



NSWC
NAVAL SURFACE WARFARE CENTER



NAVSEA WARFARE CENTERS

TECHNICAL CAPABILITIES MANUAL

Revision 6
7 July 2015

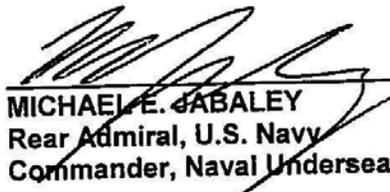


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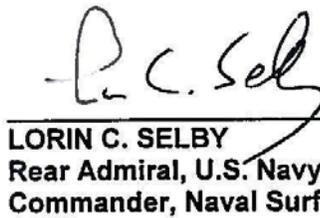
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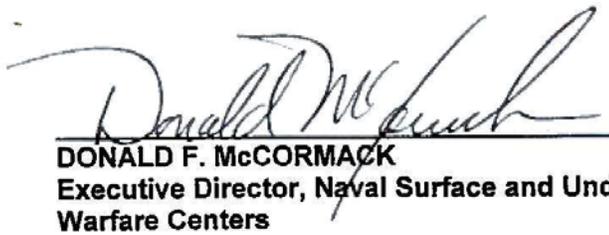
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CHANGE RECORD

Date	Rev	Change Description
1/10/07	Baseline	Created baseline document from 23 Feb 06 version and latest status of TCs overlap resolution
2/27/07	1	Corrected description of DD30 that was entered incorrectly in 10 Jan 07 version Incorporated approved TC changes from 13 Feb 07 BOD TC Overlap meeting Converted all previously approved TC descriptions to Green headers and Black text and updated status of outstanding TC overlaps Changed Appendix B from TC Overlap Status Presentation to TC Approval Summary
7/20/07	2	Incorporated BOD decisions and status changes since Revision 1 Changed all technical capability titles to BLACK that were formerly GREEN, removing TC overlap resolution history Changed color code in TC overlap status table to indicate open issues as RED instead of YELLOW
01/01/08	3	Incorporated BOD decisions and status changes since Revision 2 resulting in no unresolved TC overlaps
12/08/10	3	Created Addendum 1 to Rev3 incorporating BRAC 2005 changes for Picatinny, moving CR02 to IH06 and PH05 to IH07
06/01/11	4	Incorporated Addendum 1 of Revision 3 (listed above) Incorporated BOD decisions of 1 June 2011 Update of Appendix A, Technical Capability Proposal, Review, and Approval Process General administrative corrections to Revision 3
01/25/13	4	Created Addendum 1 to Rev 4: incorporating new TC AC07 for Seal Beach; deleting TC PH06 for BRAC 2005 transfers; removing radiological work from CD18 and creating a new TC (CD25) for that work; updating TC DD20 to add ISE to the CBRD work
06/07/13	5	Incorporated Addendum 1 of Revision 4 (listed above) Incorporated BOD decisions of 12 June 2013 Deleted Appendix B

07/07/15 6

Incorporated BOD decisions since Revision 5 and incorporated Addendum 1 of Revision 5 (dated 26 February 2014) to create Appendix B.

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EXECUTIVE SUMMARY

This document lists and defines the current technical capabilities (TCs) of the NAVSEA Warfare Centers.

The NAVSEA Warfare Centers (WC) are composed of the Naval Undersea Warfare Center (NUWC) and Naval Surface Warfare Center (NSWC). Together they cohesively and seamlessly operate the Navy's full spectrum research, development, test and evaluation, engineering, and Fleet support centers for offensive and defensive systems associated with surface warfare, undersea warfare and related areas of Joint, homeland and national defense systems from the sea.

NUWC has two Divisions with the lead locations in Newport RI and Keyport WA. Keyport Division has a second major site, Naval Sea Logistics Center, in Mechanicsburg, PA. NSWC has eight Divisions with the lead locations in Carderock MD, Corona CA, Crane IN, Dahlgren VA, Indian Head MD, Panama City FL, Philadelphia PA, and Port Hueneme CA. Dahlgren Division has a second major site, Combat Direction Systems Activity, in Dam Neck VA. To accomplish their mission, the Divisions have specific and unique TCs which describe the work they perform. A TC is defined as follows:

A technical capability represents the blending of intellectual and physical assets provided by a cadre of technical people with knowledge, skill, experience and requisite facilities and equipment that yield the ability to deliver technical products. The work in a TC is core when the function enables the accomplishment of a Division's key mission element and/or is inherently governmental, particularly in the case of value judgments affecting technological superiority; i.e., the quality and effectiveness of weapons, combat systems, and ship systems.

This document publishes the FY15 baseline of WC TCs defined by the Divisions and approved by the Warfare Centers Board of Directors (WCBOD). TC nomenclature consists of a two letter Division/two number designator, followed by the TC title. Management and assessment of these TCs is performed at the Division and Headquarter/national level to help avoid competition and redundancy and ensure that efficiencies and synergies between the Divisions are realized.

This document will be reviewed and updated to maintain the national stewardship of technical capabilities identified in the Warfare Centers Concept of Operations (CONOPS). Appendix A describes the process for defining, proposing and reviewing TCs for potential addition to, or removal from, the FY15 baseline. Appendix B provides Roles and Responsibilities matrices for work in specific mission and product areas.

CARDEROCK

CD01 Ship and Submarine Design and Integration

Provides integrated, complete life cycle surface ship and submarine hull, mechanical, and electrical (HM&E) design solutions through application of naval architecture and system engineering disciplines. This includes integration of the HM&E systems into or for the total ship solutions developed throughout the Naval Enterprise. Services are provided such as engineering management support (ship design managers, deputy ship design managers, systems engineering managers, design integration managers, and major area integration team leads), reliability, maintainability and availability (RM&A) acquisition support and analysis, and fundamental naval architecture services of ships and submarines (such as arrangements, weights and stability, ship specification development and review).

CD02 Ship and Submarine Acquisition Engineering

Provide technical support to acquisition programs in the areas of hull, mechanical, and electrical (HM&E) systems and cost engineering. Services are provided to support the assessment, development, transition and integration of new HM&E technologies into ships, submarines and expeditionary platforms. Maintains subject matter expertise capable of supporting major acquisition milestones in the areas of: technology readiness level assessments (TRLA), technology transition planning (TTP), systems engineering management plans (SEMP), test evaluation master plans (TEMP), shipboard applications of modularity and open systems architecture, program protection plans (PPP), program life cycle cost estimates (PLCCE), program-specific risk assessments and total ownership cost reduction initiatives.

CD03 Ship and Submarine Systems Concepts, Technologies, and Processes

Provides the development, application, and advocacy of advanced concepts, technologies, and processes to support total ship systems engineering (TSSE). The following areas are included: information, software, and hardware integration and interoperability associated with ship design; information technology for ship life cycle support and other Navy needs; shipbuilding process improvements, product data acquisition, development, management, distribution, and use; ship costing, manpower, warfare assessment, and early stage design tool development and application; and development and application of collaborative teaming tools and environments.

CD05 Combatant Craft and Expeditionary Vehicles

Provides naval architecture and marine engineering full spectrum, full life cycle support for the government's combatant craft and boats and technical expertise for expeditionary vehicles and expeditionary vehicle science and technology (S&T) programs. The synergistic integration of full spectrum, full life cycle boat/craft expertise and experience

near the boat/craft fleet provides for unique capabilities. Provides boat/craft level integration for all naval architecture and marine engineering aspects of boat, craft and vehicle development including vehicles with all types of hull forms and mission requirements from unpowered, towed craft to high speed vehicles with dynamic as well as buoyant lift.

CD06 Unmanned Vehicles Naval Architecture and Marine Engineering

Provides naval architecture and marine engineering expertise and facilities for the design, development, and testing of unmanned vehicles and their physical integration with existing and future manned Naval and expeditionary vehicles; and the fielding of all unmanned surface vehicles and unmanned subsurface vehicles with increasing responsibility when the vehicle size is larger than torpedo diameters, and unmanned air and ground vehicles. In addition, provides naval architecture and marine engineering expertise and facilities for launch and recovery of those unmanned vehicles (excluding payloads) from ships and submarines.

CD07 Hull Forms and Fluid Dynamics

Provides the Navy's hydromechanics capability for surface and undersea vehicle platforms (excluding small unmanned undersea vehicles (UUVs) and torpedoes). Supports all marine vehicles, including surface ships, submarines, unmanned vehicles, and other craft by developing the technologies for systems and procedures that define the external shape of the vehicle, the control systems and control surfaces. These systems are necessary to ensure that the performance of each platform meets mission requirements for controllability, powering, mobility, seakeeping, and signatures. These characteristics, to a large part, determine the safety, efficiency, and affordability of the platform operation. Addresses vehicles with all types of hull forms and mission requirements from unpowered, towed vehicles to high-speed vehicles with dynamic as well as buoyant lift. Aspects of aerodynamics, including the assessment of ship topside performance and the ship/aircraft interface for all air-capable ships, are included. The Division provides the required, extensive and highly specialized model testing facilities necessary to fully support sponsors, and to develop and validate analytic tools used to design and/or assess alternatives to meet Navy requirements.

CD08 Propulsors

Provides assessment and design capability for Navy's propulsor for surface and undersea vehicle platforms (excluding small unmanned undersea vehicles (UUVs) and torpedoes) including surface ships, submarines, unmanned vehicles, and other craft by developing the technologies, including computational fluid dynamics, for systems and procedures to design, assess, test, and verify propulsor performance. These systems are necessary to ensure that the performance of each propulsor meets mission requirements for effectiveness, produce-ability, size, weight, and signatures. These characteristics, with structural and material properties, determine the safety, efficiency,

and affordability of the propulsor. Extensive and highly specialized model testing facilities, including the Large Cavitation Channel, water tunnels, and towing basins, necessary to fully support sponsors and to develop and validate analytic tools used to design and/or assess alternative propulsors to meet Navy requirements are included. The quiet, efficient propulsor design capability included in this technical capability does not exist elsewhere in the world. Industry does not have this capability, nor does it exist outside the United States.

CD14 Surface, Undersea, and Weapon Vehicle Materials and Manufacturing Technology

Provides research, development, test, and evaluation (RDT&E), acquisition support, and in-service engineering (ISE) for surface, undersea and weapon vehicle materials and manufacturing technologies (excluding torpedoes, small unmanned undersea vehicles (UUVs) and energetics). RDT&E and acquisition support will include structural and machinery components. ISE will focus primarily on structural applications, and will include machinery applications on an ad hoc and as needed basis. Includes certifying and validating technical requirements for all materials used in the Fleet; supporting Navy safety standards; identifying materials and fabrication processes; analyzing engineering mechanics and fitness for purpose; developing and validating chemical formulations; and metallic and non-metallic tests and characterizations; fabricating and testing prototypes of ship systems and components; and developing materials, and manufacturing processes for survivability systems, sea borne signature reduction, ship structures, weapons, and propulsion and auxiliary machinery systems.

CD15 Surface and Undersea Vehicle Structures

Provides full spectrum research, development, test, and evaluation (RDT&E), and supports acquisition for surface ship and submarine structures. Includes identifying new structural concepts and materials applications; identifying potential failure modes; developing and validating methods to predict seaway, ice-breaking, and other loads; developing and validating structural analysis and design procedures; proven analytical and experimental procedures to support ship design; confirming designs through analysis, model tests, sea trial, and deep dives; works in concert with in-service engineering (ISE) agents to transition RDT&E and supports ISE agents as requested.

CD16 Alternative Energy and Power Sources R&D

Provides the research and development (R&D) personnel, equipment, facilities, and necessary body of knowledge to investigate, develop and implement programs in emerging alternative energy source technologies. Combines the strengths of the Navy's recognized leaders in electrochemical power sources (e.g. batteries and fuel cells) R&D and leadership in marinization and ship integration with other disciplines such as nuclear technologies, biotechnology, physics, materials science, and shipboard electric power systems enabling the development of energy source specifications, which

effectively address safety and environmental issues as well as performance requirements. Includes certification of advanced technology energy/power sources.

CD17 Liquid Waste Management, Science and Systems

Provides RDT&E necessary to equip Navy ships and ship-to-shore operations with liquid waste collection, transfer, management, treatment and discharge procedures, equipment, and systems that are best suited and/or designed to meet the unique requirements within the constraints of the warship environment (e.g., environmental compliance, space, weight, stealth, noise, logistics, manning, etc.). Capability includes the prevention, management, and cleanup of liquid waste spills. Products are the technologies, engineering, equipment, systems, processes, and procedures that are necessary to ensure that Navy ships and submarines can perform their mission worldwide in accordance with liquid waste discharge regulations. Capability includes technologies for non-skid surface cleaning, underwater ship hull husbandry, and hull surface preparation and painting in drydocks. Functions performed include RDT&E, design and acquisition support, and engineering for new ship and submarine designs and potential back-fit applications. Provides the body of knowledge to design, develop technologies and systems as well as evaluate commercially available liquid waste systems for new construction or back-fit on ships and submarines, ensures independent and objective testing, validation, integration, and certification of products; and provides teaming/partnering with industry and academia to ensure technological superiority for the future fleet's war fighting systems.

CD18 Solid Waste and Hazardous Material Management, Science and Systems, and Ships and Subs Systems Safety

Provides RDT&E necessary to equip Navy ships with solid waste and hazardous (solid, liquid and gaseous) material collection, management, transfer, treatment and discharge procedures, equipment, and systems that are best suited and/or designed to meet the unique requirements within the constraints of the warship environment (e.g., environmental compliance, space, weight, stealth, noise, logistics, manning, etc.). Capability includes thermal destruction technologies for solid and concentrated liquid wastes. Provides the Subject Matter Expertise in the area of New Ship Acquisition Environment, Safety, and Occupational Health (ESOH) Management and Principals for Safety (PfS). ESOH Management expertise is provided to Ship Program Executive Offices to address all ESOH requirements throughout each phase of a New Ship Acquisition Program. Products are the technologies, engineering, equipment, systems, processes, and procedures that are necessary to ensure that Navy ships and submarines can perform their mission worldwide in accordance with solid waste discharge and hazardous material management regulations. Functions performed include RDT&E, design and acquisition support, and engineering for new ship and submarine designs, and in-service engineering, alterations, and life cycle management for current systems and equipment. Provides the body of knowledge to sustain stewardship of solid waste and hazardous material management systems throughout

their life cycle; ensures independent and objective testing, validation and integration of products; and provides teaming/partnering with industry and academia to ensure technological superiority for the future fleet's war fighting systems.

CD20 Surface, Undersea and Expeditionary Vehicle Vulnerability Reduction and Protection

Provides full spectrum support for submarines, surface ships, boats, crafts and vehicles. Vulnerability and protection products are the technologies, engineering and systems necessary to ensure that all Navy platforms have the lowest vulnerability and highest survivability possible. Products apply to the platforms, and onboard systems and equipment. Functions performed include the full spectrum of research, development, test, and evaluation (RDT&E), acquisition support and in-service engineering (ISE) for new designs and for alterations to current platforms. Products include damage tolerant hull forms, damage tolerant structures and system protection technologies to underwater explosion (UNDEX) and air explosion (AIREX) threats; shock and live fire trials, and surrogate ship tests; survivability and vulnerability analyses and assessments; weapons loading and effectiveness assessments; design guidance and analyses of alternatives; tests, analyses and assessments for achieving acquisition program live-fire test and evaluation (LFT&E) objectives; vulnerability modeling and simulation technologies and tools development and utilization; battle force survivability assessments; development of shock hardening and assessment methodologies including designs, tests and analyses certification review of UNDEX tests and transient shock analyses; develop, design, and install instrumentation sensors and systems to record dynamic loading and response of ship and submarine structures during UNDEX and AIREX events to support RDT&E and LFT&E programs; and improved armor and protection concepts to protect all platforms from current and emerging, conventional and asymmetric threats.

