Technical Authority and Engineering Agents

TOPIC LEARNING OBJECTIVES

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

1. Recognize the definition of technical authority.
2. Identify the ultimate technical authority for ships, weapons systems, Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR), Cyber and Information Technology (IT) Systems.
3. Recognize the types and responsibilities of each of type of Technical Warrant Holder.
4. Identify the path for technical resolution of a waterfront issue.
5. Recognize the responsibilities and the acquisition life-cycle phase for which each of the five types of engineering agents is involved.

STUDENT PREPARATION

Student Support Material

1. Video: “Challenger: A Rush to Launch” (https://youtube/2FehGJQlOf0)

Primary References

1. NAVSEAINST 5400.97 / VS-JI-22A – Virtual SYSCOM Engineering and Technical Authority Policy

Additional References

1. NAVSEAINST 5400.95 (series) - Waterfront Engineering and Technical Authority Policy
2. NAVSEAINST 5400.111 (series) - NAVSEA Engineering and Technical Authority Policy
3. Engineering and Technical Authority Manual (ETAM), NAVSEA S9800-AC-MAN-010
4. COMUSFLTFORCOMINST 4790.3 (series) - Joint Fleet Maintenance Manual (JFMM)
5. NOTE: NAVSEA instructions available through https://www.navsea.navy.mil/Resources/Instructions/ or
6. https://flankspeed.sharepoint-mil.us/sites/NAVSEA_HOME/Docs/Instructions/Forms/AllItems.aspx (requires CAC)

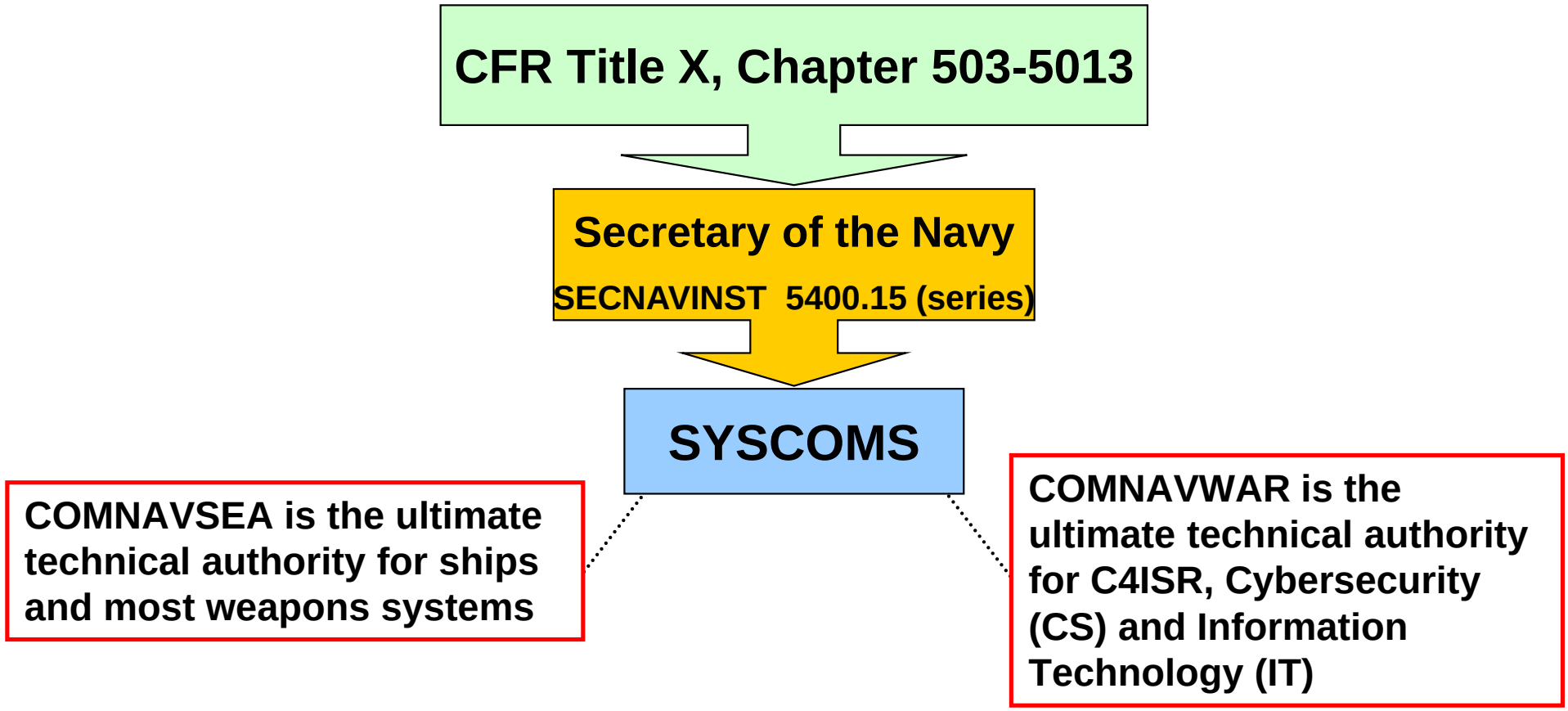
Overview

- Defining technical authority
- Need for technical authority
- Technical Warrant Holders (TWHs)
- Resolving waterfront technical issues
- Engineering Agents (EAs)

Definition

- Technical Authority is the:
  - authority
  - responsibility
  - and accountability to
    - establish
    - monitor
    - and approve technical standards, tools, and processes in conformance with higher authority policy, requirements, architectures, and standards.
- The exercise of TA is a process that establishes and assures adherence to technical standards and policies, providing a range of technically acceptable alternatives with risk and value assessments.

Ultimate Technical Authority



C4ISR - Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance

Technical Authority is an inherently governmental function assigned to SYSCOM Commanders by the SECNAV

Responsibilities (Technical Competencies)

- Responsibilities of Technical Warrant Holders:
  - ***Setting technical standards*** – creation of standards and tailoring standards to specific program applications, must balance requirements with intended missions
  - ***Technical area expertise*** – provide expert testimony as required (e.g., risk assessments, technology readiness evaluations, critiques and mishap investigations, trouble reports, test plans, test evaluation reviews, etc.)
  - ***Ensuring safe and reliable operations*** – ensure safety and reliability are addressed properly in technical documentation. When required, act as the certification authority
  - ***Ensuring effective and efficient systems engineering*** – ensure engineering and technical products meet Navy needs and requirements, and consider the full lifecycle of the system and its relationship with other systems as part of a larger system of systems
  - ***Judgment in making unbiased technical decisions*** – provide leadership and be accountable for all engineering and technical decision making. Promote and facilitate communications throughout the technical community to ensure appropriate individuals and organizations are aware of and involved in technical requirements, issues, and risks and that they are identified and understood at the earliest possible point
  - ***Stewardship of engineering and technical capabilities*** – forecast, shape, and develop the capability and capacity of engineering support networks
  - ***Accountability and technical integrity*** – balance the speed to decision, the expertise and capability of the individuals and organizations empowered, and the need to elevate significant issues

Responsibilities

- Technical authority and accountability interfaces:
  - Technical decisions are part of the cost/schedule/performance risk discussion
  - Stakeholders (e.g., Program Management Office (PMO), Naval Shipyard (NSY), Fleet) will be involved in balancing risk
  - Technical authorities assess risk, and provide recommendations and acceptable alternatives to programmatic authorities when there are programmatic or operational challenges meeting technical requirements

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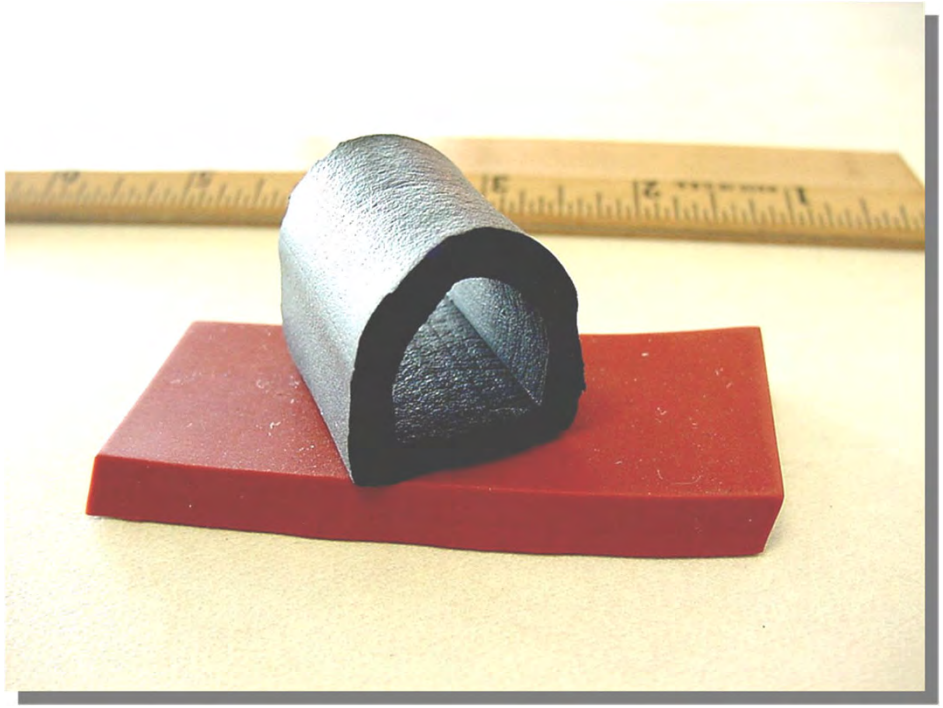
USS DOLPHIN (AGSS-555)

- 21 May 2002: Operating 100 miles off the San Diego coast
- Ship began flooding while surfaced to recharge the battery
- Fires broke out due to the flooding. Most of the crew prepared to abandon ship

- Damage control efforts of two crew members prevented a complete loss of the vessel

Technical Risks

- USS Dolphin - The black D-shaped sponge gasket was substituted for the specified red silicone
- This alteration was well-intentioned, but no authorization was obtained from a technical authority
- While surfaced in heavy seas, the Mk 54 shield side door opened and water entered the submarine
  - Filled pump room
  - Overflowed into Electrical Engineering (EE) space and crew's living space
  - Lost power to de-water ship
  - Crew abandoned ship



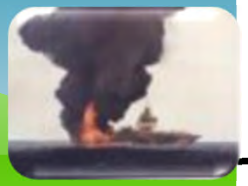
Risks to sailors, ships, systems, and the Navy's ability to recapitalize

TA History

1963 — **USS THRESHER**

World's 1st nuclear submarine to be lost. World's worst submarine disaster in terms of lives lost

→ **SUBSAFE**



1967 — **USS FORRESTAL**

Electrical anomaly discharged a Zuni rocket on the flight deck
134 dead and 161 more injured

→ **NOSSA/WSESRB**

1979 — **THREE MILE ISLAND**

Worst accident in American commercial nuclear power generation

→ **NRC inspections**

1986 — **CHALLENGER**

Faulty design - launched under unsafe conditions/ O-ring defect

→ **Shuttle Safety Panel**

1997 COMNAVSEA Technical Authority Memo

2002 — **USS DOLPHIN**

Fire and flooding was beyond the ability of the crew to control

2003 — **COLUMBIA**

Heat shield damage on the shuttle's left wing

2007 SECNAV Technical Authority Instruction

2010 — **DEEPWATER HORIZON**

Defective cement job
Systematic failure in safe practices; lack of training

Need for Technical Authority

- Per the 5400.97C TA is needed to develop and employ consistent disciplined collaborative engineering processes that provide safe, reliable, effective, integrated, timely and affordable products for the Navy.
- Technical authority is needed to
  - Establish, monitor, and approve standards, tools and processes to provide risk-based solutions to the Fleet
  - