



# Title

Presented to:

**Xxxxxx Xxxxxx**  
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Presented by:

**Xx Xxxx Xxxxxxx**

Title

- 00 Month 2022 -

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**Commanding Officer**

**Mr. Ashley G. Johnson, SES**  
**Technical Director**

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# 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.



## Range and Speed

- Propellants
- Explosives
- Fuels
- Reactive materials
- Rocket motors
- Conventional ammunition

## Effects

- Novel explosives
- Reactive materials
- Warheads
- Casing
- Modeling and simulation (M&S)
- Conventional ammunition

## Signatures

- Propellants
- Fuels
- Rocket motor design
- M&S
- Safe and arm (S&A) devices

## Safety

- EOD
- S&A / Fuzing
- Aircrew escape
- Packaging Handling, Storage, and Transportation of Energetics
- Insensitive munitions
- Chem bio defeat

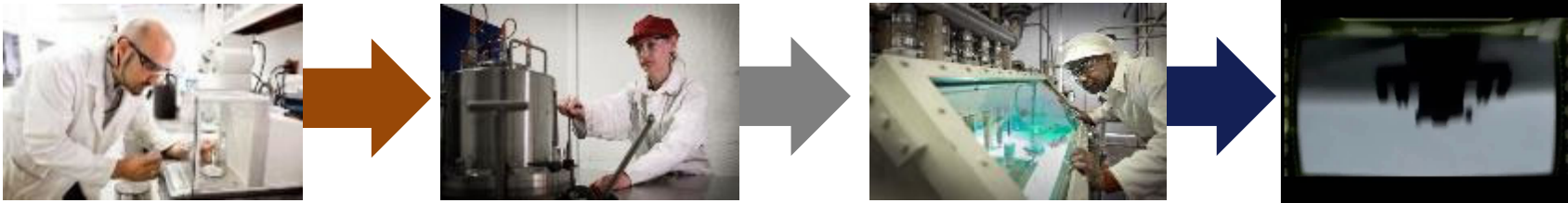
***FLY FARTHER***

***HIT HARDER***

***SAVE LIVES***

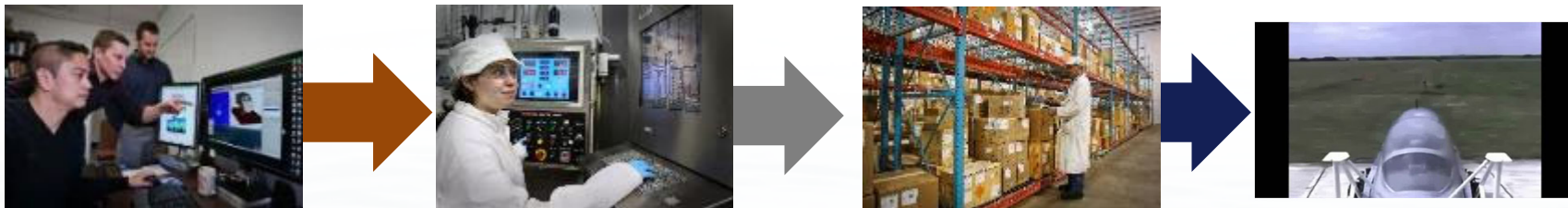
# Molecule-to-Mission Across the DoD

## Air Launched 2.75 inch Rockets

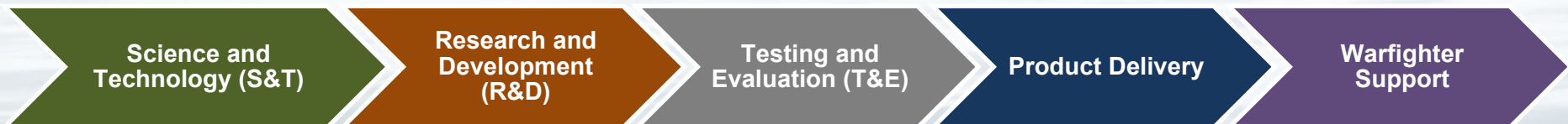


The command is the Warfighter's source for production of the 2.75 inch rocket: from propellant manufacturing to production of the warhead. We make and deliver the tools to give our Warfighter the winning edge.

## Cartridge Actuated Devices / Propellant Actuated Devices (CAD/PAD)



NSWC Indian Head Division manufactures CADs/PADs for aircrew escape ejection systems. Our Virtual Fleet Support facility allows the Warfighter to obtain any component within one week from order request.





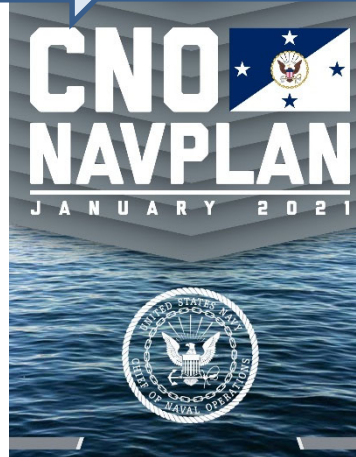


# Strategic Thrusts

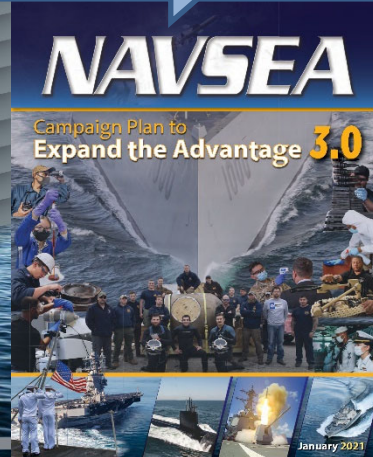


## 2022 National Defense Strategy

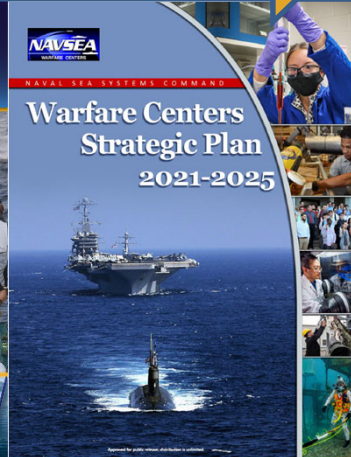
- Defending the homeland
- Deterring strategic attacks against the United States, Allies, and partners
- Deterring aggression,
- Building a resilient Joint Force and defense ecosystem.



- Readiness
- Capabilities
- Capacity
- Sailors



- Deliver combat power: on-time delivery of combat-ready ships, submarines and systems
- Transform our digital capability
- Build a team to compete and win



- Workforce and leadership development
- Mission-aligned strategies
- Technical innovation and excellence
- Business excellence and improvement
- Right culture/values



- Strengthen the Navy's arsenal
- Molecule to mission (integrated capabilities)
- Workforce flexibility and agility

***Vision: Outpace our Adversaries***



# NAVSEA Warfare Centers: 10 Divisions – 1 Team



NSWC Crane Division  
Crane, Ind.

NSWC Carderock Division  
West Bethesda, Md.

NSWC Panama City Division  
Panama City, Fla.

NSWC Dahlgren Division  
Dahlgren, Va.

NSWC Port Hueneme Division  
Port Hueneme, Calif.

NSWC Philadelphia Division  
Philadelphia, Penn.

NSWC Corona Division  
Corona, Calif.

NSWC Indian Head Division  
Indian Head, Md.



NUWC Keyport Division  
Keyport, Wash.

NUWC Newport Division  
Newport, R.I.

Naval Surface Warfare Center

Naval Undersea Warfare Center





# NSWC IHD Strategic Locations

**Ogden, Utah: 22 civ.**

- Co-located at Hill Air Force Base
- CAD / PAD Air Force Integrated Product Team

**Crane, Ind.: 4 civ.**

- Design and construct portable armories
- Provide automation for front gates

**Indian Head, Md. (two sites): 1,874 civ., 55 mil.**

- NAVSEA Center of Excellence for Energetics
- DoD EOD program lead
- Expeditionary Exploitation Unit ONE (EXU-1)

**Camp Pendleton, Calif.: 6 civ.**

- Demonstration and Assessment Team
- Assigned to D Department

**Rock Island, Ill.: 7 civ.**

- Quad-Cities Caliber Cartridge Case Facility
- Aligned with G Department

**McAlester, Okla.: 50 civ.**

- McAlester Army Ammunition Plant
- Navy Special Weapons

**Louisville, Ky.: 13 civ.**  
Naval Guns

**Norfolk, Va.: 27 civ.**

- Demonstration and Assessment Team
- Assigned to D Department
- NWS Yorktown

**Picatinny, N.J.: 268 civ., 3 mil.**

- Located at Picatinny Arsenal
- Joint CoE for Guns and Ammo
- Navy Package, Handling, Storage and Transportation, Guns and Ammo

**\* Ctr. numbers not included**



# Industrial Complexes

## Key

RDT&amp;E

Engineering

Manufacturing

Multiple

Echelon V

Center for Applied  
Analytics Technology

Ordnance Test

Ordnance Dissection &  
Machining

Detonation Physics &  
Combustion

Advanced Energetics  
Research Lab

Decon/Demil

Explosive Ordnance Disposal  
(Full Spectrum EOD)

Expeditionary Exploitation  
Unit One (EXU-1)

Weapon Systems Eng

Explosives Processing  
Development Eng

Chemical Biological  
Radiological Defense

Aircrew Escape  
(CAD/PAD)

Specialty Chemicals  
(Torpedo fuel)

Cast Composite  
(Rocket motors & warheads)

Solventless Extruded Products  
(Rocket motors & JATOs)

Explosive Processing (Pressed  
explosives, hypersonic targets)

Solvent Based Energetics  
(Bombs & rocket motors)

Continuous  
Processing

Significant Detachments not shown:

Picatinny, Systems Integration  
McAlester, Systems Engineering  
Quad Cities Cartridge Case Mfg Facility





# Numbers at a Glance



## FY21 Execution

**\$600.2M direct / \$89.3M indirect**

### Total Contracting Effort

**\$442.5M**

### Buildings Occupied

**879**

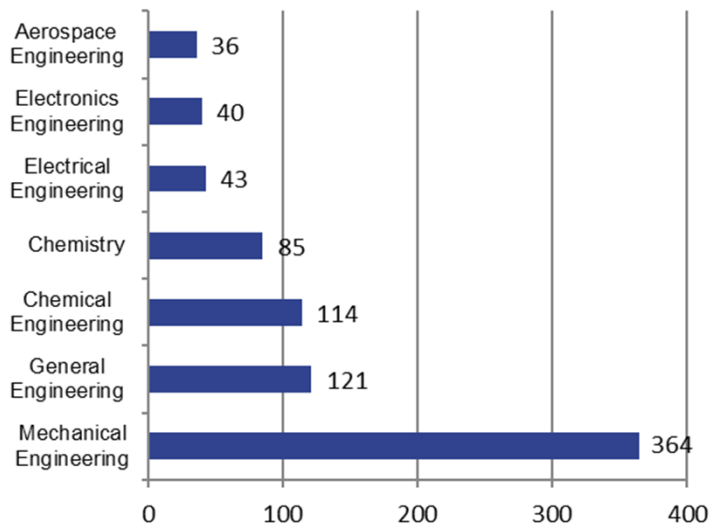
### Total Square Feet

**1,968,161**

### Civilian Staffing

#### Top S&E Disciplines

#### Top S&E Disciplines



**Scientists and Engineers:  
907**

#### Average Age of Workforce

**45**

### Employees \*

**2,362**

### Average Years of Service

**13**

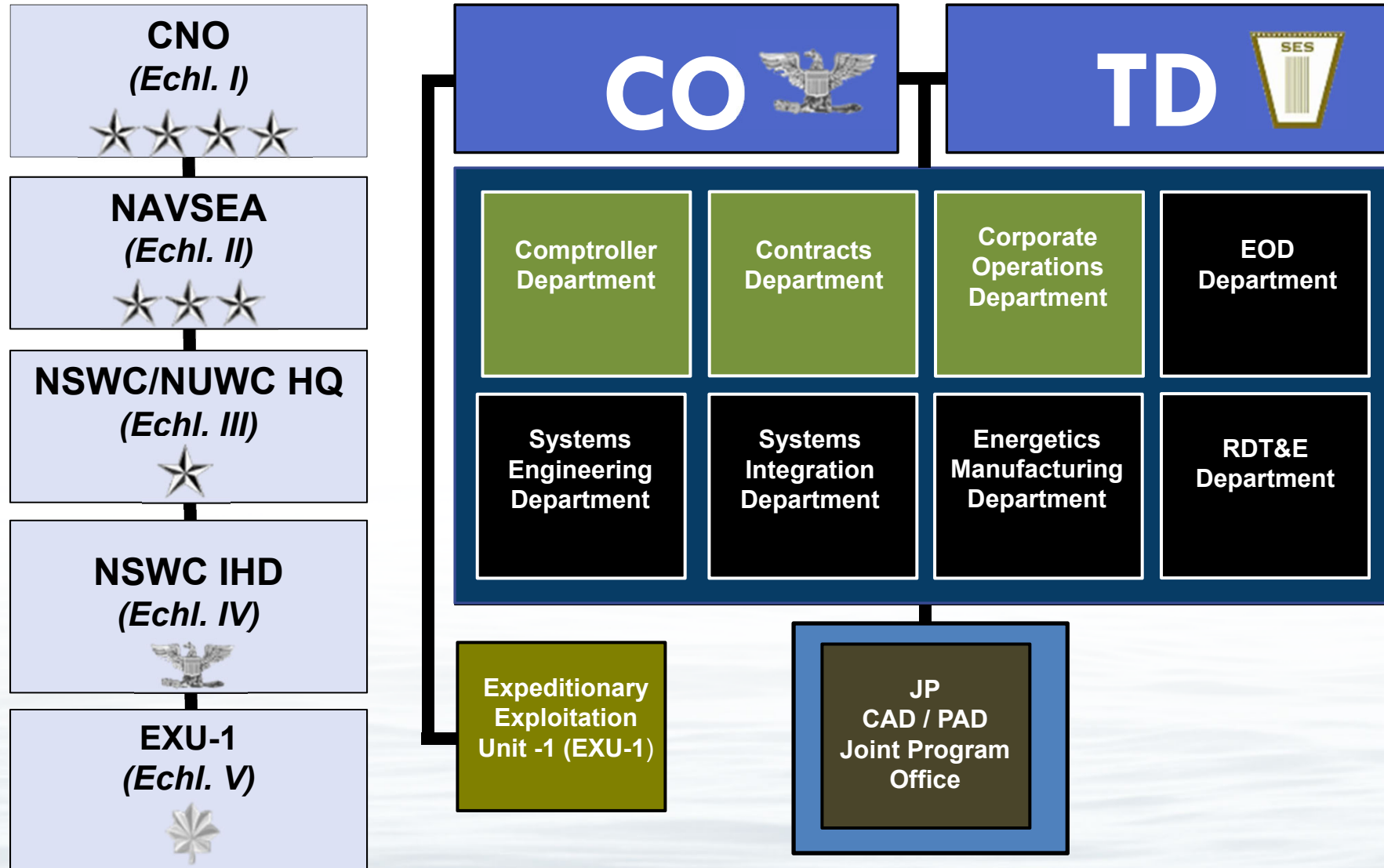
### Workforce Education (Technical)

**Bachelors: 567  
Masters: 246  
Ph. D.: 79**

\* Does not include contractors



# Organizational Structure





# RDT&E (R) Department



## Capabilities and Facilities

- Detonation science facility for controlled, dynamic research of energetic materials
- Material properties laboratory and ordnance dissection for health analysis and aging
- Non-destructive evaluation and analytical chemistry laboratories for in-house lot acceptance and quality assurance of products
- Condition-controlled laboratories for high-fidelity R&D
- Chemistry and biology labs (up to BSL-3), collective protection prototypes and over-water range testing for CBRD

## Warfighting Impact

- Integrated signatures program helps Warfighter diagnose threat to the “left of boom”
- Advanced propulsion R&D will lead to future advances in weapon range and flexibility
- Chemical, Biological, and Radiological Defense (CBRD) protects ships and facilities from attack and contamination

## Lines of Operation

### Research and Development (Code R1)

- Energetic materials science and technology to develop new chemicals, explosives, propellants and performance measurement concepts

### CBRD (Code R2)

- Full lifecycle support for CBRD in a maritime environment

### Test and Evaluation (Code R3)

- Detonation and combustion test and evaluation for performance, lifecycle analysis and lot acceptance





# Systems Engineering (E) Department



## Lines of Operation

- Energetics technology
- Micro-electrical mechanical systems, lethality, blast effects, insensitive munitions and savings-through-simulation
- Energetic systems
- Engineering for all warfighter domains
- CAD/PAD support of more than 3,000 ejection system components

## Warfighting Impact

- STANDARD and Evolved Sea Sparrow Missile propulsion engineering
- Clandestine Delivered Mine
- Improvised Explosive Device Exploitation
- Countermeasure anti-torpedo warhead and fuzing
- Aircrew escape systems
- Ordnance assessments leading to service life extensions

## Capabilities and Facilities

- MEMS explosive-certified cleanroom, characterization and test
- Polymer and metal additive manufacturing capability (3D printing)
- CAD/PAD virtual fleet support
- Airguns test rounds from 3" - 21"



# Systems Integration (G) Department



## Lines of Operation

- In-service engineering agent and acquisition engineering agent for guns and ammo
- Conventional ammunition commodity management
- Weapons and armament PHST design agent and ISEA



## Warfighting Impact

- Gun weapon systems standardized pier-side maintenance and repair
- Mobile Ammunition Evaluation and Repair Unit
- Gun weapon system casualty report support
- Fleet liaison for guns and ammo (LANT FLT / PACFLEET)
- PHST member of Board of Inspections and Survey, and Weapons System Explosive Safety Evaluation Board member

## Capabilities and Facilities

- 16,000 sq. ft. Packaging, Handling, Storage and Transportation test facility
- Gun stand complex
- 12,000 sq. ft. minor caliber lab
- Medium/minor caliber live fire range facility
- Quad City Cartridge Case Facility



# Energetics Manufacturing (M) Department



## Lines of Operation

- Energetic development, scale-up and qualification
- Design, development and low-rate initial production/full-scale production of energetic materials and ordnance end-items
- Flexibility to make products from mortars to rockets through the same processing line: from 5 grams to more than 1 million pounds
- Maintains in-house energetics processing capabilities and engineering expertise to:
  - Act as sole source, second source and emergency supplier
  - Provide expertise allowing program offices to act as "smart buyers" for the DoD, foreign military sales and other customers



## Warfighting Impact

- Provider of Otto Fuel II torpedo fuel
- CAD/PAD manufacturing and centralized stock point
  - Sole stock point of all Navy CAD/PADs
  - Able to ship parts anywhere around the globe

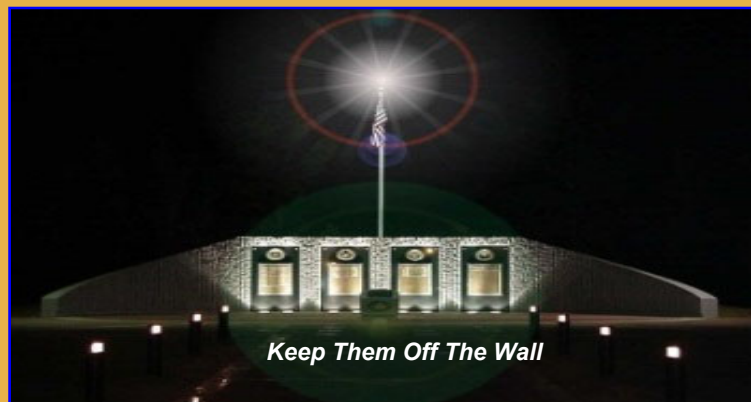
## Capabilities and Facilities

- Cast-composite propellant and polymer-bonded explosive mixing/casting
- Chemical manufacturing and scale up
- Pressed explosives and warheads
- Cartridge igniter and CAD/PAD assembly
- Solventless extrusion
- Decon and disposal





# Explosive Ordnance Disposal (D) Department



## Lines of Operation

- **EOD Information Management**
  - Collection, analysis, development and dissemination of procedures and countermeasures information to the Joint Service EOD community
- **EOD Systems**
  - Provides EOD support across the Development and Acquisition Spectrum: S&T, prototyping, POR development, T&E, engineering agent/ISEA, support/sustainment, disposal
- **Battle Lab**
  - Provides a cycle of equipment review and evaluation to feed capability gap assessment, COTS/MCOTS buying decisions, requirements development, and technology implementation at the speed of relevance

## Warfighting Impact

- Technical Data and Procedures
- Foreign Materiel Acquisition and Exploitation
- Explosives Detection Equipment Program
- Demonstration and Assessment Team and EOD Technology Assessment Team
- Underwater EOD
- EOD Unmanned Systems
- Ordnance Disrupt/Modeling & Simulation
- Anti-Terrorism/Force Protection

## Capabilities and Facilities

- Co-located with EOD service detachments and Joint EOD Executive Agency Support office
- 24-7 / 365 warfighter call-back ability to Technical Support Center
- Explosive test and robotics test ranges
- Magnetic Signature Test Facility
- Prototyping facilities to accelerate ideas/rapid support for 3D printing
- Explosive Chemistry Laboratory
- Electronics Laboratory
- EOD Library
- Disassembly complex



# Expeditionary Exploitation Unit One (EXU-1)

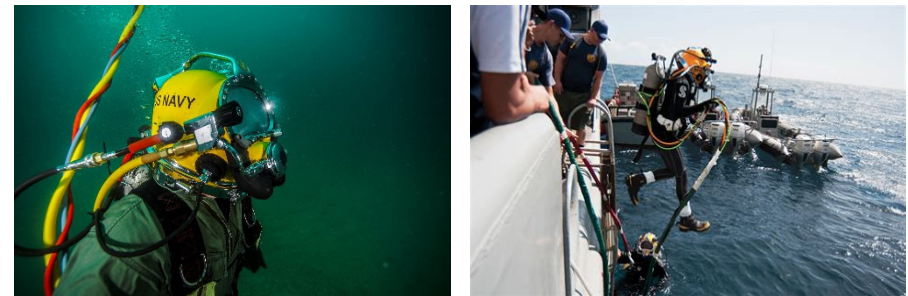


## Mission

Technical Exploitation Platoons (TXP) and Foreign Materiel Program (FMP) Platoons collect, process, exploit, and analyze improvised, conventional, and advanced weapons systems and other collected exploitable materiel (CEM), on land and at sea, for the purpose of providing near real-time technical intelligence to tactical commanders, EOD community, service components, Department of Defense (DoD), national level intelligence agencies, and Allied and Partner Nations.

## Organization and Manning

- Type II Sea Duty Operational Command (Ech V)
- ISIC: NSWC Indian Head Division



## Capabilities

- ✓ Globally deployable tailored to Fleet requirements
- ✓ Expeditionary Mine Countermeasures Exploitation
- ✓ Level-1 Exploitation (field)
- ✓ Level-2 Exploitation (lab)
- ✓ Foreign Materiel Acquisition
- ✓ Intelligence Community & SOF Interoperability
- ✓ Surface and Underwater Post-Blast Analysis
- ✓ Advanced Electronic Exploitation Division



# Questions?







# Back-up Slides

- **Please use the following Distro A slides to compliment and tailor your brief to suit your individual audiences. Slides can be used in any amount of order based on your needs.**
- **Slides are grouped in accordance to their general characterization.**



# General/Overview



# RDT&E (R) Department



**Qualification  
of PBXIH-136  
UW Explosive  
Formulation**



**Chemical Biological  
& Radiological Fleet  
Integration &  
Support**

**Warfighter Impact**

**Shipboard  
Collective  
Protection**

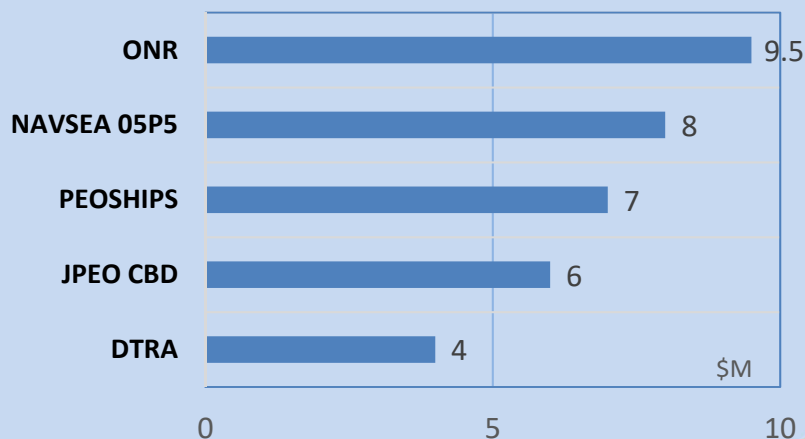


**Blast Assisted  
Munition Advanced  
Low Cost Munitions  
Ordnance Replacement**

**Reactive  
Material for  
Enhanced  
Lethality**



## Top Customers



## WFC Collaborations

- NSWC DD: CBR Defense – RDT&E
- NAWC WD China Lake and NSWC DD: advanced gun propellants and primers and a gun launched solid fuel ramjet projectile to improve range of 5" guns; novel processing methods for enhanced performance formulations
- NSWC DD: Accelerated development of Reactive Materials technology and advanced gun propellants and primers for large caliber guns.
- NSWC Philadelphia: Share ColPro engineering agent roles for ship integration.
- NSWC PCD: CBR Defense in the area of individual protective equipment.



# Energetics Manufacturing (M) Department



## Warfighter Impact

CXM AF-5/7

CKU-5 Rocket  
Catapult

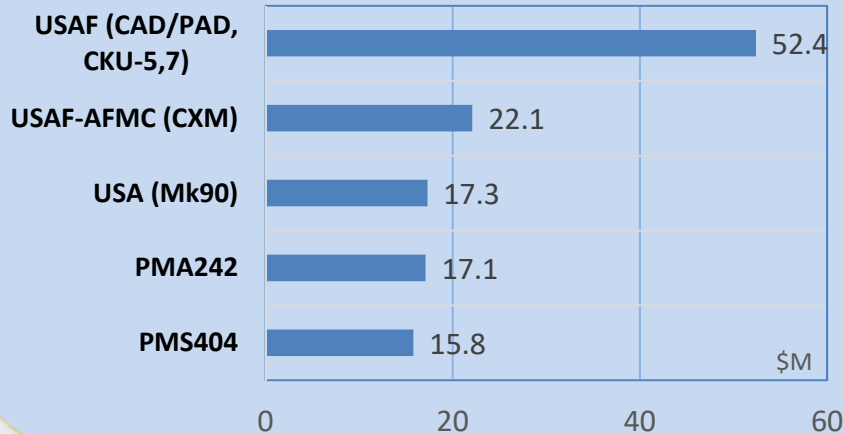
MK90 Propellant  
Grain Production

Otto Fuel II

CKU-7 Rocket  
Catapult



## Top Customers



## WFC Collaborations

- NSWC DD: Support Navy gun program/development
- NSWC DD: Explosive Waste disposal
- NUWC NPT: Disposal of Mk75 gas generators





# Systems Integration (G) Department



**Standard  
Pier-Side  
Maintenance  
& Repair  
(SPMR)**



**Shipboard  
Gun  
Installation  
Support**

**Warfighter Impact**

**Ordnance  
Handling  
Equipment  
(OHE) ISEA**

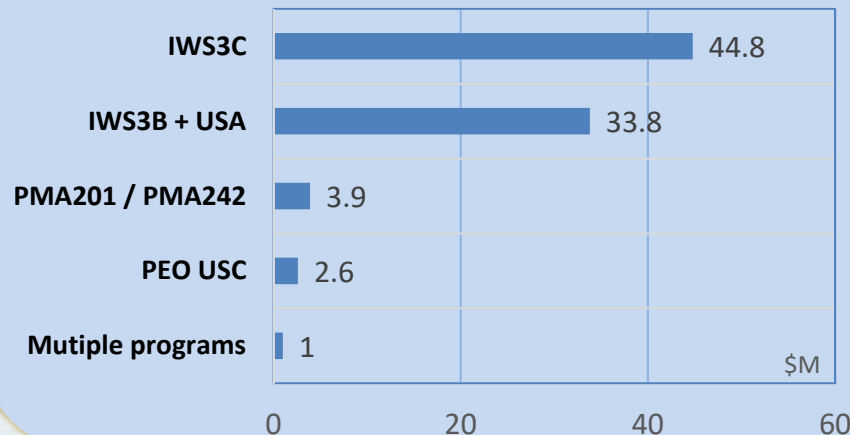
**Conventional  
Ammunition  
IS & Acq Spt**