CD22 Surface and Undersea Vehicle Underwater Signatures, Silencing Systems, and Susceptibility

Develops technologies and methodologies employing stealth concepts to reduce ships (also submarine, unmanned vehicle, and craft) underwater signatures. Silencing concepts and products are developed from mission requirements factored with existing technology along with materials and cost considerations. In their primarily military application, the products reduce the signature at its source, reduce the signature before it is radiated, and/or impedes the return of threat sensor energy to its source (echo mitigation). Includes all ships, submarines, boats, craft, and vehicles; silencing approaches, materials, hardware, machinery and systems to reduce ships signatures; research in radiated noise, structureborne noise, structural acoustics, sonar self-noise measurement and analysis, propulsor noise, acoustic materials, machinery noise, ship vibration and airborne noise, magnetic and electric signatures, and synergistic concept integration for future quiet ships and submarines with increased tactical mission envelopes; acoustic and magnetic/electric signature measurement facilities, equipment, techniques, and sensors, including onboard systems to monitor and mitigate signatures;

the relationship of marine structures to target echo structure, the mitigation of target echo by passive means through structural design and echo reducing materials suitable for marine applications; precision active acoustic measurements and data reduction, analysis, and interpretation on full-scale and large models; measurements and analysis of radiated noise, structureborne noise, structural acoustics, sonar self noise, propulsor noise, machinery noise systems; acoustic target strength, and magnetic and electric fields. Supports the Fleet by providing awareness of signature deficiencies and capabilities, aiding in the resolution of deficiencies, and providing and maintaining reference systems for ships' signatures. Develops and maintains databases and formats for calibrated U.S. and rest of world (ROW) ship signatures. Provides scientific and engineering knowledge and facilities for planning, developing, systems engineering and integration of synthetic signature generation. Develops all signature-related Simulation/Stimulation (SIM/STIM) and their incorporation into signature-based training systems. Also includes systems/procedures for the collection of calibrated signature of ROW and threat platforms and assessment of the ability of threat systems to exploit ship and submarine underwater signature characteristics and advice to operating forces on how to minimize own ship/submarine signatures and susceptibility.

CD23 Surface and Undersea Vehicle Non-Acoustic Topside Signatures, Silencing Systems, and Susceptibility

Develops technologies and methodologies employing stealth concepts to reduce ships (submarines, surface ships, boats, crafts and vehicles) topside signatures. Silencing concepts and products develop from mission requirements factored with existing technology and materials, and cost considerations. In their primarily military application, the products reduce the signature at its source, reduce the signature before it is radiated, and/or impede the return of threat sensor energy to its source. Includes all ships, submarines, boats, craft, and vehicles: signature mitigation approaches, materials, hardware, and systems to reduce topside signatures; research in radar cross-section (RCS), infra-red (IR), and electro-optical/visual (EO/Vis); topside signature measurement facilities, equipment, techniques and sensors, including onboard systems to monitor and mitigate signatures; the relationship of marine structures and equipment to RCS, IR, and EO/Vis, the mitigation of the signature by passive means through structural design, shaping, and signature mitigation materials suitable for marine applications; measurement, analysis, and interpretation of full-scale, model, and topside components signatures; recommendation of system and component signature requirements; assessments of signatures of existing ships; signature predictions of notional vessels based on modeling and simulation; design change recommendations to mitigate topside signatures of existing and future ships; advanced electromagnetic signature theories; formulations, manufacturing processes and measurement techniques for low-observable materials, coating, and equipment; system designs for backfits, new construction, and countermeasures; and Fleet support. Also includes the assessment of the ability of threat systems to exploit ship and submarine topside signature characteristics throughout the kill chain and advice to operating forces on how to minimize own ship/submarine susceptibility.

CD25 Radiation Detection Technology Research and Management

Provides full spectrum support necessary to equip Navy ships and shore operations with radiation detectors, dosimetry devices and monitoring systems to protect Naval personnel from potential exposure to ionizing radiation. Provides the body of knowledge and the laboratory facilities for research, development, test and evaluation of new detection scintillators, solid state detectors, neutron detectors and advanced dosimetry phosphors, and provides partnering with industry to assure technological sustainment and superiority for the Fleet's war fighting missions. Executes the radiation program, to include product test and evaluation leading to contract award, product acceptance testing and assistance in fielding of equipment. Supports the formulation of national standards pertaining to radiation detection and calibration, and provides in-service engineering (ISE) support for fielded radiation detection systems. Provides facilities to support research and development (R&D) efforts related to the detection and identification of Special Nuclear Material, including state-of-the-art detection and spectroscopy systems, with the capability of producing tunable and highly controllable sources of neutrons, gamma rays and heavy charged particles.

CORONA

AC01 Warfare Systems Performance Assessment

Provides Performance Assessment of deploying and deployed complete weapons systems and combat systems using consistent, government approved criteria, processes, and methodologies. Provides customers with objective measures of systems and force-level warfare capability in threat-representative scenarios and operational environments. Manages the operational collection, distribution, and analysis of Navy, Joint, and Coalition warfare system data. Identifies and evaluates factors that enhance or limit systems capability and effectiveness. Provides the analytic framework to identify performance issues and validate corrective actions. Provides training feedback to operational Naval forces and the Navy-wide training community for in-port and at-sea exercises. Enables Fleet trainers and ships' forces to rapidly determine operational performance as well as training effectiveness, from individual console operators through Strike Group operations.

AC02 Quality and Mission Assurance Assessment

Provides Quality and Mission Assurance Assessment to identify, define, and implement cost effective, disciplined, and agile technical and management processes to assure the successful acquisition and fielding of defense systems. A critical capability provided is the government's independent and objective technical assessment of quality-related strategy, requirements, processes, and practices performed over the system's life cycle to identify and mitigate design, production, test, and sustainment issues. This provides a context within which program managers can make informed decisions to assure the effective application of credible systems engineering, risk management, quality, logistics support, and technical management principles. A key component of this capability is the role of authoritative source and manager of quality-related data exchange systems. Research and expertise is also provided to develop top-level quality and mission assurance guidance, policy, and standards for the defense acquisition community including the Office of the Secretary of Defense (OSD), military services, defense agencies, systems commands, program executive offices (PEOs), and program managers.

AC03 Metrology, Test, and Monitoring Systems Assessment

Serve as the Navy's metrology and calibration (METCAL) Program's primary technical agent. Provide METCAL technical support for the Navy METCAL Executive Director, all Navy and Marine Corps acquisition program managers, and systems command METCAL program managers. Assess technical measurement requirements and capabilities for the Navy to ensure that metrology and calibration support is in place; that measurement technology keeps pace with advancements in combat systems, weapons, and test equipment technology; and that measurements are accurate and traceable to national standards. Develop, evaluate, approve, and implement test equipment

calibration procedures, weapon system calibration support plans, and measurement standards for calibration laboratories. Serve as the Navy's subject matter expert for calibration and metrology training. Establish and optimize calibration intervals for all Navy test equipment to ensure measurement reliability targets are met at the most efficient cost. Manage and provide technical oversight for the Navy and Marine Corps calibration laboratory audit and certification program. Perform research and development of new measurement standards to fill national measurement capability deficiencies that impact Navy weapon system development, testing, operation, and maintenance. Develop engineering prototypes for new measurement and calibration technologies. Coordinate Joint Service metrology initiatives and represent the Navy on the Joint Logistics Commander's Joint Technical Coordination Group for Calibration and Measurement Technology to ensure that the maximum benefit of cooperative metrology efforts is achieved. Employ test and measurement engineering, diagnostics, quality, and process control disciplines to measure the capability of testing in support of development, production, and servicing of Navy weapon and combat systems.

AC04 Naval Surface & Air Range Systems Engineering

Provides Naval surface and air range systems engineering and technology solutions for Naval and Joint training and testing, as assigned. Engineers, integrates, and installs instrumentation on test and training ranges, including shipboard systems and remote range areas. Provides information assurance certification and accreditation for systems installed, as well as performs laser safety certifications for ranges. Performs operational assessments of range instrumentation to determine effectiveness and suitability. At Fleet tactical training ranges, provides range systems engineering, maintenance, and operations to support Fleet training events. Ensures that existing and future range systems meet the Fleet's demand for combat realism, live mission monitoring and replay, and information and data collection for analysis and assessment. As such, delivers participant tracking, communication systems and networks, electronic warfare, information operations, weapons scoring, and various other range systems support for squadrons, air wings, carrier strike groups, expeditionary strike groups, amphibious readiness groups, composite training unit exercises, Joint task force exercises, and other large force exercises. Provides technical expertise for data collection, integration, and replay for Fleet training live, virtual, and constructive capabilities.

AC05 Weapons Systems Interface Assessment

Provides mechanical interface assessment services throughout the life cycle to assure interchangeability, interoperability, inspectability, and maintainability of weapon system, sub-system, and critical components. During pre-production phases support the research, development, test, and evaluation (RDT&E) lead to assure design tolerances allow for interchangeability, determine critical features, analyze component fit at assembly, and determine appropriate inspection methods. During production provide and certify Navy gages, evaluate contractor gages and methods of inspection, and

evaluate the effect of design changes on interchangeability. In post-production phases continue evaluation of changes and support maintenance activities for gages to assure the integrity of interfaces. Perform special investigations on gage interface issues experienced by the Fleet. Special investigation tasks include analyzing the problem, determining root cause, developing a plan of action, and fielding corrective measures. Provide measurement support to a wide variety of customers in the Measurement Science and Technology Laboratory by measuring large geometries to accuracies of 90 millionths of an inch, and small linear objects to accuracies of 3 millionths of an inch.

AC06 Naval Systems Material Readiness Assessment

Provides Readiness Assessment of in-service weapons, C5I systems, and hull, mechanical, and electrical (HM&E) equipment as assigned, using consistent, government approved criteria, processes, and methodologies. Calculates the authoritative measures of Navy material readiness. Develops and maintains the knowledge systems required to deliver these measures to Fleet, in-service support, and acquisition programs, along with the deep-dive analysis capability to determine readiness trends and drivers. Applies standard measures of readiness to gauge ship material condition and mission capability. Evaluates stockpile reliability and maintainability for surface missiles and performs special studies to verify or adjust missile certification periods. Performs diagnostic and predictive analyses to help identify and verify the efficacy of readiness-based improvements and corrective actions, for example in connection with maintenance procedures and training, parts sparing, logistics support plans, distance support, and tech-assist visits.

AC07 Strategic Systems Testing and Analysis, and Surveillance Assessment

Provides scientific and engineering knowledge, expertise, and facilities for laboratory tests, quality evaluation, surveillance testing, and analyses of strategic weapon re-entry systems. Provides testing, data analyses, and assessments of materials for surveillance stockpile evaluation and reliability; weapon and component quality and reliability characteristics; detection of trends and evaluation of unusual characteristics; failure analyses; material degradation risks; and special studies. Conducts electrical, electronic, radio frequency, mechanical, material, chemical and non-destructive tests and evaluations on components during and after environmental conditioning from system deployment through system retirement. Provides assessment reports on reliability, stockpile retention, cost-effective maintenance, and disposal of suspect components or weapons.

CRANE

CR04 Electronic Warfare Systems RDT&E/Acquisition/Life Cycle Support

Provides technical leadership and execution throughout the life cycle for air, ground, and surface electronic warfare (EW), including signals intelligence (SIGINT) and information operations (IO) systems. Leads research and development (R&D), system engineering, acquisition engineering and logistics, test and evaluation (T&E), design verification, and technical evaluation (TECHEVAL) / operational evaluation (OPEVAL) for all surface EW elements, and for all ground and air EW capabilities. Develops EW system and element technical requirements. For surface EW, provides the cohesive EW element for combat systems integration and supports the integration effort. Collaborates with other Warfare Center activities to facilitate the transition of new technologies into existing and planned EW capabilities. Supports higher level combat system activities relative to the evolutionary acquisition strategy. Leads logistics support services for fielded air and surface EW systems including supply chain management, performance assessments, continual technical refresh, obsolescence management, configuration control, data management services, and maintenance, overhaul and depot repair.

CR10 Infrared Countermeasures and Pyrotechnic RDT&E and Life Cycle Support

Provides comprehensive life cycle management functions to provide safe, reliable and effective infrared countermeasures, countermeasures systems, and pyrotechnics for a variety of functions including platform self-protection, target enhancement, illumination and signaling and marking. Provides total life cycle support except research, development and scale-up of energetic materials for all Navy infrared countermeasures, countermeasures systems and pyrotechnics. Provides Navy expertise and leadership for infrared countermeasures, countermeasures systems, and pyrotechnics

CR15 Strategic Systems Hardware

Provides full spectrum life cycle scientific, engineering and management functions to design, develop, test, evaluate, and acquire safe, reliable, secure and effective hardware for Strategic Systems. Ensures the required Navy expertise is available to develop, acquire, field, and maintain a credible and reliable strategic deterrent in the areas of high reliability hardware (including radiation hardened electronics and small ordnance), security solutions for safeguarding personnel, property and material aboard ships and at shore installations (excluding expeditionary coastal and riverine facilities), and acoustic sensors and underwater cables (for assigned systems). Includes hardware for the Navy's Strategic Weapon System (e.g. flight, launch, guidance, fire control, and navigation systems). Also includes security systems, sensor systems, and the logistics associated with operation of shipboard and ground-based strategic and deterrent facilities and systems.

CR16 Special Warfare and Expeditionary Systems Hardware

Provides full spectrum life cycle support functions to provide safe, reliable and effective special missions hardware and associated software primarily for use by the individual warfighter including weapons, munitions, and electronic systems for special operations and expeditionary forces. Support includes applied research (excluding energetics material formulations) requirements analysis, systems engineering, design, development, rapid prototyping, test and evaluation, acquisition, integration, logistics, fielding and in service support. Weapons include small arms (less than 20mm). Munitions include small arms ammunition, hand emplaced and man-portable anti-personnel and anti-material munitions. Electronic systems include electro-optic and visual augmentation sensors, electronic warfare, personnel and vehicle scanning and command and control systems as assigned. Weapons, munitions, and electronic systems provide communications, surveillance, detection, tracking, targeting and engagement capabilities in support of special missions.

CR18 Advanced Electronics & Energy Systems

Provides comprehensive scientific and engineering knowledge, skills and facilities for conducting programs in advanced electronics and energy systems. Conducts full spectrum program of applied research, design, development, acquisition, test and evaluation, and life cycle management to provide safe, trusted, reliable and effective advanced electronic products. Advanced electronics include active and passive electronic devices, circuit cards, interconnect technologies, electronic controls, solid state transmit/receive modules, microwave tubes and other radio frequency devices. Maintains subject matter expertise in failure analysis, counterfeit technologies, radiation hardening, additive manufacturing, design, and test and evaluation of advanced electronics. In addition, maintains Naval Sea Systems Command's (NAVSEA's) technical authority in anti-tamper technology to include vulnerability assessments, technology and program protection planning, and supply chain risk management, as well as subject matter expertise to maintain the Navy's DoD executive agent responsibilities in microwave tubes and printed circuit board technology. For energy systems, provides comprehensive life cycle management for safe, reliable and effective devices. This includes requirements definition, design, development, prototyping & limited production, acquisition & acquisition engineering, product improvement, technology evaluation and insertion, standardization, test & evaluation, safety certification (including high energy battery systems technologies such as lithium), production engineering, in-service engineering, obsolescence management, maintenance, Fleet training, and system retirement. Energy systems includes batteries, advanced high energy density storage devices, energy transfer devices, and alternative and renewable energy devices.

