadership areas:
  - Surface missile launcher systems
  - UNREP test site and fleet support
  - Self Defense Test Ship (SDTS)
  - Surface ship combat systems
  - Land-based and at-sea T&E
- Post-production life-cycle focus

NSWC Crane Division

- Location: Crane, IN
- Mission: Advance multi-domain system of systems within the mission focus areas of ***electronic warfare, strategic systems hardware, and special and expeditionary warfare***. Conduct research, development, test and evaluation, acquisition, and in-service engineering across the entire life-cycle
- Technical leadership areas:
  - Electronic Warfare (EW) systems RDT&E, acquisition and sustainment
  - Special warfare and expeditionary system hardware
  - Strategic systems hardware
  - Infrared countermeasures and pyrotechnic RDT&E and life-cycle support
  - Advanced electronics & energy systems
  - Sensors and surveillance systems
- Entire life-cycle focus

NSWC Corona Division

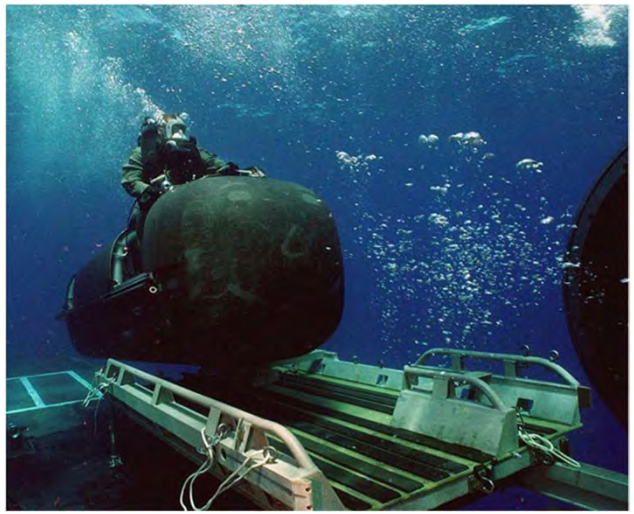
- Location: Corona, CA
- Mission: Gauges the warfighting capacity of ships and aircraft, from unit to battlegroup level, by ***assessing the suitability of design, the performance of equipment and weapons, and the adequacy of training***
- Technical leadership areas:
  - Fleet exercise assessments
  - Weapons and combat systems performance analysis
  - Missile flight analysis
  - Data collection, processing, reduction & display
  - Trend and failure pattern analysis
  - Test Systems Availability Assessment
  - Metrology Systems Engineering
  - Material Readiness Assessment
- Entire life-cycle focus

NSWC Indian Head Explosive Ordnance Disposal Technology Division (IHEODTECHD)

- Location: Indian Head, MD
- Mission: Research, develop, test, evaluate (RDT&E), manufacture and provide in-service support of ***energetics and energetic systems***. Provide Soldiers, Marines, Sailors and Airmen with information and technology to detect, locate, access, identify, render safe, recover, exploit and dispose of ***explosive threats***
- Technical leadership areas:
  - Energetics research, detonation science, chemical/physical characterization
  - Weapons product development
  - Ordnance test and evaluation
  - NAVSEA lead for weapon and combat systems packaging, handling, storage, and transportation
  - Support the Joint EOD technician
  - Counter Radio Controlled Improvised Explosive Device Electronic Warfare (CREW) related science and technology
  - Only US source and DoD facility for many types of propellant and high energy chemicals
  - One of two solvent-less extrusion plants in the US
  - Can model and scale-up many types of warheads
- Entire life-cycle focus

NSWC Panama City Division

- Location: Panama City, FL
- Mission: Conduct RDT&E, and in-service support of mine countermeasure systems, naval sea mine systems, naval special warfare systems, diving & life support systems, amphibious/expeditionary maneuver warfare systems, and other systems that occur primarily in coastal (littoral) regions
- Technical leadership areas:
  - Mine warfare
  - LCS mission packages
  - Expeditionary maneuver warfare
  - Assault craft vehicles
  - Diving and life support systems
  - Unmanned systems (air/ground)
  - Chemical/Biological individual protection
  - Special warfare
- Entire life-cycle focus