**Mobile Ammunition  
Evaluation &  
Reconditioning  
Unit (MAERU)**

**Quad Cities  
Cartridge  
Case Facility  
Reactivation**



## Top Customers



## WFC Collaborations

- NSWC DD: Mk 45 Gun Weapon System Technical Enhancement Training and Design Agent for 2T Conventional Ammunition
- NSWC PHD: Fleet Integrated Support Team (FIST) optimizes support to the fleet via the RMC's
- NUWC & NMC Pearl Harbor Detachments Stowage Density: Mk 48 Torpedo Stackable Transportation & Storage Cradle Design, NSWC CR: Pyro Demo In Service & Acquisition Engineering Support
- NSWC DD, NSWC IHD Develop and test the JENGA 5 inch round
- Shipboard Weapons Integration Team (SWIT) is a NAVSEA/NAVAIR team that assures new weapon systems are properly supported and able to move as intended aboard ship
- NSWC Crane: Collaborate with Crane to provide acquisition engineering support for PYRO Demo commodities for the Navy



# Systems Engineering (E) Department



**Clandestine  
Delivered  
Mine (CDM)**



**Mk 70 Booster  
Mod for GQM-  
163A Target**

**Warfighter Impact**

**Heavy Weight  
(HW) Torpedo  
Prototype  
(Contender)**

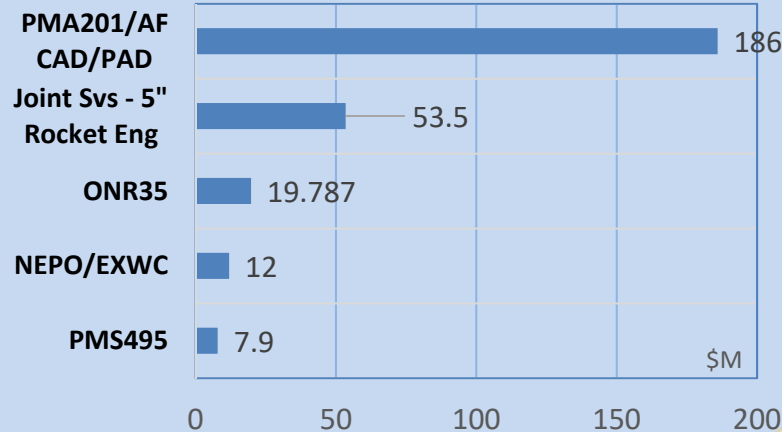
**Parachute  
Deployment  
Rocket Motor  
(PDRM) Mod 1**



**Expeditionary  
Program Office  
(NEPO) Depot  
Spt Services**



## Top Customers



## WFC Collaborations

- NSWC PCD: Autonomous AAV / MK154 (NISE 219)
- NUWC NPT, NSWC CD: RPG of the Sea
- NSWC CD: Exploitation of Foreign Mine Influence Fuzing
- NSWC DD: Clandestine Delivered Mine
- NSWC PCD: NSWC DD: System Safety
- NSWC CD: Dynamic System Mechanics Advanced Simulation (DYSMAS)

# Explosive Ordnance Disposal (D) Department



**JEOD Pubs  
(AEODPS/  
60-series)**

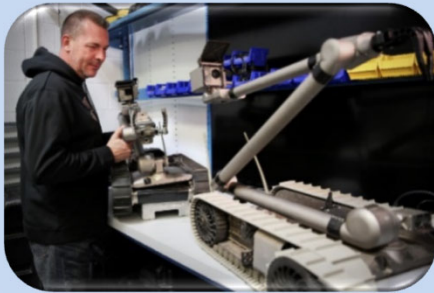
**JEOD NIPR/  
SIPR Portal**

**Warfighter Impact**

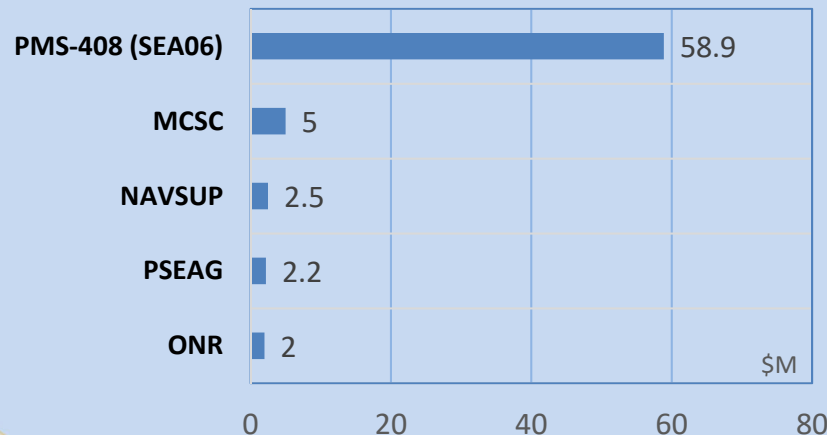
**JEOD  
Robotics**

**Explosive  
Detection  
Equipment**

**JEOD Tools /  
Technology &  
Sustainment**



## Top Customers



## WFC Collaborations

- NSWC Crane: EOD and JCREW programs (Collaborate on several PoRs), also proposing Joint NISE 219 w/Crane for Hemlock program
- NSWC Dahlgren: New/developing collaboration on unmanned communications utilizing IHD Developed FlexCSR Radio and encryption as well as UAS efforts (DD), future NISE 219 proposals
- NSWC Carderock: 2017 ANTX UGV (IHD) launched off USV
- Multiple: Unmanned Vehicles & Autonomous Systems (UVAS) WG – Since 2017 weekly interface between WFCs on projects, unmanned systems needs, etc.



# Roles of the Warfare Centers



- Make naval technical programs successful
- Provide a bridge between the technical community and the warfighter
- Determine and develop capabilities for the fleet
- Verify the quality, safety, and effectiveness of platforms and systems
- Design, develop, and field solutions for urgent operational fleet needs

## Operating Principles

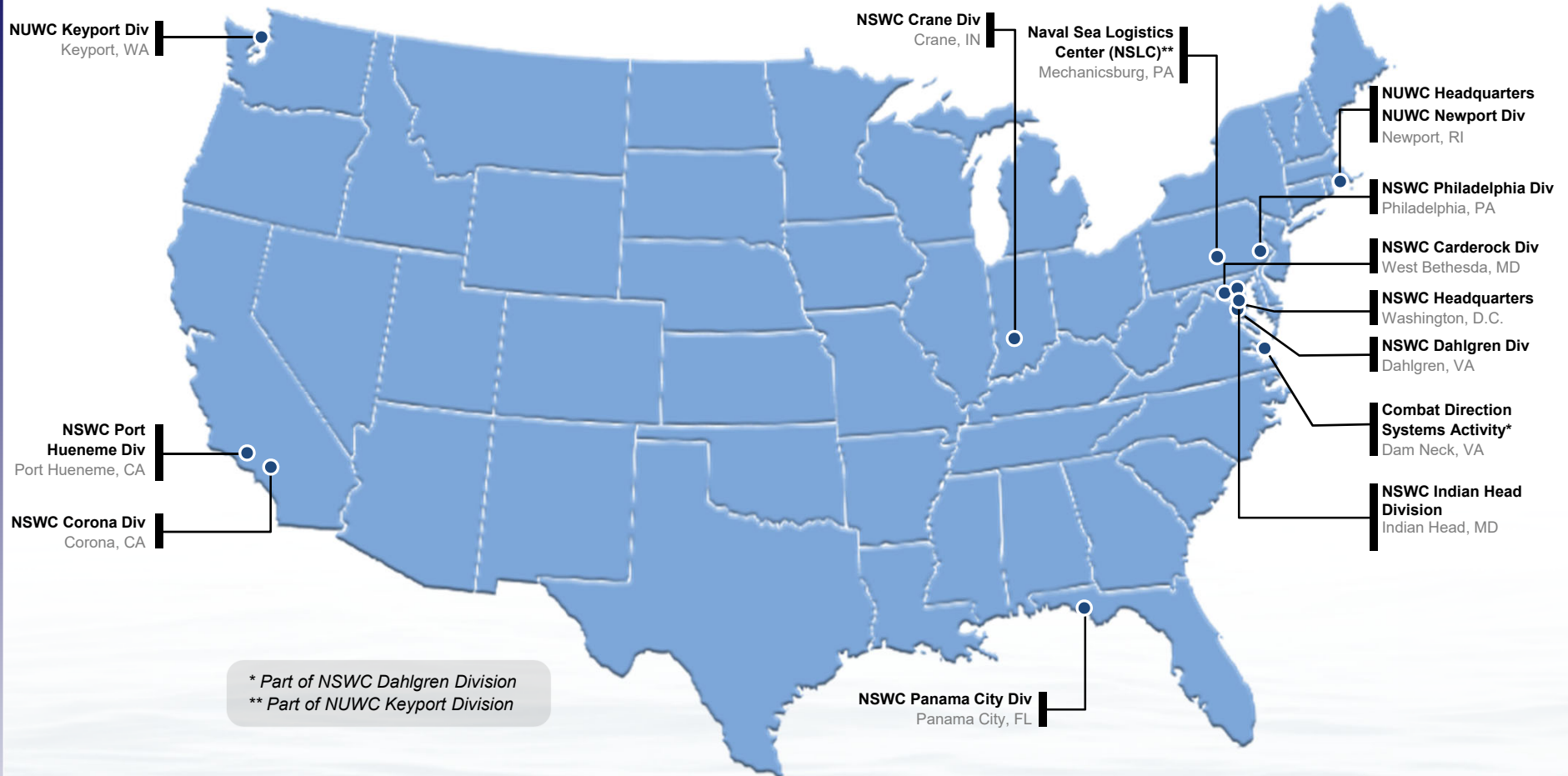
- Part of the Naval Research & Development Establishment (NR&DE)
- Technical Capabilities - disciplined process for accepting and assigning the right work to the right Division
- Operate under the Navy Working Capital Fund business model
- Workforce size based on funded workload
- Perform work our industry partners can't, won't or shouldn't do

***One Team: Expanding the Advantage***





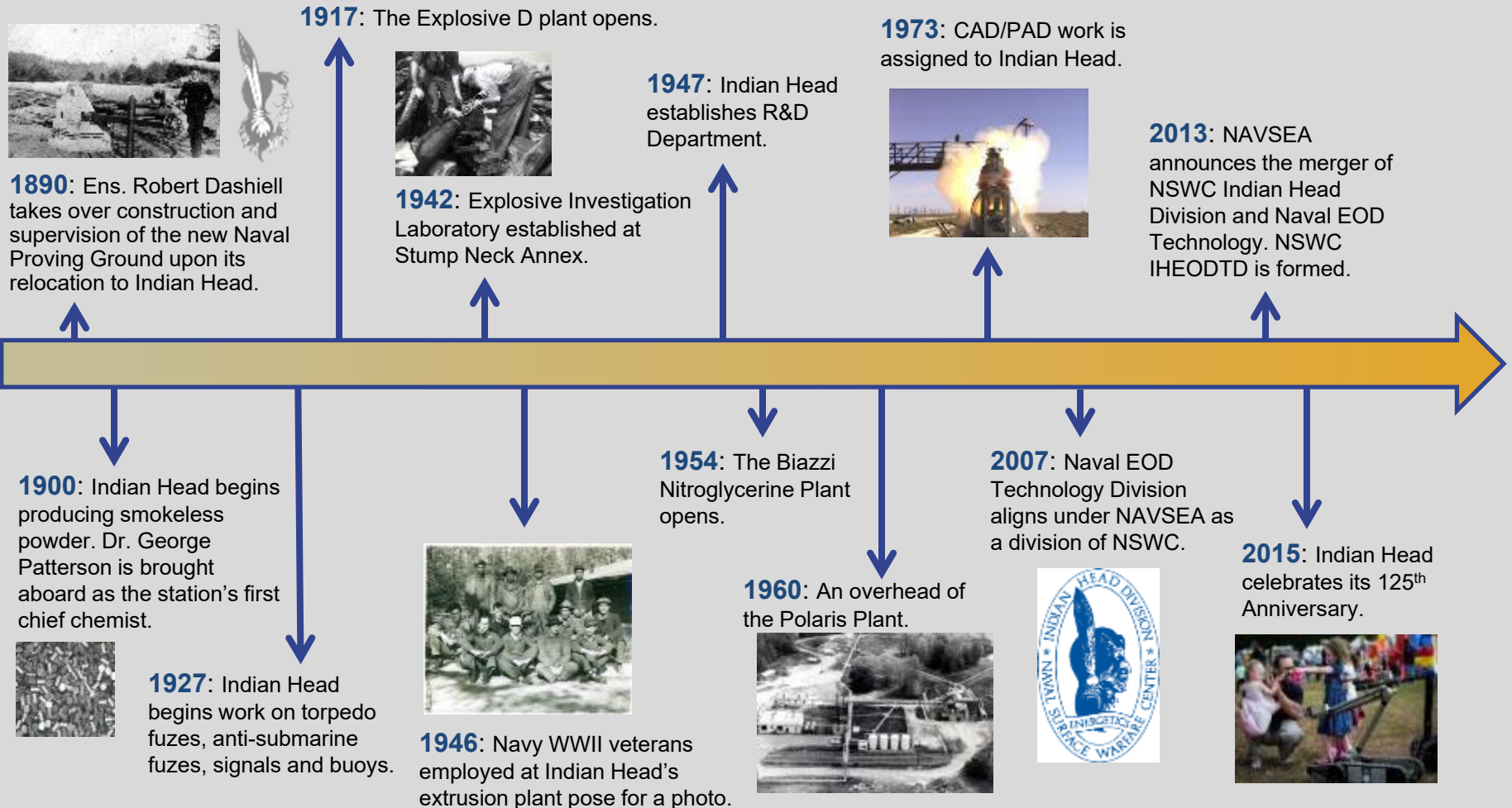
# NAVSEA Warfare Centers at a Glance



## Warfare Center Quick Facts

- ❖ ~24,479 diverse and highly educated employees focused on innovation (~16,400 scientists, engineers, and technicians with ~750 Ph.D.s)
- ❖ 129 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
- ❖ Part of the Naval Research & Development Establishment (NR&DE)
- ❖ 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

# Command Timeline



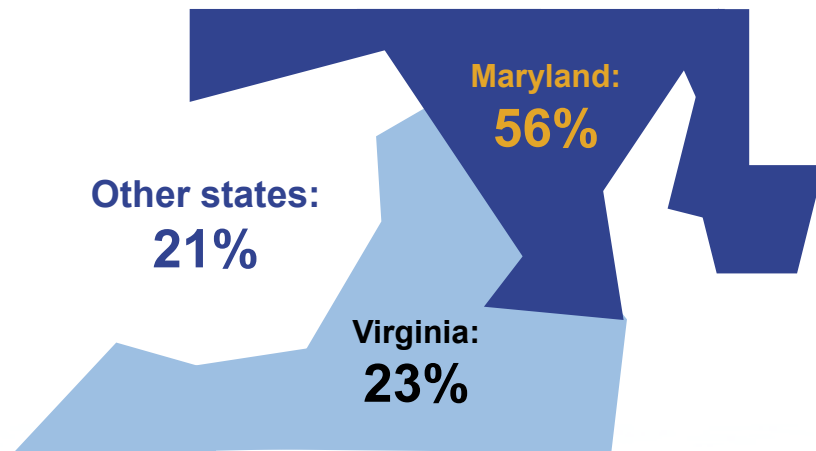
**FLY FARTHER**

**HIT HARDER**

**SAVE LIVES**

# Economic Impact

## Where We Live



## County-by-County Breakdown (Maryland)

Charles County	68%
Saint Mary's	12%
Prince George's	10%
Calvert	3%
Anne Arundel	3%
Other	4%

**NSWC IHD  
Total Maryland FY21  
Payroll**

**\$322 million**

**FY21 Maryland  
Contract Dollars**

**\$36.5 million**

# Technology Transfer

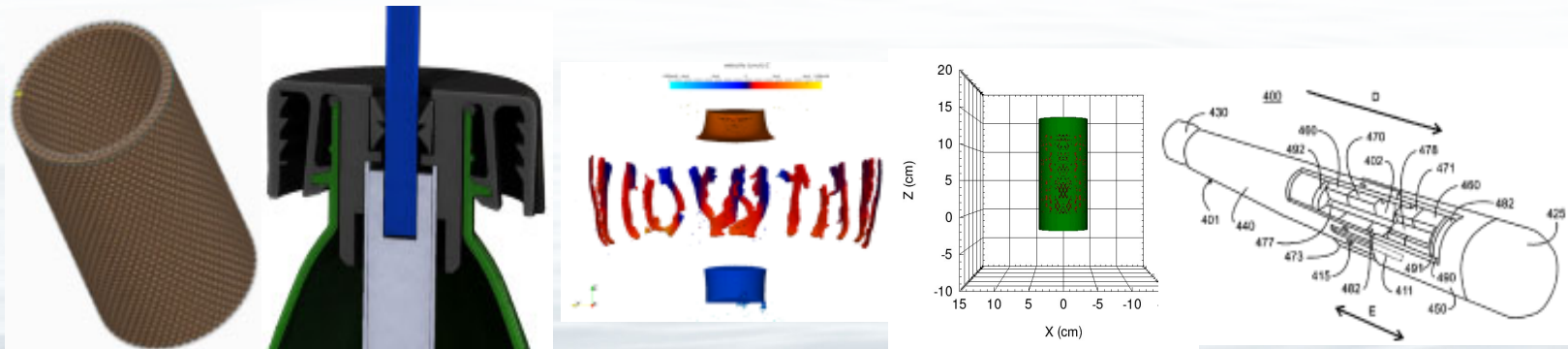
NSWC IHD Technology Transfer initiatives look to jointly develop dual-use technologies with academic and private industry partners, develop collaborations with partners interested in access to our unique expertise and facilities, and assist in the commercialization and marketing of our intellectual property.

## Partnering Agreements

- 73 Active CRADAs
- 4 Patent License Agreements
- 9 Educational Partnership Agreements
- 8 Partnership Intermediary Agreements

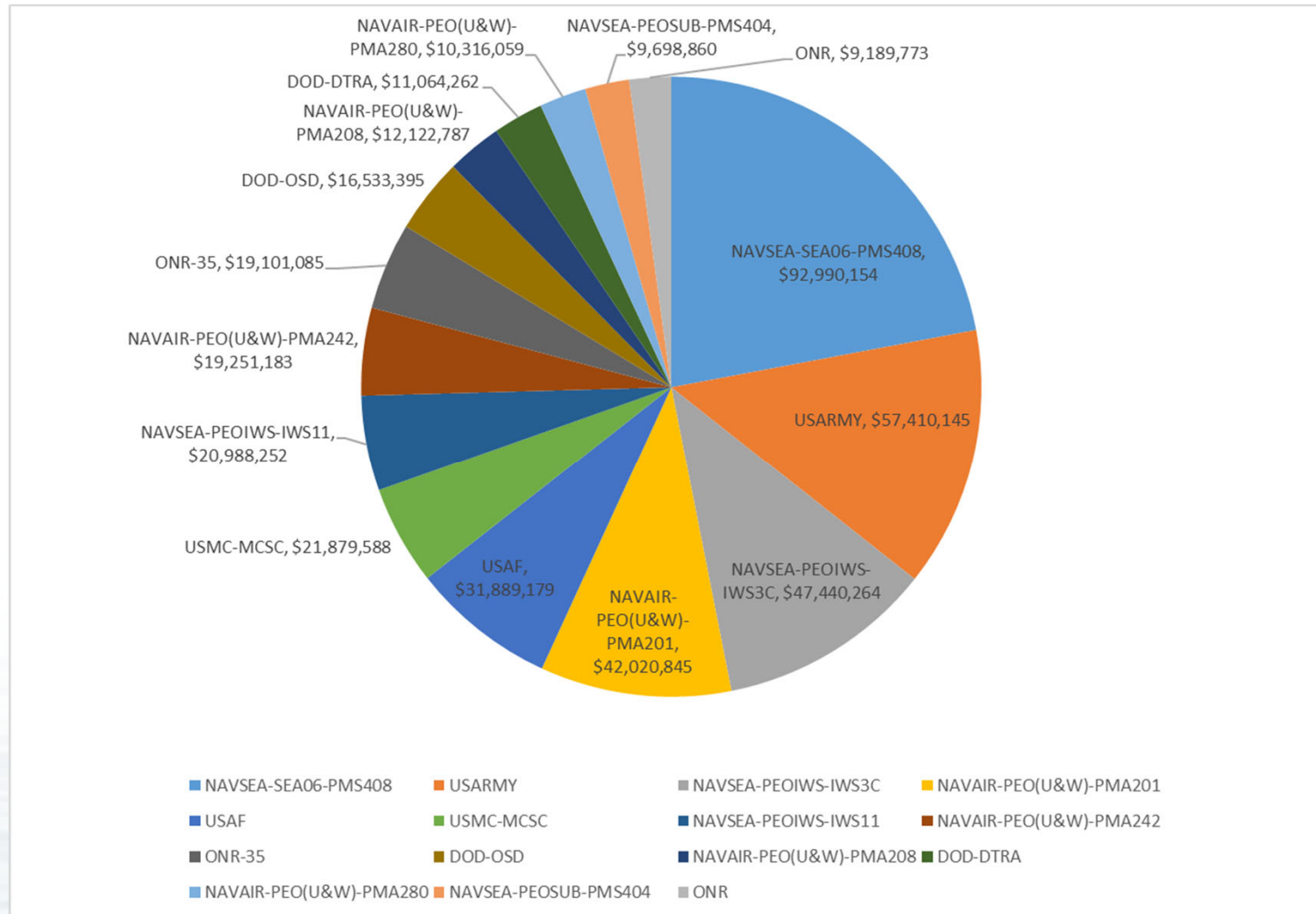
## 10 Year Metrics

- CRADAs
  - 144 collaborations
  - \$18 million
- Patents
  - 172 patents awarded
  - \$71,000 in revenue





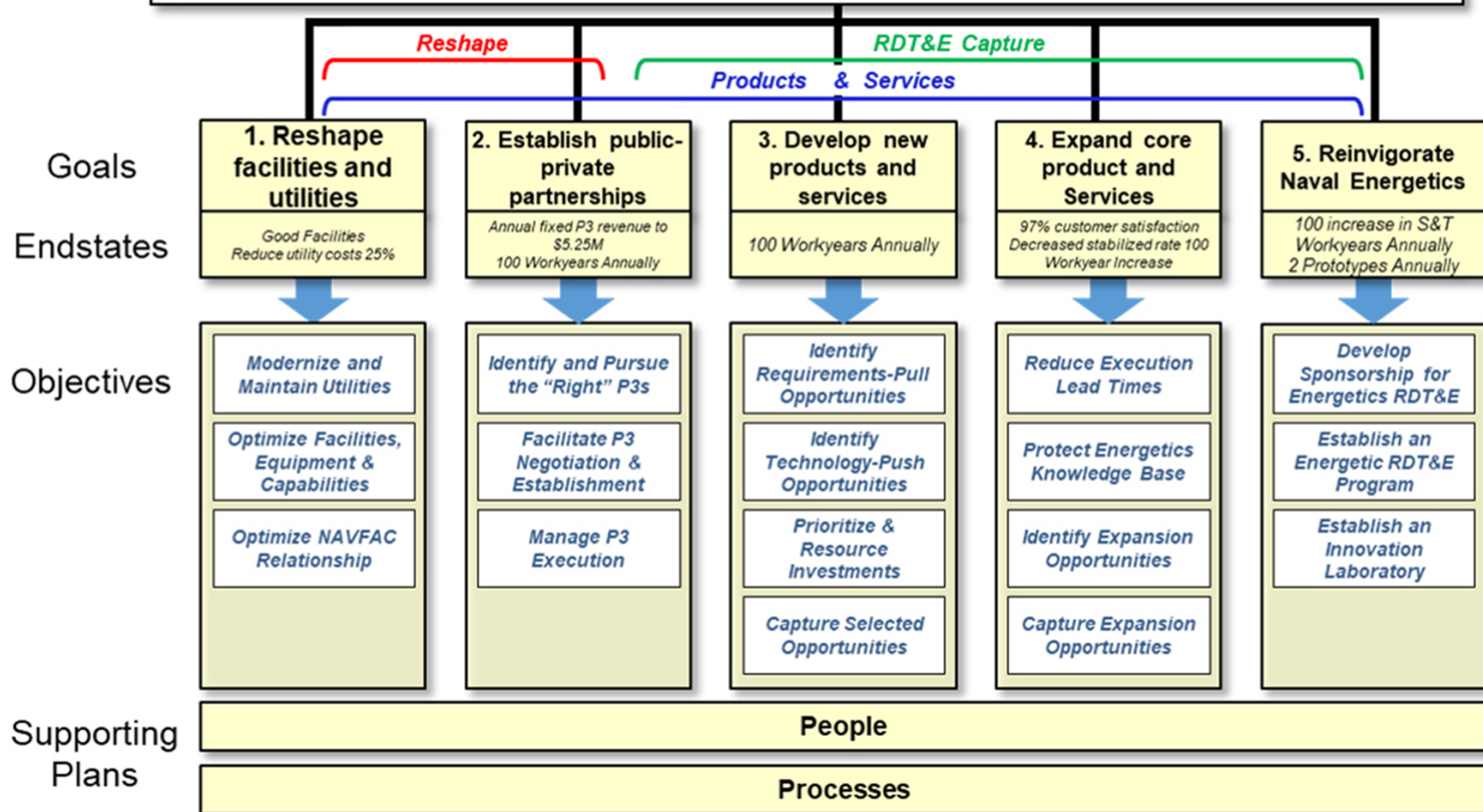
# FY20 Customer Base (Top 15)



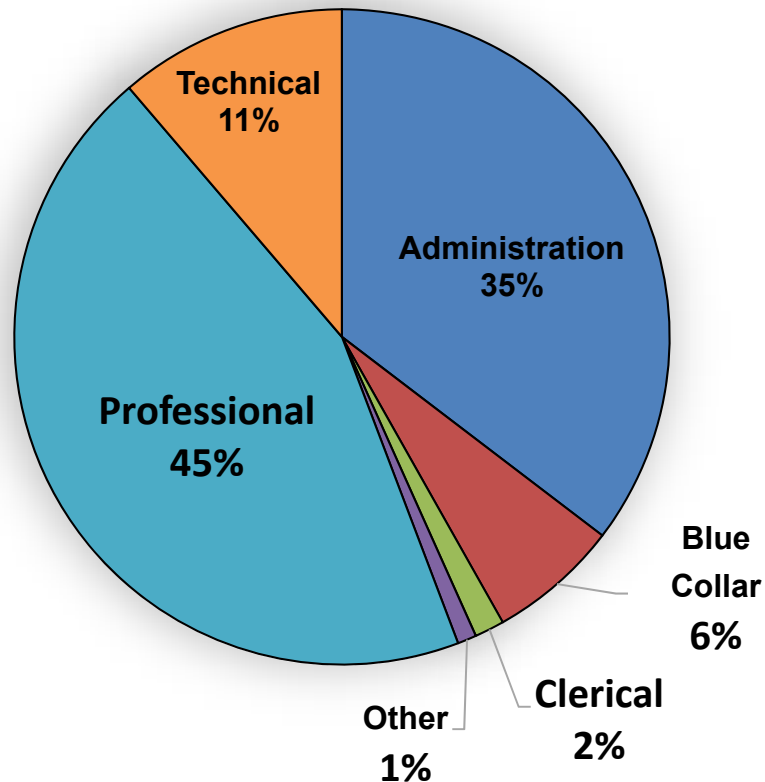
**Total FY20 accepted reimbursable authority is approximately \$596 million**

# Strategic Vision and Goals

**Vision:** In 10 years, NSWC IHD will grow 400 work-years stronger by **reshaping our industrial complex**; **capturing research, development, test and evaluation (RDT&E) opportunities in energetic systems**; and **providing reliable, quality and affordable products and services**.