CR19 Sensors and Surveillance Systems

Provide comprehensive engineering knowledge, skills and facilities for conducting development, acquisition, test and evaluation and full spectrum life cycle systems engineering for surface, air and ground sensors and surveillance sub-systems, systems,

and components. On radar systems provides production engineering support, for the development, acquisition, test and evaluation, spiral development and support of radar subsystems and hardware components. This includes support and maintenance of fielded systems and hardware components. On electro-optic and infrared portable and platform mounted air, surface, and ground surveillance, targeting, laser, and visual augmentation systems hardware and associated software, additional capabilities include applied research, development, modeling, test and evaluation, acquisition, fielding, in-service engineering, logistics, product improvement, maintenance and repair. On assigned surface, ground and air signals intelligence (SIGINT) (communications intelligence (COMINT) & electronic intelligence (ELINT)) systems, subsystems and components, including hardware and associated software, leverage multi-domain and full spectral expertise to perform requirements generation and requirements decomposition for development of integrated sensors and advanced capabilities for improved battle space/situational awareness and including, rapid response prototyping and fielding, supportability and technical analyses, in-service engineering, in conjunction with a comprehensive test and evaluation program to ensure sensors and surveillance systems meet or exceed specified requirements.

DAHLGREN

DD01 Force and Surface Platform Level Warfare Systems Analysis and Modeling

Provides the ability to identify the strengths and weaknesses of warfare systems (with exception of undersea warfare(USW)) in meeting national objectives; conducts special studies to evaluate the effects of modifying force structure, mission effectiveness, target selection, tactics, techniques and procedures, concept of operation (CONOPS) development , and science and technology guidance. Provides assistance in developing requirements and options for future forces, evaluating variations in threat scenarios and impacts of technologies, and assessing comparative capability versus costs for forces, warfare mission areas, and complex system-of-systems within the Naval environment.

DD02 Weapon Systems Analysis, Effects, and Effectiveness

Provides the ability to identify the strengths and weaknesses of weapons systems (with exception of undersea warfare(USW)) in meeting national objectives; conducts special studies to evaluate the effects of modifying force structure, targets, or tactics, and provides science and technology guidance. Provides assistance in developing and improving weapon systems, evaluating variations in threat scenarios and impacts of technologies; assessing comparative capability versus costs; assessing effects of kinetic and non-kinetic weapons systems on targets and identifying means to counter the effects; and assessing effectiveness of new weapons systems to achieve desired goals.

DD03 Radar and Electro-Optic Systems RDT&E

Provides investigations into promising test and evaluation thrusts for potential maturation and transition into radar and electro-optic systems. Provides for the research, development, test, and evaluation (RDT&E) of radar and electro-optic sensors for Naval systems. This function is full spectrum, including RDT&E of exploratory, advanced and engineering development sensors and systems as well as sensor development support and software support agent functions, for the development and acquisition of new radar systems, and the continuing spiral development of existing radar systems. Testing and evaluation services are provided from concept exploration through developmental testing (DT). During formal DT/operational testing (OT), test and evaluation support emphasis shifts to providing data analysis and system expertise with this support continuing as necessary after the DT/OT. Also provides worldwide quick reaction support to the Fleet to develop new sensors, modify existing sensors and to develop and evaluate sensor performance and countermeasures in times of crisis.

DD04 Surface Warfare Systems Engineering and Integration RDT&E

Provides for the specification and leadership necessary to develop warfare systems architectures including the design and integration of research, development, test, and

evaluation (RDT&E) for the Navy's surface force operating in the Joint environment. Includes analysis, architecture and technology development for warfare systems. Also includes all the capabilities, functions, components, trade studies and elements required to systems engineer and develop warfare systems as well as adapting and transitioning new technologies and advanced capabilities to meet changing requirements.

DD05 Surface Combat Systems Engineering and Integration RDT&E

Provides investigations into promising science and technology (S&T) thrusts for potential maturation and transition into surface combat systems. Provides the research, development, test, and evaluation (RDT&E) necessary to specify and develop combat system capabilities and architectures, including design and integration at the component, element and system level for the Navy's surface ships to optimize their effectiveness in the Joint operational environment. Includes analysis, technology development, trade studies, integration and evaluation, and testing of combat systems. Also includes all the capabilities, functions, components, and elements required to systems engineer, develop, test, and support the combat systems architecture and integration from conception through Fleet introduction. Performs combat systems development support for fielded systems, adapting and transitioning new technologies, affecting architectural migration and advancing system and subsystem capabilities to meet changing requirements lead modeling and simulation (M&S) verification, validation, and accreditation (VV&A). Develop and instantiate standards and process for models used in system development, testing, and certification. Provides systems engineering leadership for acquisition activities.

DD06 Surface Combat Control Systems S&T, RDT&E

Provides investigations into promising science and technology (S&T) thrusts for potential maturation and transition into Surface Combat Control Systems. Provides for the specification and leadership enabling the development and support of combat control systems research, development, test, and evaluation (RDT&E) for the Navy's surface ship Fleet. Includes analysis, architecture development and engineering, technology development, integration and evaluation, and testing of combat control systems. Also includes all the capabilities, functions, components, trade studies and elements required to systems engineer, develop, test, and support the combat control systems from conception through Fleet introduction. Performs combat control systems development support for fielded systems, adapting and transitioning new technologies, affecting architectural migration, and advancing system and subsystem capabilities to meet changing requirements. Provides systems engineering leadership for acquisition activities.

DD07 Surface and Expeditionary Conventional Weapon Control Systems RDT&E

Provides investigations into promising science and technology (S&T) thrusts for potential maturation and transition into conventional weapon control systems for surface and

expeditionary platforms. Provides for the specification and leadership enabling the development and support of conventional weapon control systems research, development, test, and evaluation (RDT&E) for the Navy's surface ship and expeditionary Fleet. Includes analysis, technology development, integration and evaluation, and testing of conventional weapon control systems. Also includes all the capabilities, functions, components, and elements required to systems engineer, develop, test, and support the conventional weapon control systems from conception through Fleet introduction. Performs weapon control system development support for fielded systems, adapting and transitioning new technologies and advanced capabilities to meet changing requirements. Provides systems engineering leadership for acquisition activities.

DD08 Surface Warfare System and Force Level Certification/IV&V

Provides for the specification and leadership enabling the development of common processes for the execution of warfare, combat systems, control and weapon systems, and element certification activities for effective force operation in the Joint arena. Certification processes are optimized to address competing concerns precipitated by increasingly complex system development. Processes must be both comprehensive and independent to address technology and architecture advancements and threat evolution. Certification and independent verification and validation spans the development cycle from requirements to deployed baselines.

DD09 Human Systems Integration Science and Engineering

Provides a body of knowledge and subject matter expertise for the development of technologies in support of human systems integration (HSI). Provides science, technology, and systems engineering expertise in human systems integration to define policy, processes and enterprise solutions for Navy acquisition programs with the exception of submarines, stressing optimization of manpower, decision support, and knowledge superiority in an effort to enhance the capabilities of our warfighters and improve total system performance and affordability over the entire life cycle cost of a platform or system. Addresses surface Navy definition requirements for knowledge superiority; decision support; effective communications; human-computer interaction; manning optimization; training; usability testing of new warfighter-centered designs; design of work environments, workstation/consoles, and command spaces; measurement of workload and performance across individual, team, systems, and organizational domains; and is instrumental in identifying issues regarding a new way of thinking about afloat and ashore command and control.

DD10 Surface and Expeditionary Missile Systems Integration

Provides national technical leadership and oversight for missile systems integration including the integration of associated launchers and payloads. Performs integration assessments of advanced concepts for missiles, payloads, and launchers. Performs integration and development of integration requirements for missiles, lethal and

non-lethal payloads, launchers and associated sub-systems. Provides the systems engineering and integration required to transform a multiplicity of system elements into effective engagement systems. Expertise in mechanical, electrical and command and control (C2) systems is utilized for the integration of engagement systems with the host ship and expeditionary platforms.

DD11 Conventional and Electromagnetic Gun Weapon Systems RDT&E

Provides science and technology (S&T), research, development, test, and evaluation (RDT&E), and acquisition support for conventional and electromagnetic gun weapon systems and associated munitions (greater than or equal to 20 millimeter) from technology development to platform integration. Provides critical technology development and the systems engineering and integration required to transform a multiplicity of system elements into an effective gun weapon system. Capabilities involve maturation of technologies, definition of requirements and specifications, product improvements, modifications, and evaluation of overall gun weapon system performance.

DD12 Directed Energy Systems RDT&E

Leads all science and technology (S&T), research, development, test, and evaluation (RDT&E) for the development and weaponization of directed energy (DE) systems for surface, air and ground environments. Leads the development of offensive and defensive DE technologies needed to characterize and exploit vulnerabilities, provide weapons, and protect against attack. Provides the technologies, devices, and systems designed to create or control electromagnetic energy that is used to cause persistent disruption or permanent damage by attacking target materials, electronics, optics, antennas, sensors, arrays and personnel, including non-lethal applications. Efforts include requirements analysis, measurement capabilities, concept demonstrations, system engineering, major product improvements, system integration, product development test and evaluation, and test and evaluation support through the formal developmental test/ operational test (DT/OT) stages of acquisition.

DD13 Weapons Systems Integration for Surface, Air and Ground Unmanned Systems

Provides the research, development, acquisition, test, and evaluation, including the modeling, design & development, integration, verification, experimentation and certification of engagement systems onto unmanned systems (UxS) for surface, ground, and air. Also provides the system engineering/integration required to effectively integrate the UxS into platforms, system of systems, and the force structure for Naval surface warfare (SUW) missions.

DD14 Expeditionary and Other Weaponry Systems RDT&E

Provides the technology base and conducts research, development, test, and evaluation

(RDT&E) to develop and demonstrate technologies to meet the unique weapons responsibility for expeditionary missions, amphibious warfare, and subsequent operations ashore. Provides technology base and RDT&E support for unique programs for Naval and other DoD customers. Responsibilities includes the design and development of new systems or components, product improvements enhancing the military performance of existing systems or components, the neutralizing of deficiencies in stated requirements, weapons system integration and acquisition.

DD15 Strategic Mission Planning, Targeting, and Fire Control Systems

Provides technology advancement, systems engineering, software development, and operational support for mission planning, targeting, and fire control systems for nuclear and non-nuclear strategic systems. Development of modernization concepts, development of technology to meet future need, and new system concepts (e.g., Submersible, Ship, Guided, Nuclear (SSGN)) is also supported. Applies to existing systems (all United States and United Kingdom Submarine Launched Ballistic Missile (SLBM) systems), evolving systems and to needs not previously identified by the Navy or other services.

DD16 Re-Entry Systems

Provides the system definition and participates in and manages the development of reentry systems, including definition of environments of their effects, performing analysis of reentry materials, technology development, reentry vehicle design, testing of conceptual and prototype vehicles and project management.

DD17 Surface Electronic Warfare Systems Architecture and Combat System Integration RDT&E

Leads for overall top-level combat systems requirements definition, design, integration, analysis of alternatives, and requirements decomposition to the electronic warfare (EW) element of surface ship combat systems. Is responsible for up front systems engineering, combat system integration, performance requirements, combat system architectures, generation of weapon system integration requirements, and requirements definition. Leads the EW combat systems integration role; specifically, the bringing together of the EW elements of the combat system for integration, test, and certification at the platform, strike group, and force levels. Is responsible for integration into the combat system, integration of elements into a suite, development, maintenance and upgrades of combat system databases which will be used by the EW elements, and combat system EW control and interface with the EW elements. Provides systems engineering, acquisition support, software expertise, technical evaluation and test and evaluation (T&E) for integration into the combat system. Collaborates with other Warfare Center activities to facilitate the transition of new technologies into EW elements for existing and planned combat systems.

DD18 Surface and Expeditionary Warfare Systems Safety

Provides analytical, technology base, systems engineering, product development, and Fleet support expertise to assess compliance of systems safety and survivability requirements of Fleet assets, especially warfare assets on surface and expeditionary platforms. Defines and determines effects from shock, blast, fragments, toxic products, and laser radiation in the life cycle evolution of weapons and/or combat systems. Assesses system and item vulnerabilities including software; and specifies, designs, and develops means to remove failure modes, control environments, limit damage, or otherwise reduce possible loss of combat capability.

DD19 Surface Warfare Electromagnetic Environmental Effects

Provides leadership in the area of electromagnetic environmental effects (E3) research, development, test, and evaluation (RDT&E) that assures operational effectiveness of Naval and Joint systems exposed to stressing electromagnetic (EM) environments. Develops and applies analytical and experimental techniques, facilities, and instrumentation required in the shipboard EM susceptibility/vulnerability assessment of electronic components, circuits, and systems. Coordinates and directs programs such as hazards of electromagnetic radiation to ordnance (HERO), personnel (HERP), and fuel (HERF) and electromagnetic vulnerability (EMV) to determine EM effects on equipment and systems. Investigates specific and generic EM susceptibility problems and develops, evaluates, and recommends procedural and hardware changes to ensure successful mission completion. Manages the Shipboard Electromagnetic Capability Improvement Program and serves as the E3 battle force interoperability electromagnetic interference (EMI) problem solver for the Navy. Develops and validates analytical and experimental techniques/tools, including computational electromagnetics, to predict and assess topside design issues based on location and performance. Coordinates and directs programs to achieve integrated topside designs maximizing system performance in the EM environment for new ships and ship alterations. Provides, via the Afloat Electromagnetic Spectrum Operations Program (AESOP), processes and guidance for battle force frequency management to the Fleet.

DD20 Chemical, Biological, and Radiological Defense Systems

Provides full spectrum life cycle system development, acquisition, and on-site support for assigned shipboard and shore based chemical, biological and radiological defense (CBR-D) equipment and systems to address warfighter needs for Navy, Joint, interagency, and national customers. Addresses CBR-D challenges by providing the leadership, expert knowledge, systems engineering, and practical experience required to generate and evaluate concepts, technologies, and methodologies and by providing engineering, training, and logistics support to enable successful fielding and transition of applicable CBR-D systems to the warfighter. Performs technology based research, development, test, and evaluation (RDT&E) for assigned CBR-D mission areas, including CBR threat analysis, CBR research, CBR modeling & simulation, CB detection,

CBR collective protection, CBR decontamination, and CBR warning and reporting. In addition to RDT&E in CBR Decontamination Stations, provides Fleet deployment and designated Fleet support.

DD20 does not encompass radiation detection, individual protective equipment (IPE), in-service engineering for CBR collective protection systems, or energetics-based neutralization.

DD21 National Response Missions, Including Homeland Security and Defense

This technical capability focuses on the research, development, test, and evaluation (RDT&E) and acquisition of capable warfighting and peacekeeping technology options that enable the Navy and nation to more effectively and appropriately understand and respond to asymmetric threats and acts of aggression, with timely, balanced and appropriate measures. The focus of this technical capability is to adequately safeguard and empower our nation's warfighters, homeland defenders, and first responders by ensuring they are equipped with proven and response-ready technologies for continuing to fight and win the global war on terrorism. This technical capability allows our men and women in uniform to effectively prepare for and react to the most pressing needs across a full spectrum of military operations, and focuses on improving our capacity to identify, deter, combat, defend against, and recover from terrorist attacks, major disasters, and national emergencies. To benefit the Navy, Joint forces, and the nation, this technical capability is intended to deliver innovative and cost-effective solutions to bolster asymmetric defense, maritime security, anti-terrorism, force protection, non-lethal warfare, identity management, stability, and law enforcement operations. These solutions directly impact our national efforts to combat and counter terrorism, including counter-narco terrorism; oppose the full spectrum of maritime threats; to enforce border and trade sanctions; integrate battlefield and special technologies; mature and integrate biometrics; enhance intelligence collection; refine security and defensive equipment; and support world-wide humanitarian services.

DD22 Physical and Non-Physical Vulnerability Analysis

Provides robust integration across the spectra of research, development, analysis, deployable tools and systems to assist the services, other government agencies, and the civilian sector in analyzing the support networks in place and developing options to mitigate potential threats. Addresses homeland security initiatives by providing the technical and systems engineering capability necessary to mitigate the effects of asymmetric threats on our homeland to include homeland defense and support to civilian authorities. Supports force protection requirements in the areas of combating terrorism, physical security, operations security and personal protective services by developing products to mitigate hostile actions against DoD personnel, resources, facilities, and critical information. Includes a commercial and defense critical infrastructure protection, information assurance, and mission assurance capabilities by providing the ability to identify critical infrastructure susceptibilities and operational dependencies that, if not assured, could adversely impact mission success or continuity of operations.

DD23 Force Level Warfare Systems Engineering and Integration

Provides technical direction and systems engineering for the development of integrated systems and components that provide integrated force level capabilities, with emphasis on establishing the requirements necessary to define the total system in the context of the Joint Services platforms and the overall mission warfighting capability. Activities include systems engineering and analysis of new and existing systems, defining system interface requirements, reviewing platform integration packages, establishing test requirements, preparing test plans when applicable, reviewing and monitoring contractor test events, reviewing interface specifications, defining requirements for interfacing with communications systems as well as other Navy/Joint tactical systems, and defining communication architectures. Effort includes establishment of performance and functional baselines; development and analysis of requirements; and requirements mapping and allocation – all leading to the development of key performance parameters (KPPs), measures of performance (MOPs), measures of effectiveness (MOEs), and information energetics requirements (IERs) based on collaborative inputs from Warfare Center (WC) Divisions. Provides systems engineering expertise to devise and deploy systems that integrate within the United States Navy, Marine Corps, Army, and Air Force, United States Special Operations Command (USSOCOM), Agency, and Coalition forces operations.

DD24 Force Level Warfare Systems Interoperability Engineering

Provides the analysis, systems engineering, and evaluation of the interoperability of systems and system of systems during early stages of program development. Evaluates the ability of deploying or deployed Navy / Joint systems and platforms to fulfill required contributions to mission capability within the context of Naval, Joint, allied and Coalition operating environments, with overarching emphasis on achieving force interoperability. Live, virtual, and constructive environments are used to measure, quantify and report operational capabilities and limitations of developmental, prototype and deployed systems. Products assist in the development of acquisition strategies by identifying redundancies, deficiencies, and inefficiencies in the Navy's ability to support interoperable Joint operations across required capability areas. In support of the formal interoperability testing, provides:, developing the specialized facilities and assessment tools in an open architecture environment, characterizing deploying tactical group (Carrier Strike Group (CSG) or Expeditionary Strike Group (ESG), etc) contributions to mission capabilities within the context of Joint and Coalition operating concepts and developing interoperability metrics and measurement techniques and systems that support evaluation of performance against warfighter mission threads. Also provides for the development of distributed (at-sea and land-based) technology and architectures to test and certify selected command, control, communications, computers, combat systems, and intelligence (C5I) software interoperability. As programs continue through the acquisition cycle, force warfare system interoperability performance is assessed through collaboration with the Corona Division.

DD27 Tactical Common Data Communications Systems Integration and Interoperability

Provides the technology applications, design, development, integration, test, and evaluation, to enable tactical common data communication infrastructure for integration of tactical subsystems. Capabilities focus on situational awareness, hostile detection, targeting, communication signature management, communications, and subsystem integration. Using the tactical common data communication infrastructure, these subsystems will be integrated into Joint and Navy large force units' strategic architectures and supported as needed to ensure operational capability and effectiveness.

DD35 Integrated Surface Combat Control Systems Support

Provides systems engineering and analysis to support the full integration of combat system elements. Provides in-service engineering (ISE) support for currently assigned legacy systems throughout their remaining life cycle. Analyzes Fleet combat system and combat system interface issues in conjunction with combat system and element design and ISE agents, and actively supports the acquisition, delivery, and software support of integrated combat control systems.

DD36 Integrated Training Systems

Focus of capability is the development and support of an integrated training capability across the national/agency/Joint /Coalition/maritime military system domains excluding undersea warfare (USW) training systems. Emphasis is placed on ensuring training capability is horizontally integrated and interoperable within the specific domain, meets the complete operational mission requirements of the specific domain, and is vertically integrated and interoperable with neighboring, superior, and subordinate systems and domains. Incorporates and integrates live/virtual/constructive training capabilities as well as modeling and simulation systems, learning methodologies and human systems integration approaches to meet training system requirements. Through System of Systems engineering, design, development, and life cycle support, provides integrated training systems which improves readiness across the Fleet and will support all warfare areas across the breath of military, naval, Joint and Coalition operations.

DD37 Radar Distribution Systems

Specifies and leads the development, integration, acquisition, and support of radar distribution systems and equipment for the Navy's surface ship Fleet. Includes design, integration, analysis, technology development, software support, and testing of radar distribution systems and equipment. Also includes all the capabilities, functions, components, and elements required to acquire, develop, systems engineer, and test for the radar distribution systems and equipment from conception through their lifetime as well as adapting and transitioning new technologies and advanced capabilities to meet

changing requirements. Provide in-service engineering (ISE) and integrated logistics support (ILS) of radar distribution systems and equipment during all phases of the system life cycle. Develop system requirements and specifications. Provide systems engineering and analysis to support the full integration of radar distribution system elements. Analyze Fleet system integration problems and failures to provide engineering and logistic solutions. Provide equipment restoration and commercial off-the-shelf (COTS) material support including COTS obsolescence management.

DD38 Joint Command and Control Systems Integration and Architecture Development

Provide developmental support and integration of Joint and Coalition systems. This technical capability provides systems engineering for development and evaluation of warfighter operational requirements, integration of technology with superior and subordinate system structures, and identification and development of next-generation technology including prototype assessment and rapidly fielding of new technology. Additionally, this capability provides full life cycle support as an engineering agent including on-site support at combatant commands, software support activities, and engineering required to address technology obsolescence. Joint Task Force (JTF) and Joint Force Maritime Component Commander (JFMCC) architectural frameworks are decomposed to identify and correct specific domain shortfalls in capability, interoperability, and integration. Provides Joint warfighter command and control capability across the Doctrine, organization, training, materiel, leadership, personnel, and facility (DOTMLPF) spectrum.

INDIAN HEAD EXPLOSIVE ORDNANCE DISPOSAL TECHNOLOGY

IH08 Threat and Countermeasure Information Development and Dissemination for EOD, IED, and CREW

Provides explosive ordnance disposal (EOD), foreign material acquisition (FMA) and exploitation (FME), intelligence analysis, electronic and mechanical engineering, and EOD response procedural development knowledge and facilities to collect information regarding improvised explosive devices (IEDs), improvised nuclear devices (INDs), weapons of mass destruction (WMDs) and conventional & unconventional ordnance; perform analysis of IEDs, INDs, WMDs, conventional & unconventional ordnance and associated components and enemy tactics, techniques, and procedures (TTPs); develop systems of relevant data to support EOD-related decision-making and response capabilities; and develop and deliver threat information and countermeasures dissemination methods for the Joint Service EOD (JSEOD) community. Provides operational and tactical counter radio-controlled improvised explosive device electronic warfare (CREW) life cycle integration of data and data management to support delivery of authoritative information for CREW systems, threat characteristics and countermeasure information for CREW developers and users worldwide.

IH09 Technology Development and Integration for EOD, IED, and CREW

Provides scientific and engineering knowledge and facilities to develop and integrate the technologies required to provide the Joint service explosive ordnance disposal (JSEOD) community the ability to detect/locate, access, identify, render safe, recover/exploit, and dispose of conventional ordnance, weapons of mass destruction (WMDs) and improvised explosive devices (IEDs). The capability includes science and technology (S&T); research, development, test, and evaluation (RDT&E); and acquisition efforts to identify, develop, deliver, and provide full life cycle support for explosive ordnance disposal (EOD) related sensors, explosive detection equipment, ordnance locators, underwater/countermine technologies, radiographic equipment, explosive neutralization tools, disruptors to permit remote access, identification, neutralization and recovery of IEDs and associated components. Provides scientific and engineering knowledge and facilities to develop and integrate the technologies required to provide the counter radio-controlled improvised explosive device electronic warfare (CREW) systems. The capability includes S&T for both Joint service EOD (JSEOD) users and the Joint CREW (JCREW) community. This capability also includes RDT&E and acquisition efforts associated with the development, delivery and the full life cycle support of CREW technologies for JSEOD users.

IH10 Energetic and Ordnance Component and Ordnance Systems for S&T, Emergent and National Need Requirements

Provides the scientific and engineering knowledge, expertise, and facilities for the science and technology (S&T), materials research, development, test, and evaluation (RDT&E), scale-up, and manufacturing technology for energetic and ordnance component and ordnance systems for emergent and national needs. Includes the synthesis, development, scale-up, selection, characterization and application of specialty energetic chemicals, explosives, propellants, reactive materials, ignition materials, pyrotechnic materials, energetic ordnance system materials, and energetic and ordnance components (including initiation train systems and micro electro mechanical systems (MEMs) devices) and ordnance systems for emergent and national needs. Develops and validates manufacturing technologies and specialty energetic chemicals and materials. Includes the Navy Energetic Manufacturing Technology Center of Excellence, which is responsible for the application of state of the art equipment and processing techniques to the development and manufacture of new or existing energetic materials and components. Supports ordnance environmental compliance, explosive decontamination, demilitarization, and explosive safety. Applies active and passive technologies, MEMS sensors, and embedded sensors for real-time health and inventory management of energetic and ordnance components and ordnance systems (excluding missile all-up-round applications). Applies energetics and energetic system technologies to the prediction, detection, prevention, neutralization, lethality, target vulnerability, and effects mitigation of non-lethal, conventional warfare and non-conventional warfare items. Provides the science and technology (S&T) for packaging, handling, storage, and transportation (PHS&T) for ordnance including the application of joint modular packaging and container technologies and handling equipment.

IH11 Energetic and Ordnance Components and Ordnance Systems for Air Warfare

Provides the scientific and engineering knowledge, expertise, and facilities for the research, development, test, and evaluation (RDT&E), acquisition engineering, in-service engineering, logistics management, ordnance assessment, maintenance, and manufacture of energetic and ordnance component and ordnance systems for air warfare applications. Energetic and ordnance component and ordnance systems include propellants, explosives, pyrotechnic materials (except for flares and illuminators), aircraft guns and ammunition, bombs, fuzes, jet assisted take-off/rocket assisted take-off (JATO/RATO) systems, rockets and rocket motors, safe-arm devices, warheads, and energetic payloads for unmanned systems. The capability includes cartridge actuated devices /propellant actuated devices (CAD/PADs) and similar devices in support of aircraft, missile and target subsystems (e.g. aircrew escape, stores/bomb rack, electronic counter-measure (ECM), fire extinguisher, and non-strategic missile flight components). Provides the RDT&E, acquisition engineering, and in-service engineering (ISE) for the packaging, handling, storage, and transportation (PHS&T) of air warfare energetic and ordnance components and ordnance systems.

IH12 Energetic and Ordnance Components and Ordnance Systems for Surface Warfare

Provides the scientific and engineering knowledge, expertise, and facilities for the research, development, test, and evaluation (RDT&E), acquisition engineering, in-service engineering (ISE), logistics management, ordnance assessment, maintenance, and manufacture of energetic and ordnance component and ordnance systems for surface warfare applications. Products include energetic and ordnance components and ordnance systems such as Cartridge Actuated Devices (CADs) and similar devices in support of missile and ship subsystems (e.g. missile dud ejection, fire suppression systems, cable cutters, and non-strategic missile flight components), propellants, explosives, pyrotechnic materials (except for flares and illuminators), fuzes, gas generators, rocket motors, safe-arm devices, warheads, shock and special test charges, and energetic payloads for unmanned systems. Provides explosive lethality and target vulnerability (including foreign systems) assessment. Provides the RDT&E, acquisition engineering, and in-service engineering for the packaging, handling, storage, and transportation (PHS&T) of surface warfare energetic and ordnance components and ordnance systems. The capability includes in-service engineering, logistics management support, acquisition and development support, and test and evaluation for surface guns and gun systems (including but not limited to chemical and electrical launch systems). The capability provides acquisition engineering, in-service engineering and field maintenance support to provide safe, reliable and effective surface ammunition to the Department of the Navy.

IH13 Energetic and Ordnance Components and Ordnance Systems for Expeditionary and Undersea Warfare

Provides the scientific and engineering knowledge, expertise, and facilities for the research, development, test and evaluation (RDT&E), acquisition engineering, in-service engineering, logistics management, ordnance assessment, maintenance, and manufacture of energetic and ordnance component and ordnance systems for Expeditionary and Undersea warfare applications. Energetic and ordnance component and ordnance systems include propellants, explosives, pyrotechnic materials (except for flares and illuminators), fuzes, gas generators, rocket motors, safe-arm devices, warheads, assigned hand emplaced explosive devices, mortars, and ordnance subsystems, including cartridge actuated devices (CADs), energetic payloads, for unmanned systems, non-lethal systems, mine and mine countermeasures and breaching systems. Provides explosive lethality and target vulnerability (including foreign systems) assessment. Applies energetics and energetic system technologies to the prediction, detection, prevention, neutralization and effects mitigation of conventional warfare items and unconventional warfare items including non-lethal systems and improvised explosive device (IED) systems, and energetic support to counter-improvised explosive device (C-IED) system efforts and the neutralization of chemical-biological

warfare items. Provides the RDT&E, acquisition engineering, and in-service engineering for the packaging, handling, storage and transportation (PHS&T) of expeditionary and undersea warfare energetic and ordnance components and ordnance systems. The capability provides acquisition engineering, in-service engineering and field maintenance support to provide safe, reliable and effective expeditionary ammunition to the Department of the Navy. The capability excludes small arms and custom ammunition in support of Special Operation Forces.

IH14 EOD Unmanned Systems

Ensures proper integration of explosive ordnance disposal (EOD) tools on unmanned vehicles. By coupling the organizationally and physically resident Joint service explosive ordnance disposal (JSEOD) warfighter representation (JSEOD Military Test and Acceptance Board (MTAB)) with an engineering and logistics workforce possessing extensive knowledge of robotics, this capability provides focused, responsive, and integrated robotics solutions to JSEOD requirements. Provides full life cycle technical support of ground EOD robotic vehicles. This includes the scientific and engineering knowledge and facilities needed for the concept development, engineering, integration, test & evaluation, assessment, and integrated logistic support of the technologies required to satisfy EOD mission requirements.

KEYPORT

KP01 Pacific USW T&E Range and Test Facility Operations

Provides the real estate, capital equipment, human resources and skills, and processes required for operations of Division undersea warfare (USW) Test facilities including the Pacific Northwest Ranges, Division environmental test facilities and range and test facilities located with Division detachments at San Diego and Hawaii. Enables the conduct of experimentation, test and evaluation and training operations for the purpose of obtaining critical data for analysis of USW system performance, reliability and readiness. Supports conduct of operations utilizing fixed ranges and land based test facilities, and remote testing in threat representative littoral and deep water environments through the use of portable test and evaluation (T&E) systems.

KP02 Independent USW Systems Test and Evaluation and Experimentation

Provides acquisition and development managers with independent assessments of performance and reliability of undersea warfare (USW) systems and components. Includes skilled personnel for translation of critical test objectives into executable tests, development of test strategies and methods, architecting test plans, executing operations, and performing post-test evaluation of the data. Utilizes highly specialized analysts and specialized tools for the purposes of making acquisition and material support recommendations to decision makers. Includes the ability to support Joint collaborative test and evaluation (T&E) events.

KP03 USW Weapons and Vehicles Range and Environmental Test Systems

Provides the skilled personnel, facilities and processes required for the development, acquisition, application and support of test and evaluation technology used for the Division's Pacific Northwest Range and land based environmental test operations. These systems are used to accomplish high-fidelity, precision test measurement and analysis of undersea warfare (USW) weapon systems and components. Includes the design, integration, modernization and improvement of test systems required to support torpedo and undersea vehicle test and evaluation (T&E) requirements spanning the full spectrum of the life cycle from science and technology (S&T) to full operational test and evaluation (FOT&E).

KP04 Torpedo and Unmanned Undersea Vehicle Maintenance and Repair

Provides facilities, capital and test equipment, skilled personnel and processes required for the maintenance, repair, and upgrade of torpedoes and unmanned undersea vehicles. This capability provides for the conduct of Intermediate Maintenance processes for upgrades and turnaround of all US Navy torpedoes and vertical launch antisubmarine rocket (ASROC), undersea targets, and unmanned undersea vehicles (UUVs); installation and maintenance of countermeasures; and maintenance and repair of

undersea mines. The overhaul and limited repair of the associated electronic, electro-mechanical, and mechanical components and systems require teams of highly skilled mechanics, technicians, logisticians, and engineering personnel as well as unique specialized industrial facilities. It also includes the unique facilities and processes for maintenance, storage, and handling of ordnance.

KP05 Obsolescence Management for Undersea Warfare Systems

Provides the expertise and knowledge to formulate warfare center obsolescence engineering/custom engineered solutions policies; develop and manage standards, analysis tools, and processes; and provide these to the warfare centers to support logistics and acquisition communities in performing analysis to extend service life and lower life cycle costs of in-service components, systems and platforms. This includes performing predictive obsolescence management; technical analysis and engineered solutions to mitigate current/future obsolescence problems; development and application of emerging repair and maintenance technologies; and affordable, rapid repair and manufacturing for resolution of unanticipated logistics requirements. This capability includes skilled personnel with specialization in component obsolescence research, reverse engineering, commercial/emerging technology application/adaptation, hardware design and integration, and material qualification.

KP06 Undersea Warfare Systems Material Depot

Provides facilities, capital equipment, processes, and skilled personnel required to sustain Navy Undersea Warfare (USW) Material readiness by ensuring material availability through Navy and Defense material stock systems. The Division maintains technical capability to repair a broad base of legacy and state-of-the-art, electronic, mechanical and electromechanical devices. This involves performing depot level repair, overhaul, test and/or calibration of systems, sub-assemblies, and components required for material support of in-service systems. Depot maintenance activities are managed by the DoD Joint Depot Maintenance Advisory Group (JDMAG). Requirements and workload for this capability are determined through Naval supply material requirement projections and similar processes of other material supply agencies. Depot capability is established, certified, and maintained in accordance with Program technical requirements and Naval Sea Systems Command (NAVSEA) certification processes.

KP07 Torpedo and Unmanned Undersea Vehicles ISE and ILS

Provides the personnel knowledge and skills, analysis tools, facilities and processes for performing in-service engineering and integrated logistics support for the Navy's surface and air-launched torpedoes, vertical launch antisubmarine rocket (ASROC) systems, undersea vehicles including undersea targets and unmanned undersea vehicles; and integrated logistics support for heavyweight torpedoes. Capabilities include engineering and technical specialists with the skills and knowledge to monitor and maintain system readiness and reliability goals, and to provide the Fleet and program maintenance

activities with the processes and tools for effective employment and maintenance of the systems. Includes implementing programs to maintain or improve system material reliability and availability, and development or recommendation of engineering changes to maintain or improve system supportability. Provide like functions for foreign military sales cases.

KP08 Submarine USW Systems ISE and ILS

Provides the personnel knowledge and skills, facilities and processes for performing life cycle engineering and acquisition support, integrated logistics support (ILS) and waterfront technical support for systems as assigned for U.S. Navy submarines. Includes maintaining processes and personnel certifications for installing ship alterations (SHIPALTs) using alteration installations teams (AITs). Also includes maintaining personnel with requisite system technical and process knowledge in in-service engineering disciplines to monitor, assess and maintain system readiness and material availability to meet system and program goals.

KP09 Carrier USW Systems

Provides laboratory facilities, equipment, processes and skilled personnel to perform full spectrum engineering, logistics and Fleet support for Carrier Strike Group undersea warfare combat and sonar systems. Includes requirement definition, system development and full service in-service engineering and integrated logistics support for the Carrier Tactical Support Center (CV-TSC) and related systems.

KP10 Fleet Training and Training Management Systems

Provides full spectrum engineering, logistics and Fleet support for assigned Fleet computer-based training systems, training and job performance support and applications, and shipboard non-tactical data and application management systems supporting Fleet individual skill training, qualification and job task performance requirements. Training systems and applications are delivered across the individual training continuum spanning U.S. Navy training centers, schoolhouses and deployed training and job task performance onboard ships. Includes the personnel, facilities and tools for the design, fielding and support of electronic classrooms; and portable, computer-based training devices for shipboard use. Includes the personnel, facilities and tools. It also includes the development, deployment, integration, test and support of electronic classrooms, computer based training applications, training curriculum, training management systems, and shipboard non-tactical data management application systems.

KP11 Integrated Product Support for Surface and Undersea Systems

In support of Naval Sea Systems Command Headquarters (NAVSEA HQ) and acquisition program offices, and in collaboration with assigned design and in-service engineering agents, provide comprehensive and standardized acquisition and life cycle logistics product support design interface, engineering, program administration and

metadata analysis to conduct performance assessments of acquisition and life cycle logistics policies and process oversight. Perform engineering, technical and quality assurance support to the Navy Special Emphasis Programs (NSEP); Level I and Deep Submergence System-Scope of Certification (DSS-SOC) Host Submarine (HOSUB) and Dry Deck Shelter (DDS) stock programs. Perform Navy allowance and outfitting calculation approval supporting NAVSEA outfitting account solvency and compliance requirements. Perform configuration management for assigned systems and manage the qualification and training standards and information technology (IT) infrastructure for NAVSEA configuration management processes within the boundaries of NAVSEA's authorized ship level Configuration Status Accounting (CSA) program. Supports Navy and DoD material quality assessment and contractor past performance systems.

KP12 Central Design Agent for Navy and NAVSEA Corporate Logistics Data Systems

Provide capabilities to establish requirements, develop, maintain, operate and host information and data systems which support execution and analysis of Navy logistics and maintenance programs. For assigned Central Design Agent (CDA) roles, provide and host applications for Navy logistics and maintenance data systems that include shipyards, material outfitting, configuration management (as well as management of supplier performance and product quality), and process management systems. CDA capabilities includes providing skilled personnel responsible to review and recommend changes to the maintenance and logistics enterprise architecture and assist in determining the most efficient hosting of legacy logistics applications to the future Navy business system architecture.

KP13 Ships Planned Maintenance System

Provide management of the development and deployment of Naval Sea Systems Command's (NAVSEA's) Planned Maintenance System (PMS) in accordance with reliability centered maintenance principles and requirements for carriers, surface ships, and submarines. Provide oversight/direction for PMS, coordination of PMS tasks with supporting maintenance and technical organizations, and performance of assigned maintenance effectiveness reviews for evaluation of PMS. This capability continuously collects data and publishes information and analysis that allow the ships maintenance community to manage the availability and readiness of Navy platforms.

NEWPORT

NP01 Submarine Exterior Communication Systems

Provides national scientific and engineering knowledge and facilities for planning, design, developing, and conducting research, advanced engineering and operational systems development to ensure submarine exterior communications system (ECS) systems readiness. Performs systems engineering, independent verification and validation (IV&V), and certification for integration of new and upgraded communications subsystems into submarine combat systems. Performs analysis, assessments, and evaluation of advanced technologies for transition to ECS to ensure an affordable evolution of compatible systems for Fleet use.

NP02 USW Communication Antenna Systems

Provides national scientific and engineering knowledge and facilities for planning, design, developing, and conducting research, advanced engineering and operational systems development to ensure undersea warfare (USW) communications antenna systems readiness. USW communications antennas systems supports submarines, USW distributed sensor systems, and other USW platforms. Performs systems engineering, independent verification and validation (IV&V), and certification for integration of new and upgraded communications antennas and subsystems into submarine combat systems. Performs analysis, assessments, and evaluation of advanced technologies for transition to development to ensure an affordable evolution of compatible systems for Fleet use. Ensures continuum of life cycle engineering support for Fleet, industry and academia toward development and maintenance of USW Comms antenna systems.

NP03 USW Combat Systems

Provides national scientific and engineering knowledge, expertise and facilities for planning, design, developing and conducting research, advanced engineering, data fusion, payload integration and operational systems development to ensure technical and operational performance of undersea warfare (USW) combat systems. Ensures leadership in advanced technology development and transition and an end-to-end systems engineering discipline encompassing all aspects of relevant kill chains in the application of technology to USW combat and command and control systems. Performs the analysis and evaluation of deployed and advanced command and control systems and technologies and provides the expertise and resources for a full spectrum continuum of life cycle engineering support, both shore-based and at-sea, for Fleet, industry and academia. Provides specialized technical expertise and laboratory test facilities to execute assigned engineering agent roles and technical authority responsibilities in support of in-service and advanced submarine and USW combat systems.

NP04 USW Trainer Systems

Provides land-based and shipboard trainer development for undersea warfare (USW) combat systems, command and control systems and other anti-submarine warfare/anti-surface warfare training applications. Provides trainers related stimulation technologies/sub-systems for integrating signatures simulations. Develops, integrates, installs and maintains combat system training devices at Fleet locations. Performs analysis and evaluation of embedded system commercial equivalents and advanced simulation/stimulation (SIM/STIM) technologies for transition to USW combat, command and control system trainers with application to enumerated mission areas to ensure affordable and timely trainer devices for Fleet use. Provides national scientific and engineering knowledge and facilities for planning, developing, and integrating trainer devices. Performs systems engineering for integration of new and upgraded USW combat, command, and control system trainers into total combat system trainers. Ensures continuum of life cycle engineering support for Fleet, industry and academia toward development and maintenance of combat system trainers. Provides technical expertise for development/specification of trainer architecture and equipment, and their performance integration.

NP05 USW Sensor and Sonar Systems

Provides a full spectrum program of research, development, engineering, and test and evaluation for underwater sensors and sonar systems (except those designed principally for mines and small objects) applicable to all platforms as well as off board distributed and unmanned systems, with equal emphasis on technology base, advanced development, requirements generation and system employment, modeling and simulation, full-scale development, in-service engineering, supportability, and life cycle hardware and software support. Provide and maintain national underwater acoustic metrology science, technology and standards.

NP06 Submarine Periscopes and USW Imaging Systems

Provides national scientific and engineering knowledge and facilities for planning, design, developing, and conducting research, advanced engineering and operational systems development to ensure Periscope and Imaging systems readiness in support of undersea warfare (USW) Imaging Sensor Systems on submarines, USW distributed sensor systems, and other USW platforms. Performs systems engineering, Independent Verification and Validation (IV&V), and certification for integration of new and upgraded Periscope and Imaging subsystems and sensors into USW systems and submarine combat systems. Performs analysis, assessments, (including radar cross section analysis of sensors and masts) and evaluation of advanced technologies for transition to development to ensure an affordable evolution of compatible systems for Fleet use. Is the lead Navy laboratory for periscope imaging systems. Provides full spectrum research, development, test, and evaluation (RDT&E), acquisition support and in-service engineering (ISE) Agent for all imaging systems on Navy submarines. Provides the engineering and technical expertise to develop state-of-the-art imaging

concepts. Supports headquarters' acquisition programs throughout each stage of the life cycle taking imaging concepts from development to land-based testing at government owned-contractor operated test facilities. Provides life cycle management of all imaging systems and depot repair of imaging components. Provides test and simulation facilities for all imaging concepts and interfacing systems.

NP07 USW Electronic Warfare, SIGINT, IO Sensors and Systems Integration

Provides technical leadership, engineering expertise, execution, and facilities for the submarine unique aspects of the following sensors and systems: electronic warfare (EW), signal intelligence (SIGINT; including electronic intelligence (ELINT) and communications intelligence (COMINT)), and information operations (IO). These functions are provided throughout all phases of the sensors' and systems' life cycles that require specific submarine-unique mission, platform, system, and subsystem expertise. Leads submarine EW/SIGINT/IO requirements definition; submarine specific threat and mission area analysis (including radar cross section analysis of sensors and masts); Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) system-of-systems end-to-end performance analysis; submarine combat system integration; submarine-unique component development, acquisition and modernization; submarine platform integration and testing; rapid prototyping and fielding of submarine-unique aspects in support of emergent EW/SIGINT/IO/global war on terrorism (GWOT) mission needs; and, submarine installations and submarine-unique in-service support.

NP08 Undersea Surveillance Systems

Provides research, development, engineering, integration, networking, test and evaluation and in service support in the development of undersea fixed surveillance system shore processing systems, fixed distributed surveillance systems, ocean survey systems, and towed and distributed surveillance systems

NP09 USW Launcher Systems and Payload Integration

Provides national technical leadership, system engineering, and technical direction oversight of assigned submarine and surface ship undersea warfare (USW) weapon/countermeasure launcher systems and associated sub-systems (including torpedoes and unmanned undersea vehicles (UUVs)). Provides specialized technical expertise and unique national asset laboratory test facilities to execute assigned engineering agent roles and technical authority responsibilities in support of in-service and advanced USW launcher systems, including submarine internal and external launcher systems and advanced concepts. Performs integration assessment of advanced USW payloads and weapons including launch dynamics, transient launch acoustics, payload shock survivability, and other related payload integration requirements. Provides full spectrum life cycle engineering support for all assigned USW launcher systems and associated equipment and sub-systems.

NP10 Submarine Tactical Missile Integration

Provides national technical leadership, system engineering, and technical direction oversight of assigned submarine launched all-up-round tactical missiles, capsules, missile electronic simulators, and associated equipment and sub-systems. Provides specialized technical expertise and unique national asset laboratory test facilities to execute assigned engineering agent roles and technical authority responsibilities in support of in-service and advanced submarine launched tactical missiles. Performs system engineering, design engineering, software engineering, logistics engineering, and test and evaluation for integration of new and existing tactical missile systems onto submarines. Provides full spectrum life cycle engineering support for all assigned submarine launched tactical missiles and associated equipment and sub-systems.

NP11 USW Autonomous Vehicles

Provides scientific and engineering knowledge and facilities for conducting a full spectrum program of research, science and technology, development, engineering, acquisition planning, and test and evaluation for undersea warfare (USW) autonomous unmanned undersea systems, with equal emphasis on technology base, advanced development, requirements generation and system employment, modeling and simulation, full-scale development, in-service engineering, supportability, and life cycle hardware and software support. Provides research and concept development expertise and specialized facilities in support of experimental unmanned undersea vehicles (UUV) technology base programs, including air-independent fuel cell and advanced energy and power conversion, to ensure technology development and insertion for unmanned undersea vehicle systems and USW mobile training targets. This technical capability also includes hulls, power, propulsion, machinery, and associated controls for small tactical scale unmanned undersea vehicles (UUVs) with responsibilities decreasing when vehicle size exceeds 21 inches in diameter. This capability also includes payload integration and associated core systems for all USW Autonomous Systems in the following mission areas: antisubmarine warfare (ASW), above water Intelligence Surveillance and Reconnaissance (ISR), ISR supporting ASW, tactical oceanography, and multi-mission.

NP12 Torpedo and Sonar Defensive and Countermeasure Systems

Provides scientific and engineering knowledge and facilities for conducting a full spectrum program of research, development, engineering, and test and evaluation for undersea warfare (USW) defensive and countermeasure systems, with equal emphasis on technology base, advanced development, requirements generation and system employment, modeling and simulation, full-scale development, in-service engineering, supportability, and life cycle hardware and software support. Provides the capabilities required to develop and transition technologies needed to defend both surface ships and

submarines from threat torpedoes. These techniques include torpedo detection, classification and localization, effective combat control and data fusion interfaces, various devices and methods employed to defeat the threats and the overall system engineering efforts to ensure the subsystems work effectively.

NP13 Torpedoes and Undersea Weapons

Provides scientific and engineering knowledge and facilities for planning, development, acquisition and life cycle support of torpedoes and undersea weapons used aboard submarines, surface ships, and air platforms, with the exception of systems supporting mine warfare and defensive and countermeasure missions. Performs science and technology (S&T), research and development, allocates requirements, directs advanced and engineering development, and provides systems engineering, design engineering and software engineering for development and integration of new/upgraded torpedoes and undersea weapons, both kinetic and non-kinetic, into the fleet. Performs acquisition engineering, logistics engineering, test and evaluation, software upgrades, performance assessments, and tactical analysis. Develops and acquires ancillary and support equipment for organizational and intermediate level support. With the exception of surface and air launched torpedoes, provides Fleet operations and training support, in-service engineering, failure analysis, system reliability analysis, and facility certifications. Provides and maintains facilities, analytic tools, and modeling and simulation capabilities to support these activities.

NP14 Undersea Warfare (USW) Analysis

Provides a comprehensive analysis foundation that supports the conceptualization of current and emerging undersea warfare technological and operational directions. Performs the analytical modeling and simulation of undersea warfare (USW) mission effectiveness required to assess submarine, surface ship, undersea surveillance and air-based USW, encompassing all aspects of warfare from under the sea and warfare against undersea threats. Provides comprehensive analysis of USW systems and their performance. Evaluates at-sea exercises through detailed reconstruction to explain system-level operations. Performs technical analysis of intelligence information to assess implications for USW research and development. This technical capability excludes mine warfare (MIW) missions in riverine, surf zone, beach zone, and very shallow water domains; "dedicated" mine countermeasures (MCM) systems; ship vulnerability to mines; and mine systems.

NP15 USW Environmental Assessment Effects Analysis

Provides comprehensive environmental planning and effects analysis of Navy at sea operations, training and testing on the marine environment with emphasis on marine biological resources. Provides technical expertise and knowledge on the effects of explosive and acoustic sources on the environment combining expertise in the areas of marine biology and oceanography, underwater acoustics, sonar systems, computer

modeling and simulation for open ocean and range operations. Develops marine mammal monitoring and effects mitigation technologies and plans, computer models simulating environmental effects and provides analyses of potential effects.

NP16 Undersea Range Technology and Application

Provides engineering and scientific knowledge and facilities for planning, developing, installing, and operating of fixed and portable undersea ranges for training and test and evaluation of platforms and systems. Performs program management, systems engineering, requirements definition, algorithm and software development, environmental assessment and monitoring, ocean engineering, and development of acoustic, optical, and electronics technologies for training and test and evaluation (T&E) range applications. Provides leadership for undersea ranges.

NP19 USW Systems Test and Evaluation

Provides test and evaluation (T&E) expertise for tactical undersea warfare (USW) (excluding mine warfare (MIW)) systems development programs from program start, as a member of a concurrent engineering team, and throughout the test life of the program. Provides specialized T&E expertise, including test logistics, test planning, test facility operation and management, and installation support as required by the program specific needs. Serves as an independent T&E agent in assessment of alternatives. Provides test direction and performance analysis to supplement tactical system expertise.

NP20 USW Distributed Netted Systems

Provides national scientific and engineering knowledge and facilities to develop and integrate the technologies required to deliver netcentric battlespace warfighting capability. Supports the deployment and utilization of distributed netted sensors and systems and the command and control capabilities and tools necessary to provide an expanded battlespace awareness and enable effective and timely warfighter response. Provides end to end systems engineering, including architectures, information assurance, anti-tamper and interface requirements, of undersea warfare distributed sensor systems, and command and control across platforms, within the undersea warfare battle space and the theater level battle space. Unique technical challenges include off board, mobile and fixed, netted sensors, long endurance energy sources, autonomy and group behavior, underwater communications, advanced processing techniques and system-level command and control.

NP21 Atlantic USW T&E Range and Training Operations

Provides management and technical oversight, and Improvement and Modernization of the Atlantic Undersea Test and Evaluation Center (AUTECE) and related test sites, portable systems and facilities. Provides expertise in safety, security, and environmental compliance. Provides comprehensive end-to-end undersea warfare (USW) (excluding

mine warfare (MIW)) readiness assessment, facilities, and training support to undersea warfare system acquisition, Fleet tactical development, and readiness assessment programs. Provides leadership for the development/specification of the undersea battlespace, providing the ability to simulate the introduction of new and proposed systems to the warfighter in his environment. Performs full spectrum test requirement development, production acceptance, test planning, conduct, and performance assessment of assigned systems, subsystems, and components at diverse facilities, in both real and simulated environments. Conducts comprehensive laboratory, dockside and underway testing and training of USW systems. Conducts operational testing, develop evaluation reports for operational test and evaluation for assigned systems.

PANAMA CITY

PC20 Chemical and Biological Warfare Individual Protection Systems

Covers all aspects of chemical biological warfare (CBW) for individual protection from initial technology development through system procurement. It provides the technology base, threat analysis and the full spectrum of engineering expertise necessary to design, develop and support the equipment needed to protect Naval and Joint Services forces afloat or ashore, whether the threat is chemical or biological.

PC21 Expeditionary Coastal and Maritime Security System Engineering and Integration

Provides the full range of concept and technology development, systems engineering and integration functions required to provide expeditionary coastal and riverine forces with capabilities and decision support that enables their performance across the entire range of military operations. This technical capability will be predominantly focused on evolving non-traditional missions (i.e. irregular, catastrophic, disruptive warfare); stability, security, transition, and reconstruction operations (SSTRO); anti-terrorism afloat/ashore (AT afloat/ashore); defense support of civil authorities (DSCA); theater security cooperation (TSC) missions as well as homeland defense missions that occur in an expeditionary context. This technical capability will be supported through a robust involvement in research, development, test, and evaluation (RDT&E) programs and projects within DoD, Department of Homeland Security (DHS) and allied research organizations when they relate primarily to coastal and maritime security related challenges.

PC25 Air Cushion Vehicle Systems

Provides the facilities and expertise to conduct research, development, test and evaluation, and in-service support of air cushion vehicles (ACVs) systems, required by Joint forces as well as Navy and Marine forces to conduct expeditionary maneuver warfare and seabasing. Encompasses ACV/LCAC craft interface systems; command, control, computer, communications and navigation (C4N) equipment; control and monitoring systems; decision support systems; and related unique hull, mechanical and electrical systems. Support encompasses acquisition, life cycle, and Fleet support.

PC26 Expeditionary Maneuver Warfare Systems Engineering and Integration

Provides the facilities and expertise to develop and support warfare systems required by Joint forces as well as Navy and Marine Forces to conduct expeditionary maneuver warfare (EMW) and seabasing. This technical capability encompasses deployable

command and control (C2); expeditionary systems to ship interfaces; assault breaching systems; land mine countermeasures; targeting sensors; seabasing systems; Ship-to-objective maneuver systems; raids and reconnaissance in-service engineering

agent (ISEA) support and systems engineering and integration support of littoral Joint/Navy/Marine Corps C2 systems.

PC27 Special Warfare Maritime Mobility Mission Systems and Mission Support Equipment

Spans the full spectrum research development, test, and evaluation (RDT&E), acquisition engineering (AE), in-service engineering (ISE), and includes the technology development, facilities and expertise to develop, acquire, train, sustain, and support the systems and equipment (excluding personnel protection, weapons and ammunition) required by Special Operations Forces (SOF) to conduct their missions in the littorals. Missions include special mobility operations, unconventional warfare, coastal and riverine interdiction, beach and coastal reconnaissance, SOF infiltration/exfiltration (infil/exfil) and certain intelligence operations. Special operations generally are accepted as being non-conventional in nature and clandestine in character.

PC28 MCM Detect and Engage Systems, Modular Mission Packaging, and Platform Integration and Handling

Provides for the development and implementation of new technologies, mission systems integration and packaging, and applied system engineering to conduct mine countermeasures. Mine countermeasures includes detecting, identifying, and neutralizing mine threats from deep water through the surf zone. Detection and identification may use magnetic, acoustic, and electro-optics as well as other technologies. Neutralization uses systems ranging from minesweeping to explosive clearance. Assets used for mine countermeasures operations include both dedicated modular and organic air, surface and sub-surface platforms. Included are the specialized facilities and expertise needed to exploit the new technologies found in existing and emergent mine threats and to develop new systems and tactics to counter those threats.

PC29 Littoral Mission Systems Integration and Modular Mission Packages Certification

Provides for the scientific research and engineering, analysis, and planning support for the modularization of off-board systems in support of the littoral warfare mission areas except for antisubmarine warfare (ASW) mission modules. Provides for the certification of all littoral warfare mission packages. Expertise includes the packaging and handling of off-board system hardware, tactics development and mission planning for simultaneous operation of littoral mission systems, system integration of legacy and emerging littoral mission systems, seaframe integration of off-board systems, development of mission systems integrated communications networks, and distributed

engineering testing, validation and verification of all littoral mission packages' computing environment.

PC30 Unmanned Systems Engineering & Integration, Autonomous Operations, Joint Interoperability and Common Control

For littoral and riverine environments, provides personnel, equipment, facilities, and necessary expertise to perform the full range of acquisition life cycle development for the implementation of unmanned systems payloads and their associated technologies on (1) Developmental or existing Unmanned Underwater Vehicles (UUVs), unmanned surface vehicles (USVs) and unmanned ground vehicles (UGVs) excluding explosive ordnance disposal (EOD) UGVs; (2) Non-developmental (lightweight tactical) unmanned aerial vehicles. The following missions are supported: mine warfare (MIW), amphibious/expeditionary maneuver warfare, Naval special warfare (NSW), diving and life support, underwater intelligence surveillance and reconnaissance (ISR), and other littoral and riverine missions. Technical expertise for supported mission systems includes autonomous behaviors, payloads integration and management, multi-vehicle command, control, computer, communications and navigation (C4N) systems, systems integration to host platforms including launch and recovery, systems certification, and integration of joint interoperability messaging standards.

PC31 Mine Sensor and Target Detection Technology, Mine Delivery Platform Integration, and Minefield Architecture

Includes analysis and modeling used to develop target detecting device algorithms and to perform mine effectiveness computations against current military targets of interest. Includes the research, development and implementation of new technologies and systems to conduct offensive undersea mine warfare. Offensive mine warfare includes those people and facilities necessary for successful and innovative research, design, development, analysis, modeling, engineering, test, acquisition, platform integration, as well as Fleet and operational support for safe, effective, high technology mine systems and sub-systems including deployment equipment. Undersea mine warfare includes mine technologies that leverage other undersea programs and includes replacement of mine target detection devices with advanced detection capability.

PC33 Diving and Life Support Systems

Provides the personnel, equipment, facilities, and necessary expertise to perform the full range of acquisition life cycle development and support required to enable Naval and Joint forces to globally conduct diving operations and other operations requiring life support equipment. This technical capability encompasses the roles of technical design agent, acquisition engineering agent, test director, in-service engineering agent and depot-level maintenance for underwater diving and life support systems and specialized equipment. This capability focuses on developing and supporting technologies that

better enable Naval force diving operations from individual based systems to platform based systems and their support equipment. Typical systems and equipment supported include saturation, surface supplied, self contained and closed circuit diving; diver thermal protection; diver navigation; recompression; gas purification, monitoring, charging and storage; and mobile diver support. This technical capability is sustained and enhanced through a robust involvement in all phases of a program's life cycle (material solution analysis through operations and in-service support).

PC34 Surface Life Support Systems for Extreme Environments

Provides the personnel, equipment, facilities, and necessary expertise to perform the full range of acquisition life cycle development and support required to enable Naval forces personnel to conduct damage control operations requiring life support systems. This technical capability encompasses the roles of Acquisition Engineering Agent, Technical Design Agent and In-Service Engineering Agent for damage control personal protective equipment. This technical capability supports the research, development, test, and evaluation (RDT&E), acquisition logistics, system procurement, ship installations, sustainment and overhaul of equipment/systems intended for manned response in extreme environments, such as damage control and firefighting for respiratory protection, protective clothing or floatation use. Equipment and systems include breathing apparatuses, breathing air charging systems, fire fighter's ensemble, life preservers, flame retardant coveralls, anti-flash clothing, steam suit ensemble, ladder safety system/ firefighters extraction system, safety harness and lanyards. This technical capability is sustained and enhanced through a robust involvement in all phases of a program's life cycle (material solution analysis through operations and in-service support).

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PL04 Surface and Undersea Vehicle Machinery Systems Integration

Provides a coordinated, integrated approach for all surface ship and submarine major machinery programs. Includes test and evaluation (T&E) initiatives, enabling technology insertion, and machinery integration and additive manufacturing processes into new acquisition programs and the deployment of machinery initiatives into the Fleet. This capability provides an integrated approach to systems engineering for machinery systems that requires focus from multiple technical capabilities.

PL09 Surface and Undersea Vehicle Mechanical Power and Propulsion Systems

Provides full spectrum support for the engines (non-nuclear), reduction gears, shafting, bearings and associated mechanical components, which provide mobility, range, and endurance to surface ships, submarines and craft. Specific items include gas turbine, internal combustion, and steam power systems, equipment, aqueous and hydraulic fluids, fuel and lubricating oils, and components; main propulsion reduction gears, clutches, brakes, couplings, thrust bearings, shafting components, and propulsors. Principal functions performed are the research, development, test, and evaluation (RDT&E), and life cycle management of mechanical power and propulsion systems and equipment.

PL10 Surface and Undersea Vehicle Electrical Power and Propulsion Systems

Provides full spectrum support for the electrical power and propulsion generation, conversion and distribution systems for surface ships, submarines and craft. Specific items within this technical capability include electric power and propulsion generators and motors, current collectors, high power energy storage devices, switch gear, power conditioning devices and equipment, and electric distribution systems, pulse forming networks, and equipment as applied to ship's prime power and propulsion. Principal functions performed are the research, development, test, and evaluation (RDT&E), and life cycle management of electrical power and propulsion systems and equipment.

PL11 Surface and Undersea Vehicle Auxiliary Machinery Systems

Provides full spectrum support for the critical infrastructure systems and equipment that support all aspects of operation such as propulsion, power generation, combat systems, life support, weapons, acoustics, depth, and maintenance for surface ships, submarines and craft. Specific items include pumps, air compressors, hydraulics, piping and valves, actuators, distillation plants, oxygen generators, heat exchangers and cooling systems and equipment. Principal functions performed are the research, development, test, and evaluation (RDT&E), and life cycle management of auxiliary machinery systems and equipment.

PL12 Surface and Undersea Vehicle Hull, Deck, and Habitability Machinery Systems

Provides full spectrum support for systems and equipment which provide the intra-ship materiel and weapons handling and stowage, boat, vehicle and aircraft handling, navigation, closures and habitability and hotel service systems. Specific items include: anchor windlasses, boat davits, conveyors, cranes, elevators (aircraft, cargo, weapons, and personnel), escalators, hoists, submarine hydraulics, torpedo handling, minesweeping handling, steering, helicopter hangar doors, life lines, safety nets, doors, hatches, scuttles, food service, galley, laundry and dry cleaning, lavatories and berthing equipment. Principal functions performed are the research, development, test, and evaluation (RDT&E), and life cycle management of hull, deck and habitability machinery systems and equipment.

PL13 Surface and Undersea Vehicle Machinery Automation, Controls, Sensors and Network Systems

Provides full spectrum support for the devices, systems, applications, connectivity, and interfaces that provide the enabling smart-ship driven digital technologies and programs. Functions include performance detection and monitoring, control, unmanned machinery operation, automated navigation, and distribution of information for machinery systems and components. They enable situational awareness, fault detection and corrective action, intelligent reconfiguration and redistribution of vital systems, and reduction of human involvement in machinery operation and decision making tasks. Principal functions performed are the research, development, test, and evaluation (RDT&E), in service engineering, software support, and life cycle management of machinery automation, controls, sensors and network communications systems and equipment.

PL19 Advanced Logistics Concepts and HM&E Life Cycle Logistics Support

Provides research and development (R&D) for Navy logistics support technology and develops and maintains integrated logistics support (ILS) products for hull, mechanical, and electrical (HM&E) equipment and systems in the Fleet and for Army watercraft. Products and services include: concept development, R&D, test and evaluation (T&E), modeling and simulation, cost/benefit analysis, designs and specifications hardware, technology transition, knowledge/technology base, and management support. Specific areas of expertise and programs include: life cycle engineering, logistics technical documentation, logistics information technology, condition-based maintenance, logistics systems analysis and modeling, offshore basing, materiel support and automated/prognostics maintenance. Provides Navy-wide logistics R&D, and research, development, test, and evaluation (RDT&E), Fleet support, and in-service engineering (ISE) for Fleet HM&E logistics systems (including ordnance, material, boat and vehicle handling systems), ensuring mission sustainability where and when needed. Examines development and application of technologies pertinent to transportation and transfer of personnel and material; maintenance, diagnostics, and repair of surface and subsurface vessels and marine vehicle systems; development and maintenance of logistics

technical documentation for HM&E systems; digital Logistics data environments, and ILS planning, management and implementation.

PL21 Ship Recoverability and Damage Control

Provides full spectrum support for ship recoverability and damage control. Products are the technologies, engineering, equipment, systems, procedures, and logistics necessary to ensure that all Navy ships and submarines are safe to operate and have the optimal recoverability while in theater and during peace time accidents. These products apply to the platform, systems/equipment, and onboard personnel. Functions performed include research, development, test, and evaluation (RDT&E), design and acquisition support, and engineering for new ship and submarine designs, and in-service engineering (ISE) and alterations for current vehicles, systems, and equipment. Ship products include damage control and firefighting systems and equipment; damage control sensor systems and equipment, including fire and smoke detection; design guidance and analyses of alternatives; fire resistant and fire safe materials; conventional damage control systems and processes; damage control training; and damage control/recoverability analyses, assessment, tests and trials. Additionally, ISE and acquisition engineering is provided for decontamination, and ISE is provided for individual protection for chemical, biological and radiological (CBR) defense aboard ship and for Navy land-based forces; CBR defense equipment stowage and readiness improvement; damage stability analysis; and equipment for floatation and survival-at-sea.

PL24 HM&E for Undersea Vehicle Sail Systems and Deployed Systems

Provides full spectrum support for hull, mechanical, and electrical (HM&E) for submarine sail and deployed systems used to communicate, navigate, and conduct surveillance and intelligence in an undersea and littoral environment. Specific items within this technical capability include the sail mounted and deployed (buoy and floating wire) antenna, periscope, snorkel, imaging and electronic warfare (I&EW), and radar systems. Of critical importance is the operation of the HM&E components, which raise/lower or deploy/retrieve sensors and from Submarines. Principal functions performed are the research, development, test, and evaluation (RDT&E), engineering, submarine safety (SUBSAFE) certification, and life cycle management of undersea vehicle sail and deployed systems and equipment.

PL27 Shipboard Waste and Hazardous Materials Management Systems

Provides Lifecycle Management necessary to equip Navy ships with liquid and solid waste collection, transfer, management, treatment and discharge procedures, equipment, and systems that are best suited and/or designed to meet the unique requirements within the constraints of the warship environment (e.g., environmental compliance, space, weight, stealth, noise, logistics, manning, etc.). Capability includes the prevention, management, and cleanup of liquid waste spills. Products are the

technologies, engineering, equipment, systems, processes, and procedures that are necessary to ensure that Navy ships and submarines can perform their mission worldwide in accordance with liquid, solid and hazardous materials management regulations. Functions performed include acquisition support, in-service engineering, alterations, and life cycle management for current systems and equipment or upgrades and back-fits to improve performance. Provides the body of knowledge to sustain stewardship of liquid and solid waste systems and hazardous materials management processes throughout their life cycle; ensures independent and objective testing and certification of systems, validation, integration, and provides teaming/partnering with others as necessary to ensure proper equipment operations and readiness.

PL28 Surface Ship and Undersea Vehicle Machinery Systems Integrity

Provides acquisition support, test and evaluation, engineering, modifications and alterations, and life cycle management to ensure the integrity and performance of naval machinery on surface ships, submarines, and craft. Capabilities include materials, in-service structures, and shock qualification for naval machinery components and systems. Specific areas of expertise and responsibility are for materials used in the design, fabrication, assessment, and maintenance of machinery components and systems to include welding, fasteners, non-mechanical joining technologies, corrosion control mitigation technologies, tools and products, recommendations for topside, interior and underwater hull coating improvements, and failure analysis. In-service structures capabilities include assessments, recommendations for repair, validation of repair procedures, inspections, and post installation follow-ups. Shock qualification capabilities include certifications, requirements compliance and specifications for ship systems and components, Dynamic Design Analysis Method (DDAM), inspections, maintenance of USN's shock qualification data repository, and support of ship shock trials and test programs (including Total Ship Survivability Trials - TSSTs).

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PH01 Strike Force Interoperability and Theater Warfare Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), test and evaluation (T&E) and integrated logistics support (ILS) at the theater warfare and strike force level. Provides systems engineering and analysis in support of integration of command, control, communications, computers, combat systems, intelligence, surveillance and reconnaissance (C5ISR) systems used to provide Strike Force, theater and area defense, precision strike and fire support from ships and submarines, including Joint interoperability. Ensures integration, interoperability, and effectiveness of strike force warfare systems through the assignment of strike force interoperability teams. Provides logistics support for shipboard system elements as well as test and evaluation of advanced systems and upgrades to current systems. Develops strike force interoperability capabilities and limitations documents that include Joint and Coalition information and provide inputs to tactics development.

PH02 Surface and Expeditionary Combat Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), integration, modernization, test and evaluation (T&E) and integrated logistics support (ILS) of combat systems during all phases of the system life cycle. Develops system requirements and specifications. Provides systems engineering and analysis to support the full integration of combat system elements. Analyzes Fleet combat system integration problems and failures to provide engineering and logistics solutions. Plans, manages, and conducts test and evaluation throughout life cycle. Develops capabilities and limitations documents and provide inputs to tactics development. Develops and conducts combat system level and integration tests. Conduct Combat System Ship Qualification Trials (CSSQTs) during which the entire combat system, support elements, and personnel are assessed.

PH03 Surface and Expeditionary Weapon Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), integration, modernization, test and evaluation (T&E), and integrated logistics support (ILS) throughout the entire life cycle of weapon systems. Provides input to the design and development of new weapons systems; assume design agent for out of production systems. Plans, manages and conducts ship test and evaluation throughout life cycle. Analyzes Fleet problems and failures to provide engineering and logistics solutions. Provides a full array of logistics services to the Fleet. Inspect, test and certify weapons systems and their integration. Trains and certifies personnel. Develops, maintains, tests, certifies, and distributes tactical and support software. Ensures safety, effectiveness and affordability and integration of operational weapons systems.

PH04 Underway Replenishment Systems ISE, RDT&E, and ILS

Provides underway replenishment (UNREP) in-service engineering (ISE), research, development, test, and evaluation (RDT&E), and integrated logistics support (ILS) throughout the entire life cycle of UNREP systems. Provides production design and integrated logistics support for advanced or modernized UNREP systems. Provides life cycle technical support for advanced, modernized and in-service UNREP systems, including: ship installations, crew training, ship qualification trials, maintenance (ships force and shipyard), casualty report (CASREP) assistance, analyze Fleet problems and failures, and produce engineering and logistics solutions.

PH07 Surface and Expeditionary Missile Launcher Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), test and evaluation (T&E), and integrated logistics support (ILS) throughout the entire launching system life cycle. Ensures safety and operational readiness is maintained and that the systems are managed efficiently and effectively. Develops requirements, system specifications and procedures, computer programs and procedures. Certifies launching systems and personnel to enable systems and crews to operate safely and effectively. Analyzes Fleet problems and failures to produce engineering and logistics solutions.

PH08 Radar Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), test and evaluation (T&E), and integrated logistics support (ILS) throughout the system life cycle. Services include requirements definition, design review, integration, test and evaluation, performance analysis, software support, logistics product development, configuration management and installation planning/execution for the development and acquisition of new radar systems, the continuing spiral development of existing radar systems, and the support of legacy radar systems. Testing and evaluation services are provided beginning at formal developmental testing/ operational testing (DT/OT) and continuing through the operational deployment life cycle until system disposal. Prior to DT/OT, during concept exploration and development, support is provided as needed. Ensures system safety, operational readiness and effectiveness are maintained. Provides systems engineering services and analysis to support ship combat system integration and Fleet implementation. Analyzes maintenance technician/operator performance and develops training curriculum and technology solutions to improve human performance effectiveness. Develops system documentation and procedures, operational employment guidance, remote monitoring capability, maintenance plans, tactical computer programs and availability enhancements. Analyzes Fleet performance and identifies performance and sustainability problems to produce engineering and logistics solutions. Provides restoration activity certification, engineering support and oversight.

PH09 Directed Energy and Electric Weapon Systems ISE, T&E, and ILS

Provides in-service engineering (ISE), test and evaluation (T&E), and integrated logistics support (ILS) for directed energy (DE) systems and Electric Weapon Systems (DE&EWS) throughout the system life cycle. Services include requirements definition, design review, integration, T&E, performance analysis, software support, logistics product development, configuration management and installation planning/execution for the development and acquisition of electric weapon systems. Ensures system safety, operational readiness and effectiveness are maintained. T&E services are provided beginning at formal developmental testing/operational testing (DT/OT) and continuing through the operational deployment life cycle until system disposal. Prior to DT/OT, during concept exploration and development, support is provided as needed.

PH10 Littoral Mission Module ISE, T&E, and ILS

Provides the facilities and expertise to perform In-Service Engineering (ISE), Integration, Modernization, Test and Evaluation (T&E) and Integrated Logistics Support (ILS) of littoral mission modules during all phases of the system life cycle. Provides closed loop systems engineering and analysis to develop and conduct mission integration tests. Plans, manages, and conducts T&E throughout the life cycle of the mission modules including CSSQTs, during which the embarked mission packages, support elements, and personnel are assessed. Analyzes integration problems, system performance and sustainability problems to produce engineering and logistics solutions. Analyzes maintenance technician/operator performance and develops training curriculum and technology solutions to improve human performance effectiveness. Develops Mission Module operational technical documentation and procedures, operational employment guidance, remote monitoring capability, maintenance plans, tactical computer programs and availability enhancements to support safe and effective operation. Provides for the intermediate and depot level engineering analysis, maintenance, modernization, configuration management and distance support for the mission modules in support of the Littoral Warfare mission area. Expertise includes the packaging and handling of mission system hardware, operational system integration of legacy and emerging littoral mission systems, and software support agent coordination of all littoral mission packages computing environment hardware and software configurations. Provide direct fleet support during operational periods when distance support, fly-away teams, and mission module embark/debark, are necessary to meet mission requirements.

PH11 Ballistic Missile Defense T&E Specialized Target Vehicle Development, Integration, and Deployment

Supplies, develops, integrates, deploys and launches the AEGIS Readiness Assessment Vehicles (ARAVs) in support of Ballistic Missile Defense (BMD) and Integrated Air and Missile Defense (IAMD) Test Execution. This includes the furnishing/supply of target vehicles to meet CSSQT, DT/OT, Fleet assessment and FMS cases requiring BMD/IAMD system readiness assessment and verification. Provides full life cycle support for ARAVs to include procurement, maintenance, modification,

documentation and support facilities. Performs modeling and simulation, inventory management, design agent services, Integrated Logistics Support, environmental qualifications, and disposition and disposal of vehicles.

APPENDIX A:

Technical Capability Proposal Review and Approval Process

Purpose

To provide a process for proposing and vetting Warfare Centers (WC) technical capability (TC) changes, including addition of new TCs and modification or deletion of existing TCs, and approving the changes for addition to the TC manual.

Definition

- **A technical capability (TC)** represents the blending of intellectual and physical assets provided by a cadre of technical people with knowledge, skill, experience and requisite facilities and equipment that yield the ability to deliver technical products. The work in a TC is core when the function enables the accomplishment of a WC Division's key mission element and/or is inherently governmental, particularly in the case of value judgments affecting technological superiority; i.e., the quality and effectiveness of weapons, combat systems, and ship systems.
- **Key rules for defining TCs include:**
 - Unique to a Division
 - Distinct (technically)
 - Standalone (title is clear by itself)
 - Narrative definitions should not be more than 1-2 paragraphs
- **Common Taxonomy.** TC definitions should identify the following elements, as appropriate to the capability being defined:
 1. Product or Platform
 2. Function or Component
 3. Life cycle Stage
 4. Technical Discipline (as required to deconflict)
 5. Mission (as required to deconflict)

Background

The continued alignment and refinement of WC TCs is integral to achieving both the NAVSEA Vision and Mission¹ and the WC Vision and Mission². Specific and concise review filters, decision support criteria, and simplified process flow are required to facilitate the development or deletion of WC TCs and support WC Board of Director

¹ Naval Sea Systems Command Strategic Business Plan 2009-2013

² NAVSEA Warfare Centers Strategic Plan 2008-2012, March 2008

decision making, consistent with the WC CONOPS³. WC efforts to produce meaningful, specific TCs and integrate them into the cyclic Integrated Planning Process³ will enable the alignment and shaping of the WC TCs at a more discreet level. Fully vetted TCs will improve workload assignment and workload projections, support TCs health assessments and focus sustainment/improvement actions, and foster the alignment of human resources and investment planning consistent with Navy core requirements.

To ensure that the TCs accurately reflect the capabilities of the Warfare Centers, they are periodically reviewed and updated in accordance with the WC Integrated Planning Process. This review process takes place on a two to three year cycle, and any changes made to the TCs are validated jointly by the Divisions and the WC Headquarters with the goal of eliminating duplication of effort at different Divisions. Management and assessment of these TCs is performed at the Division and Headquarters level to help avoid competition and redundancy and ensure that efficiencies and synergies between the Divisions are realized. The National Workload Management Directors (NWMDs) direct and oversee this process, with the WC BOD holding final approval authority for changes.

Types of Change Requests

- **New TCs** may be submitted as a result of:
 - (a) Development of emergent technical capabilities due to changes in war fighting or technology requirements (e.g., break-through or disruptive technologies) that are consistent with mission and core requirements.
 - (b) New mission areas that have become part of the NAVSEA WCs via external changes such as BRAC realignment, or NAVSEA-directed additions of new communities into the NAVSEA WC family.
- **TC Modification** may become necessary because of changes in TCs due to growth of mission area, or as the result of shifted focus when technology develops beyond the original scope.
- **TC Realignment** may be needed when a technical capability is shifted to a different WC Division due to Base Realignment and Closure (BRAC) or other realignment initiatives.
- **TC Deletion** is requested when the Division is divesting or retiring a technical capability. This occurs when workloads decrease due to maturing missions or technology, external events such as BRAC realignment that move the function(s) outside the WC Divisions, or obsolescence.

³ Integrated NAVSEA Warfare Centers concept of Operations, 10 January 2011

TC Change Roles and Responsibilities:

- **Divisions:** Use the common business rules to propose new or to delete existing baseline (approved) TCs. Division COs and DTDs approve all TC change submissions and comments on submissions prior to submittal.
- **Division TC Change Point-of-Contacts (POCs):** Represent their Division during the TC change process, and communicate directly with their Division's CO and TD about actions in process.
- **National Workload Management Directors (NWMDs):** Support and endorse new/deleted TCs by validating the proposed change against their strategic assessments. Review and adjudicate changes to the TCs, and to the TC proposal review and approval process.
- **WC Headquarters TC Configuration Manager (CM):** Maintain configuration control of WC TCs the TC Manual, and documentation regarding TC changes. Facilitate the TC review and approval process by supporting Division development, NWMD review and endorsement, and WCBOD review and approval of TC changes.
- **WC Division Technical Directors (DTDs):** Review and concur with TC changes prior to submission to WC BOD.
- **WC Executive Director (ED):** Review and approve steps within the change process, on behalf of the WC BOD.
- **WC BOD:** Approval/disapproval all WC TC changes. Review and approve changes to the TC review and approval process.