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- Major customers
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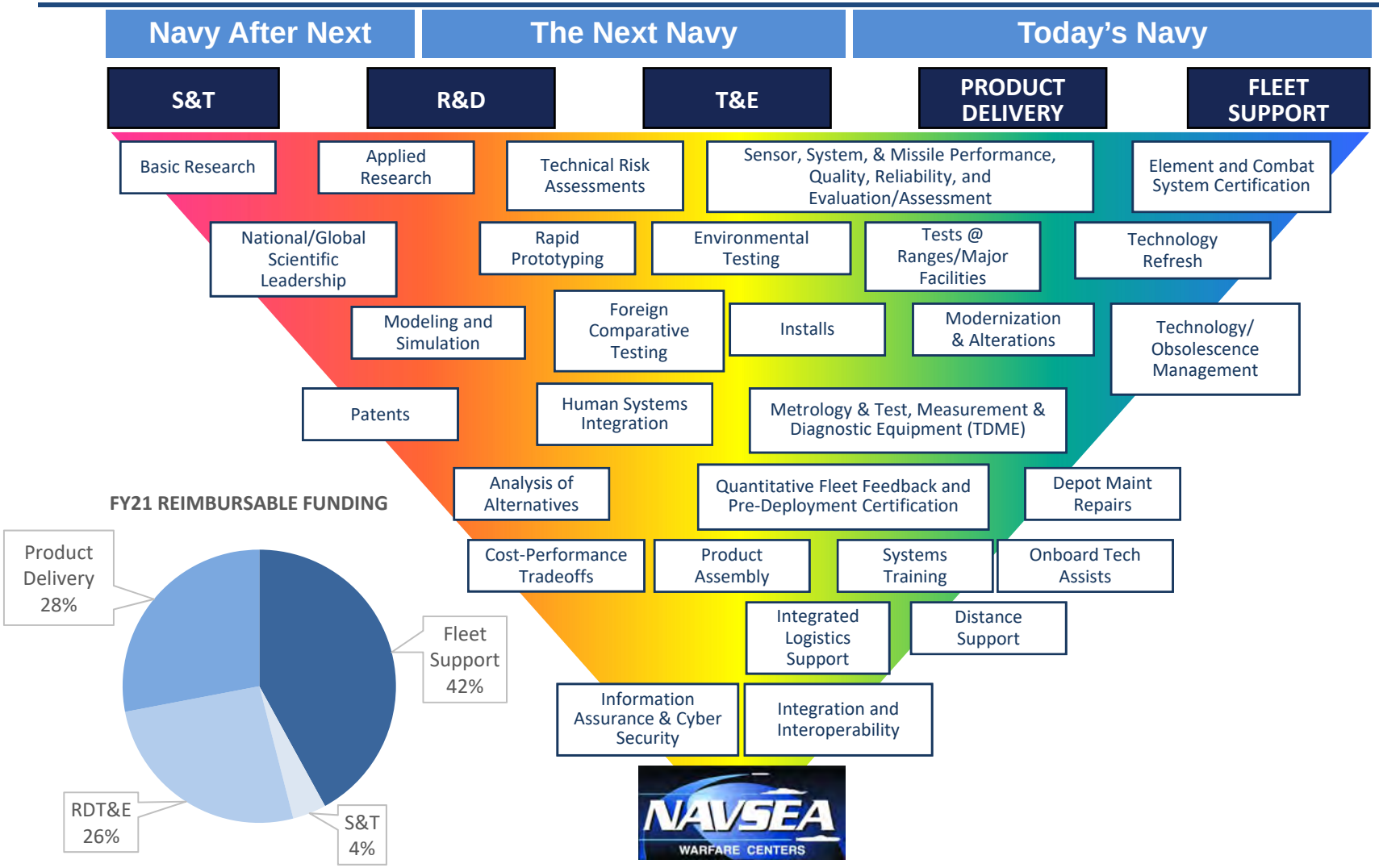
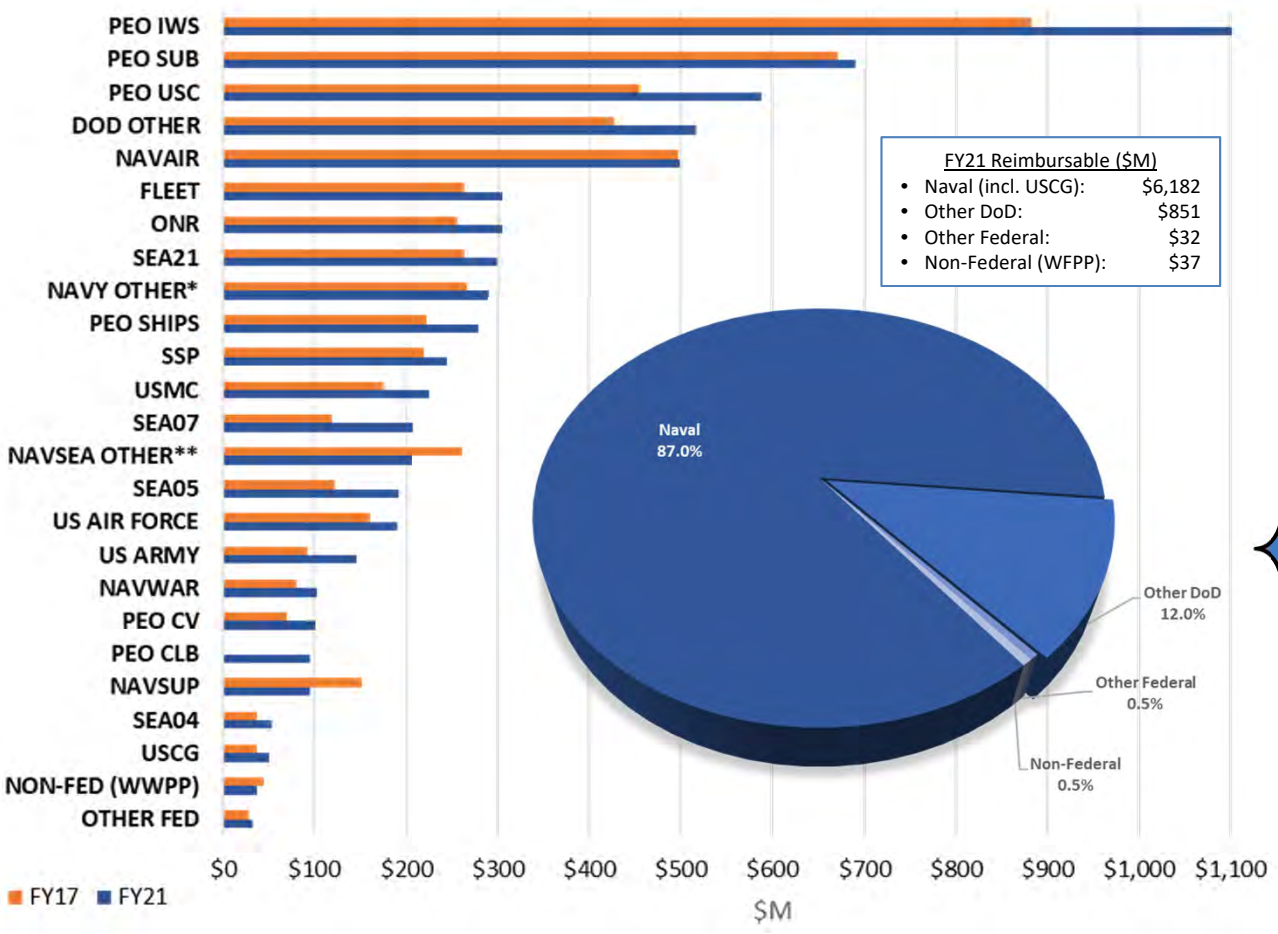
NAVSEA WC Customers, Products & Services