# Occupational Demographics



*Trades and technicians both unique and essential for explosive manufacture, scale-up, laboratory operations and energetic tests and evaluations.*



# S&T/RDT&E





# Full Spectrum Capabilities

**Research  
Development  
Test & Evaluation**

**Engineering**

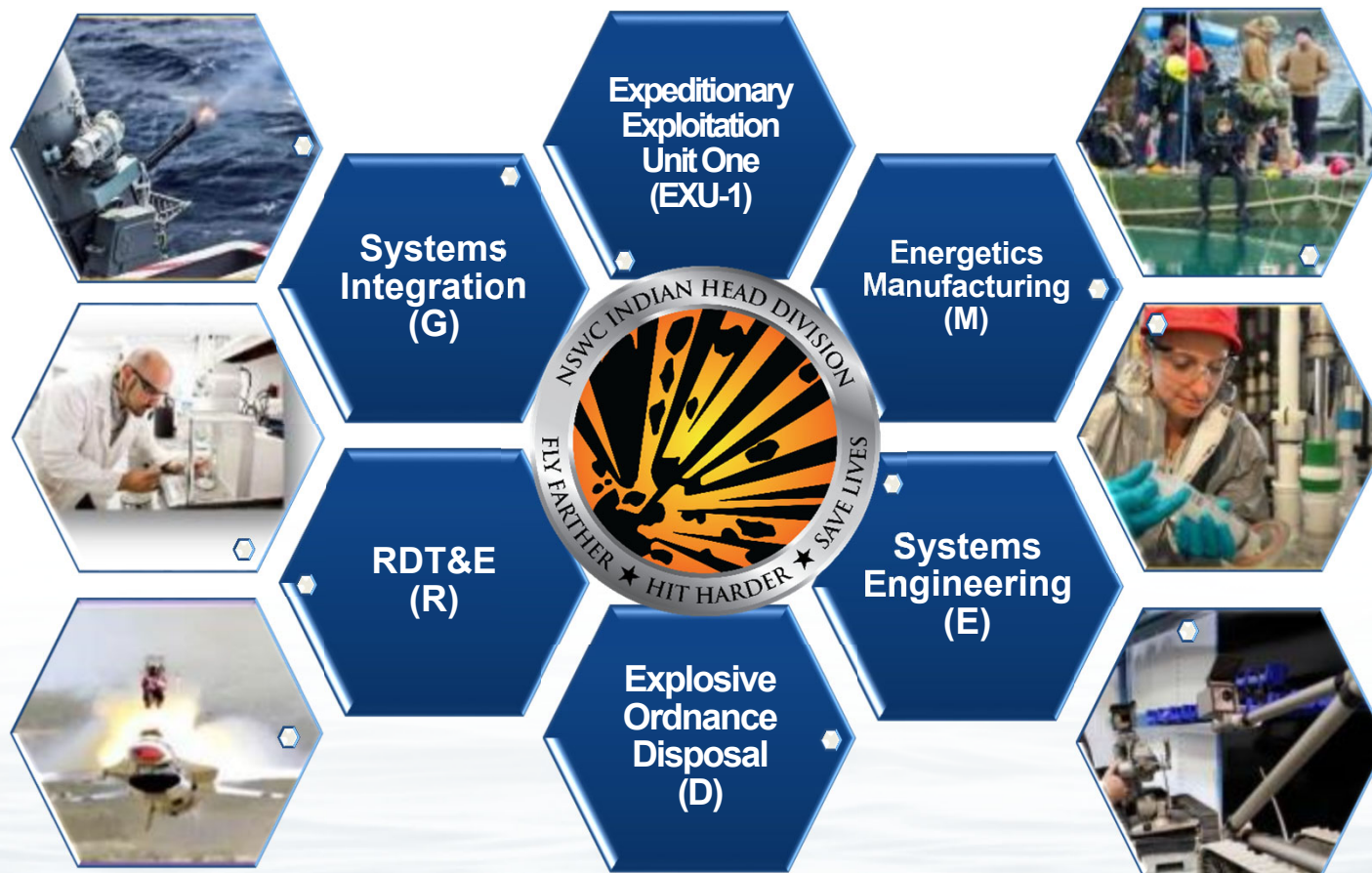
**Manufacturing**

**Operational  
Footing**



**Indian Head's operations range full spectrum from basic research to warfighter support**

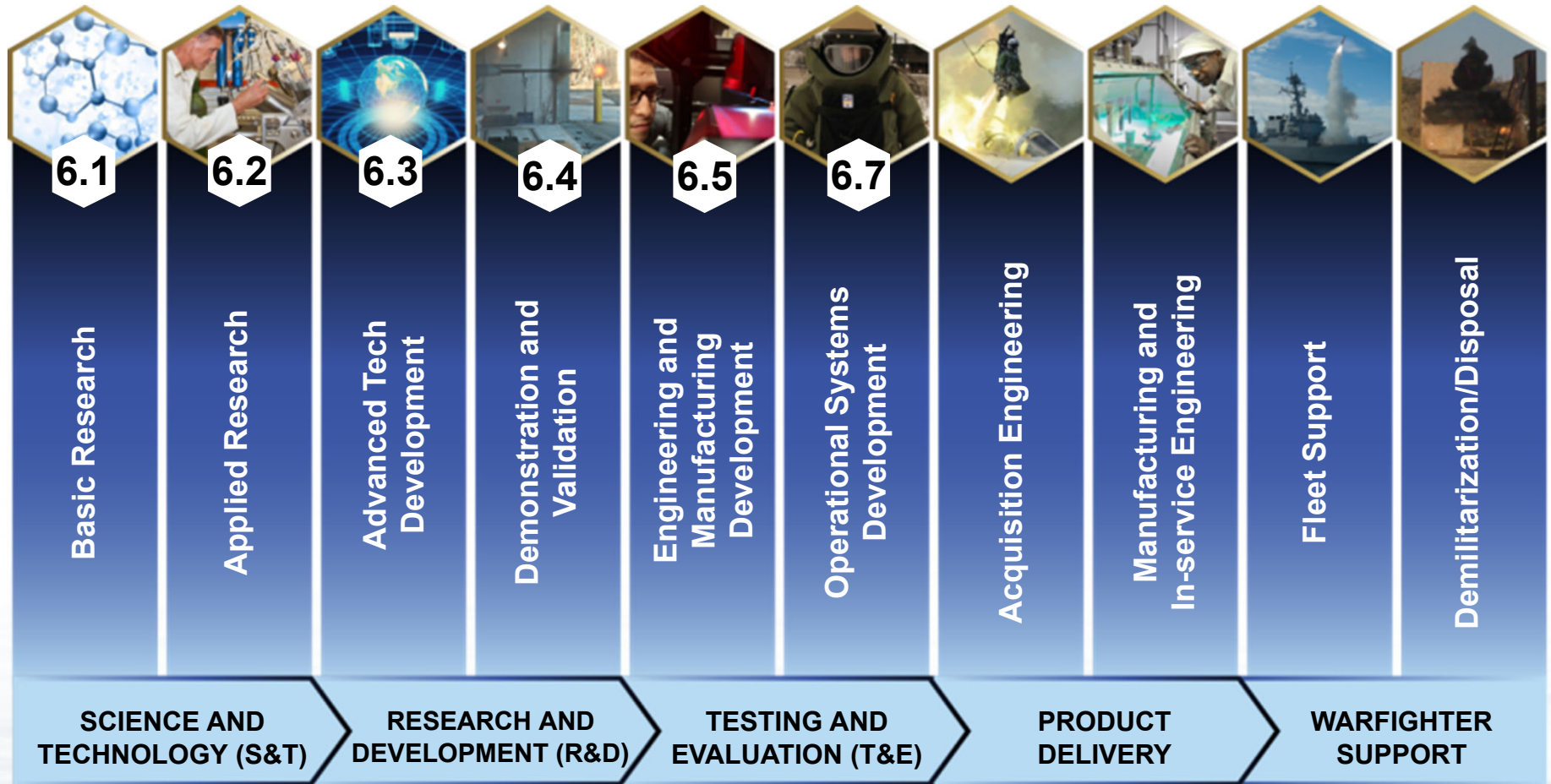
# Technical Departments







# Molecule-to-Mission






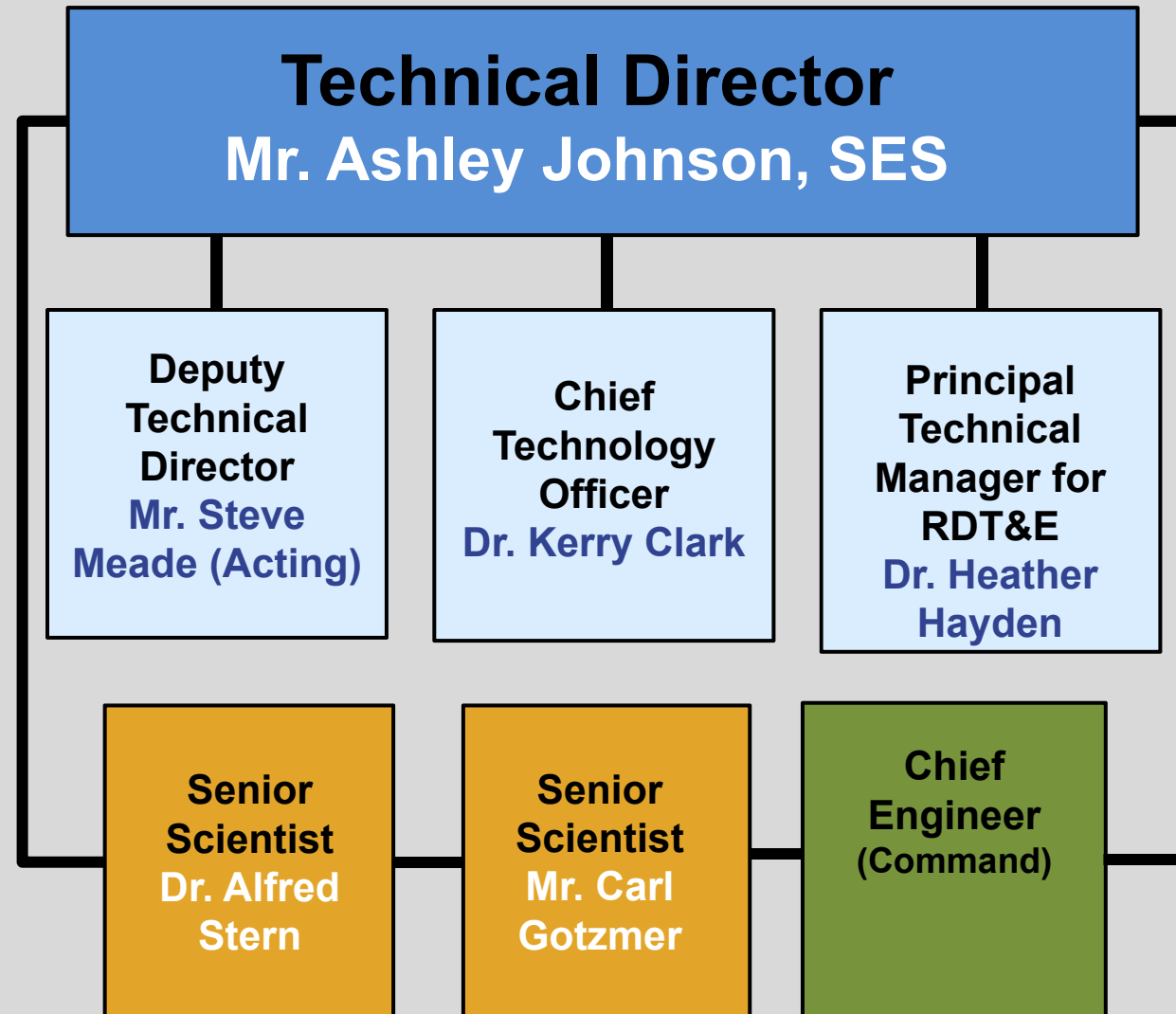
Only DoN activity delivering both energetics and EOD technology solutions from basic research through disposal

# Scientific Technical Staff



## Key

-  = Senior Technologists
-  = Senior Scientists
-  = Chief Engineer







# Explosive Ordnance Engineering (SEA-05E)



Deputy Warrant Officer  
*Ashley Johnson, SES*

Deputy Director  
*Spencer Johnson*

## Technical Warrant Holders

Explosives (05E1)  
• Michael Kenyon

PHS&T (05E2)  
• David Hoegler

Propellants and Energetics  
Propulsion (05E3)  
• Dr. Jamie Gumina

CAD / PAD (05E4)  
• John Burchett

EOD (05E5)  
• Michael Hollander

Small Arms (05E6)  
• David Long

Anti-Terrorism Afloat (05E7)  
• Mike Konerman



# Technical Capabilities



1. EOD / improvised explosive device (IED) / counter radio-controlled IED electronic warfare (CREW) threat and countermeasure information development and dissemination
2. EOD / IED / CREW technology development and integration
3. Emergent and national-need requirement energetics, S&T, ordnance components and systems
4. Air warfare energetics, ordnance components and systems
5. Surface warfare energetics, ordnance components and systems
6. Expeditionary and undersea warfare energetics, ordnance components and systems
7. EOD Unmanned Systems
8. Conventional and Improvised Weapons Exploitation
9. Chemical, Biological, and Radiological Defense Systems
10. Force Protection Systems Engineering, Integration, and Equipment Ashore

# Center for Industrial and Technical Excellence



NSWC IHD received Title 10 sec 274 designation as a Center for Industrial and Technical Excellence (CITE) for Energetics and Ordnance systems Depot maintenance and Arsenal activities in May 2014.

CITE designation provides the legal authority for NSWC IHD to form Public-Private Partnerships (P3).

- Workloads critical plant complexes
- Facilitates collaboration with private industry
- Reduces total ownership costs to the NAVY, promoting financial viability



## To date we have entered into five P3 agreements with Private Industry

- Chemring – APOBS Grain Manufacture
- Chemring – Mk90 Grain Manufacture
- NEIH – Rocket Motor and Warhead Manufacture
- GreyOps – Explosive Neutralization Tools for EOD Applications
- GMP - RDT&E and Manufacture of Energetic Materials and Ordnance Systems

**We are currently engaged in active P3 negotiations with several companies and expect three new P3s to be finalized in FY2021**



# Warfighter Products



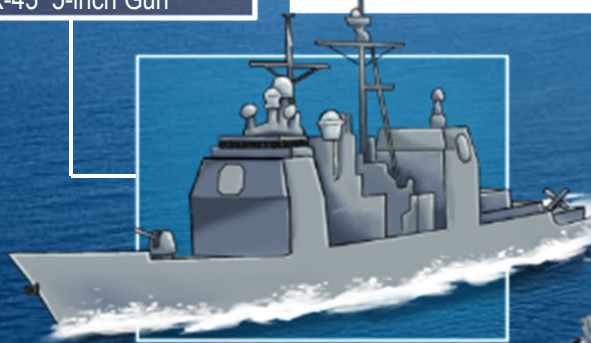
# CARRIER STRIKE GROUP

Phalanx CIWS  
SM-2 Missile  
MK-53 Decoy Launching System  
Tomahawk Missiles  
MK-45 5-inch Gun

NSWC IHD provides products that are utilized across all Carrier Strike Group vessels and aircraft.



CAD/PAD  
Sidewinder Missile



Otto Fuel for Torpedoes  
Tomahawk Missiles  
CAD/PAD

Evolved SeaSparrow Missile  
MK-53 Decoy Launching System  
CAD/PAD  
Countermeasure Anti-Torpedo  
Phalanx CIWS

MK-45 5-inch Gun  
Standard Missile  
Tomahawk Missiles  
Otto Fuel for Torpedoes  
Phalanx CIWS  
MK-53 Decoy Launching System

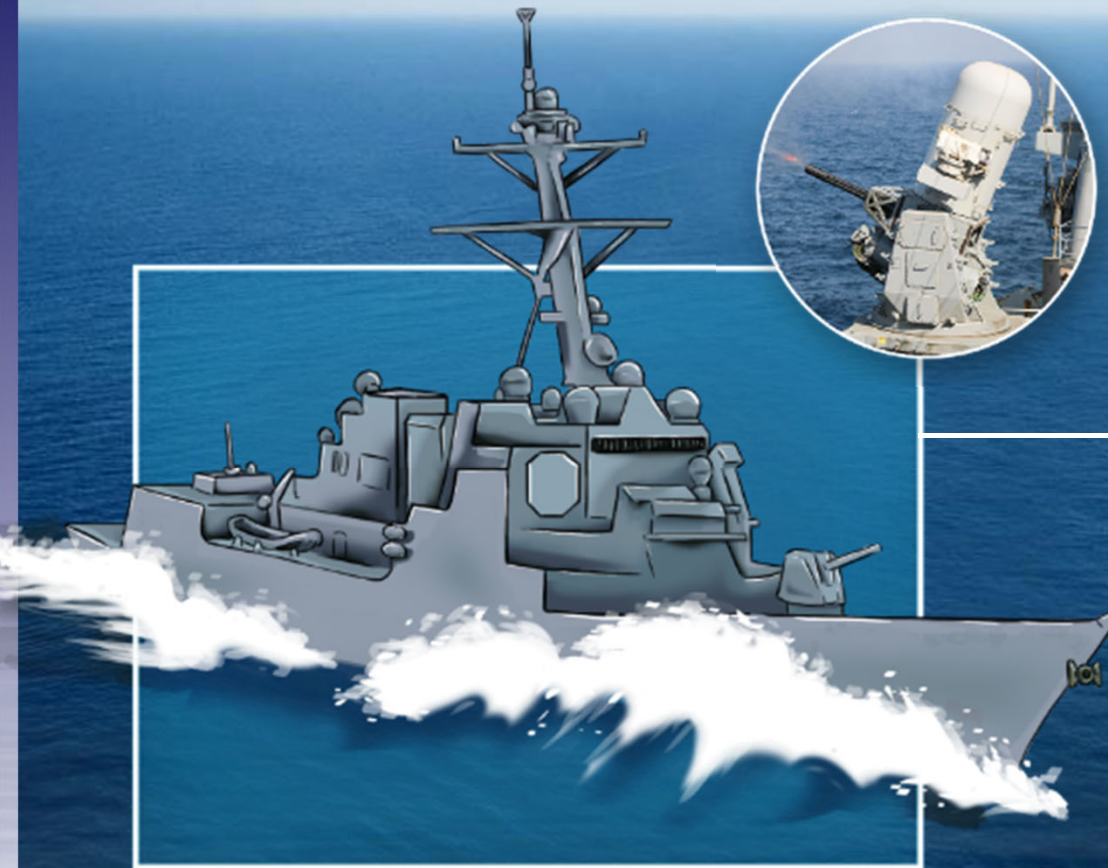


# CARRIER PRODUCTS



Phalanx CIWS  
MK-53 Decoy Launching System  
Countermeasure Anti-Torpedo  
Evolved SeaSparrow Missile

# DESTROYER PRODUCTS



MK-45 5-inch Gun  
SM-2 Missile  
Tomahawk Missiles  
Otto Fuel for torpedoes  
Phalanx CIWS  
MK-53 Decoy Launching System



# AIRCRAFT PRODUCTS

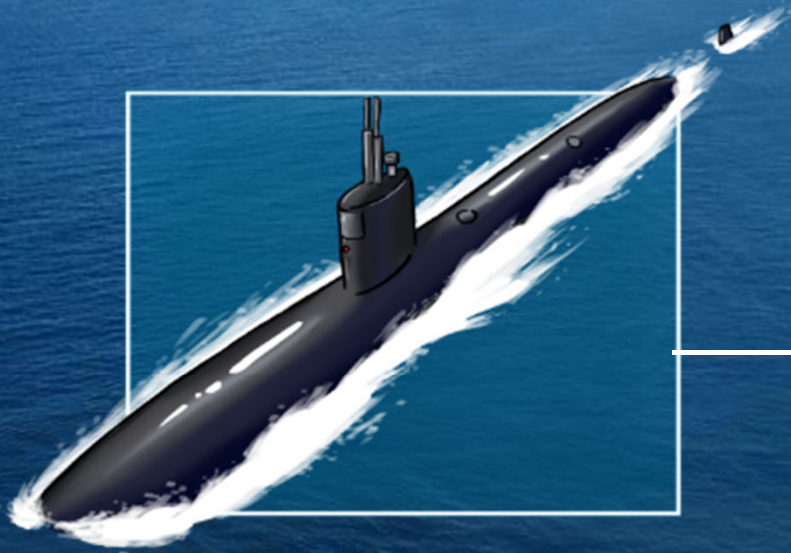


Sidewinder Missile  
CAD/PAD Products  
2.75 in. Rockets





# SUBMARINE PRODUCTS



Otto Fuel for Torpedoes  
Tomahawk Missiles  
CAD/PAD