TC Review Process

Step 1: NAVSEA WC TC review is announced.

Every two to three years as needed, the NAVSEA WC BOD announces a schedule for the review of the TCs. The announcement, along with the current TC document and the TC Change Request form, is distributed to all WC COs and DTDs, with copies to the Division TC Change POCs.

Step 2: WC Division initiates request for TC Change.

As part of the review, Divisions document any desired TC changes on a provided TC Change Request form, and send via their Division POC to the CM. The documentation provided to the CM includes detailed justification for the changes and suggested new/revised TC descriptions, as appropriate.

Step 3: Package Review

The CM reviews the TC Change Request packages submitted by the Divisions, and works with the Division to insure that the packages contain all necessary information. The CM keeps the TC Change Request packages updated for the entire review cycle. The CM then compiles a list of proposed changes for distribution, and performs a high level review with WC management, including the NWMDs, to ascertain if the requested change fits within the business rules and is appropriate for processing. The submitting organization is informed of the package status.

Step 4: Identification of Division Involvement, TC Change Discussion, and Submission of Comments (for each individual request)

If accepted, each individual proposed change package is sent to the Division TC Change POCs, and they are asked to indicate if they have TCs in their Division with any potential conflict. For Divisions indicating that concern, a meeting is held with the submitting Division to discuss the changes, with the CM facilitating. A deadline is set for the Divisions to submit any recommended changes, along with rationale for the change, in writing to the CM. The Division TC Change POCs must get approval from their Division COs and DTDs prior to submission of the recommended changes.

Step 5: Adjudication Process (for each individual request)

The CM creates a TC adjudication document. It contains the original request and all recommended changes with accompanying rationale. The package is distributed to the NWMDs and to all Divisions involved in the initial review. A meeting is held between the NWMDs and the submitting Division to adjudicate the comments, with the CM facilitating. The CM then updates the adjudication document, creates an adjudicated version of the TC, and sends the package first to those involved in the initial review, then to all Division TC Change POCs. Barring any major issues, the package is the ready for WC BOD approval. If additional questions are received, steps 4 and 5 are repeated as necessary to reach agreement. If agreement cannot be reached on a package, at the discretion of the NWMDs and/or WC DTDs, the package goes to the WC BOD for decision.

Step 6: WCBOD Approval

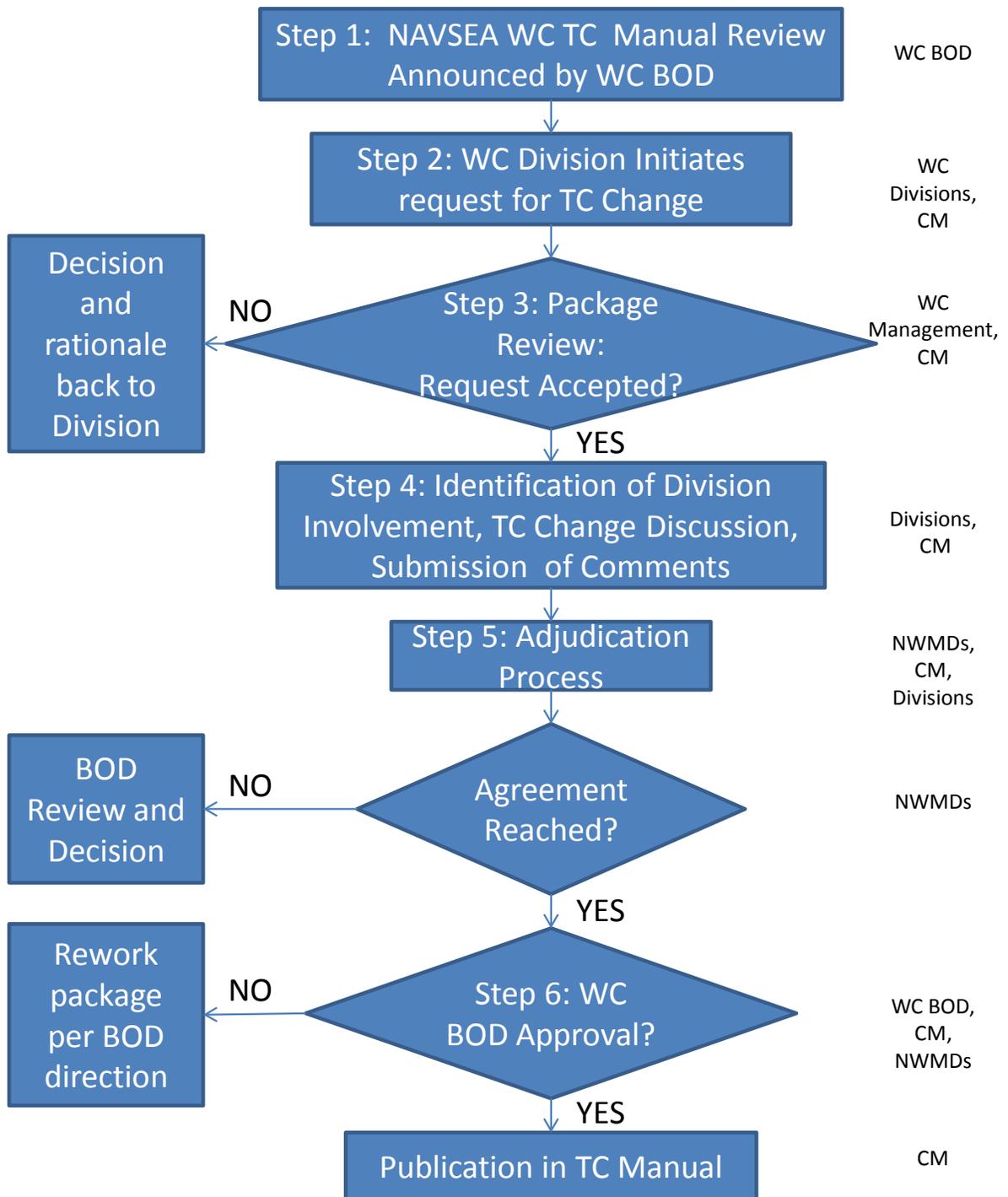
The WCBOD reviews the final TC Change package, and either approves or rejects the proposed TC change. Approved changes are announced to WCs (COs and TDs with copies to the Division TC Change POCs), and the TC document is updated.

Special Note: Steps 2 through 6 may also be initiated at the discretion of the WC BOD outside the normal 2-3 year review process for emergent changes such as BRAC or the movement of other NAVSEA organizations under the WC structure.

NAVSEA Warfare Center (WC) TC Filter

Role/Use of TC (Division Level)	Major Attributes	Business Rules
<ul style="list-style-type: none"> • Used to manage/assign workload <ul style="list-style-type: none"> • Define value added contributions • Establish boundaries for exploring alternative work assignments • Identify potential synergies/partnerships • Is a fundamental description of workload and facilities (functions Divisions do) • Informs Stakeholders of capabilities of WCs • Provides basic building blocks for Technical Capability Health Assessment (TCHA) data collection • Connected to investment decisions 	<ul style="list-style-type: none"> • Clearly relates to WC <u>Division's</u> intellectual and physical assets that deliver products to the Customer <ul style="list-style-type: none"> • Unique in its contribution to the WC Enterprise • Links to Division mission/ mission essential • Links to acquisition life cycle • Clearly recognized as required to steward in-house capability <ul style="list-style-type: none"> • Government role • Best value to government • Economic viability • Links to technical discipline and capable of being divided into Knowledge Areas (KAs) • Relates value to Customer or Stakeholder 	<ul style="list-style-type: none"> • Each TC must be unique to a single Division • Each TC must be technically distinct from every other TC • Each TC must be standalone (title is clear by itself) • Narrative definitions should be not more than 1-2 paragraphs • TCs must capture all direct work • TCs must link upward to Core Equities <ul style="list-style-type: none"> • May support more than one • TC must have extended life beyond a program/project • TC must use common taxonomy: <ul style="list-style-type: none"> • Product or platform • Function or component • Life cycle stage • Technical discipline (as required to de-conflict) • Mission (as required to de-conflict)

Annotated Flow Diagram



APPENDIX B:

Roles and Responsibilities Matrices

Purpose

This appendix contains the Roles and Responsibilities (R&R) matrices for work in specific mission and product areas. The matrices provide additional granularity to what is provided in the Technical Capability (TC) descriptions and offer insight into how individual TCs are currently aligned to the respective mission and product areas. These matrices are intended to help eliminate redundancy, determine the best Warfare Center team to meet customer needs, promote cross-site collaboration, and maximize efficiency across the Warfare Center enterprise. The matrices capture the current state, but are not all-encompassing; any Division with unique capabilities not explicitly shown may be required to provide support to work in these mission and product areas. The R&R matrices will be reviewed periodically to address changes from the current state.

Electronic Warfare Roles

Technical Function			S&T	Technology Transition	Combat System/ Platform Integration	Acquisition Engineering	Threat Exploitation	Techniques Development	In Service Engineering/ Support	
Mission	Surface		NSWCCR (co-lead) <i>CR04</i>	NSWCCR (lead) <i>CR04</i>	NSWCDD (lead) <i>DD17</i>	NSWCCR (lead) <i>CR04</i>	NSWCCR (lead) <i>CR04</i>	NSWCDD (lead) <i>DD17</i> (Note 1)	NSWCCR (lead) <i>CR04</i>	
			NSWCDD (co-lead) <i>DD17</i>	NSWCDD (support) <i>DD17</i>	NSWCCR (support) <i>CR04</i>	NSWCDD (support) <i>DD17</i>	NSWCDD (support) <i>DD17</i>	NSWCCR (support) <i>CR04</i> (Note 2)		
	Ground	CREW		NSWCIHEODTD (co-lead) <i>IH09</i>	NSWCCR (co-lead) <i>CR04</i>		NSWCCR (lead) <i>CR04</i>	NSWCCR (lead) <i>CR04</i>	NSWCCR (lead) <i>CR04</i>	NSWCCR (lead) <i>CR04</i>
				NSWCCR (co-lead) <i>CR04</i>	NSWCIHEODTD (co-lead) <i>IH09</i>	NSWCCR (support) <i>CR04</i> (Note 3)	NSWCIHEODTD (support) <i>IH09</i>	NSWCIHEODTD (support) <i>IH09</i>	NSWCIHEODTD (support) <i>IH09</i>	NSWCIHEODTD (support) <i>IH09</i>
						NSWCDD (support) <i>DD17</i>				
		JSEOD		NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>	NSWCIHEODTD (lead) <i>IH09</i>
	Undersea			NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>	NUWC NPT (lead) <i>NP07</i>
										NSWCDD/DN (support) <i>DD21</i>
	Air			NSWCCR (lead) <i>CR04, CR10</i>	NSWCCR (lead) <i>CR04, CR10</i>		NSWCCR (lead) <i>CR04, CR10</i>	NSWCCR (lead) <i>CR04, CR10</i>	NSWCCR (lead) <i>CR04, CR10</i>	NSWCCR (lead) <i>CR04, CR10</i>
						NSWCCR (lead) <i>CR04, CR10</i> (Note 3)				

Notes:

1. Library development work executed under the category of techniques development
2. Lead for LCS legacy systems only
3. Crane acts as integration lead on occasion (i.e., ground vehicles and CEASER)

Unmanned Systems Roles

Vehicle	USV				UUV				UGV			UAV
Mission	X-Class	Harbor Class	Snorkeler Class	Fleet Class	Man-Portable Class	Light Weight Vehicle Class	Heavy Weight Vehicle class	Large Vehicle Class	Maneuver Class	Maneuver Support Class	Sustainment Class	
Predominately Undersea Warfare	NUWC NPT (ASW Lead) <i>NP 05, 08, 09</i> NSWC CD (support) <i>CD06</i>	NUWC NPT (ASW Lead) <i>NP 05, 08, 09</i> NSWC CD (support) <i>CD06</i>	NUWC NPT (ASW Lead) <i>NP 05, 08, 09</i> NSWC CD (support) <i>CD06</i>	NUWC NPT (ASW Lead) <i>NP 05, 08, 09</i> NSWC CD (support) <i>CD06</i>	NUWC (lead) <i>NP 03, 05, 07, 09, 11, 20</i> <i>KP 02, 04, 07, 11, 12</i>	NUWC (lead) <i>NP 03, 05, 07, 09, 11, 20</i> <i>KP 02, 04, 07, 11, 12</i> NSWC PCD (support) <i>PC30</i>	NUWC (lead) <i>NP 03, 04, 11, 13, 20</i> <i>KP 02, 04, 07, 11, 12</i> NSWC PCD (support) <i>PC30</i>	NUWC (lead) <i>NP 03, 04, 11, 20</i> <i>KP 02, 04, 07, 11, 12</i> NSWC CD (support) <i>CD06</i> NSWC PCD (support) <i>PC30</i>	N/A	N/A	N/A	NUWC (support) NP <i>01, 02, 03, 07, 09</i> KP 02
Predominately Surface Warfare (includes EOD Land)	NSWC DD (lead) <i>DD13</i> NSWC CD (support) <i>CD06</i>	NSWC DD (lead) <i>DD13</i> NSWC CD (support) <i>CD06</i>	NSWC DD (lead) <i>DD13</i> NSWC CD (support) <i>CD06</i>	NSWC DD (lead) <i>DD10, 13</i> NSWC CD (support) <i>CD06</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NSWC DD (lead) <i>DD13</i> NSWC CR (support) <i>CR 04, 16</i>
Predominately Littoral Warfare (MIW, NSW, Expeditionary Maneuver; and *includes EOD Land)	NSWC PCD (lead) <i>PC 21, 27, 30</i> NSWC CD (support) <i>CD06</i>	NSWC PCD (lead) <i>PC 28, 30, 31</i> NSWC CD (support) <i>CD06</i>	NSWC PCD (lead) <i>PC 28, 30, 31</i> NSWC CD (support) <i>CD06</i>	NSWC PCD (lead) <i>PC 28, 30, 31</i> NSWC CD (support) <i>CD06</i>	NSWC PCD (lead) <i>PC 30, 31</i> NUWC NP (support) <i>NP 05, 11</i>	NSWC PCD (lead) <i>PC 30, 31</i> NUWC NP (support) <i>NP 05, 11</i>	NSWC PCD (lead) <i>PC 30, 31</i> NUWC NP (support) <i>NP 05, 11</i>	NSWC PCD (lead) <i>PC 30, 31</i> NSWC CD (support) <i>CD06</i> NUWC NP (support) <i>NP 05, 11</i>	NSWCIHEOD (lead*) <i>IH09</i>	NSWC DD (lead) <i>DD13</i> NSWC PCD (support) <i>PC 26, 28, 30</i> NSWC CD (support) <i>CD06</i>	NSWCIHEOD (lead*) <i>IH09</i> NSWC DD (lead) <i>DD13</i> NSWC CD (support) <i>CD06</i>	NSWC PC (support) <i>PC 28, 30</i>

Any unmanned system that utilizes site unique capabilities may require support by divisions not listed on this matrix (e.g. Energetics, Energy/Power, Machinery Systems).

Vehicle Classes References:

UU:- The Navy Unmanned Undersea Vehicle (UUV) Master Plan, 09 November, 2004

USV: The Navy Unmanned Surface Vehicle (USV) master Plan, 23 July 2007

UGV: Unmanned Systems Integrated Roadmap FY2011-2036, OSD Ref # 11-S-3631