NAVSEA WC Customers, Products & Services

Reimbursable Funding by Customer - $M (FY17 represented in current year dollars)



Other DoD:
- MDA – Navy/AEGIS Integration
- COCOM – Naval Systems Integration
- SOCOM – Naval capabilities
- Joint Range Ops – Navy ranges
- Battleforce Interop. – Navy Lead
- Joint EO/IR – Navy is Joint Lead
- CBRD – Navy is Joint Lead
- Joint Counter IED- Navy is Joint Lead
- Nuclear Deterrence – Naval Int.
- Army/Navy Watercraft – Navy is Joint lead
- Army/Air Force – Energetics JPEO

Other Federal:
- DHS Insensitive Munitions – Navy Cog.
- NASA Global/Ballistics interoperability
- DOE NR integration

Non-Federal:
- Work With Private Parties – Direct GFE/GFM/T&E for Navy OEM/Primes

Life-cycle support across broad products and services to a diverse customer base

- NAVY OTHER includes OPNAV/CNO, NAVSUP, NETWARCOM, NELO, ONI, MSC, CNSWC, and multiple small-dollar Navy customer tasking

** NAVSEA OTHER includes SEA08, Diving & Salvage, NEBO, SEA03, and small-dollar miscellaneous reimbursable support

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Office of Naval Research (ONR)

- Typically headed by Navy 2-star
- Mostly civilian staff
- ***Reports to ASN (RD&A)***
- Conducts research through the following means:
  - Science and technology (S&T)
  - Naval Research Laboratory (NRL)
  - ONR Global (Fleet, International, and S&T community info sharing)
  - Naval Reserve S&T Program (leverages capabilities of NR)
  - Commercial Technology Transition Office (CTTO) (rapidly transitions technology to the field)

Provides worldwide science and technology-based solutions for current and future naval challenges

Naval Research Laboratory (NRL)

- Location: Washington, DC
- Headed by O-6, reports to the Office of Naval Research
- Mission: To be the Navy's full spectrum corporate laboratory to conduct ***broad-based multi-disciplined scientific research and advanced technology development directed toward maritime applications*** of new and improved materials techniques, equipment, systems and ocean, atmospheric, and space sciences and related technologies
- Technical leadership areas:
  - Primary in-house research for physical, engineering, space, and environmental sciences
  - Broad-based exploratory and advanced development for anticipated Navy needs
  - Broad multi-disciplinary support to the Naval Warfare Centers
- Early life-cycle focus

Research and advanced technology development for future Navy and maritime applications

Summary

- Who do the Warfare Centers report to?
- Who do the Warfare Center Divisions report to?
- What is the mission of NRL?
- Who does NRL report to?
- What are the technical leadership areas of NUWC Keyport Division?
- What are the technical leadership areas of NSWC Port Hueneme Division?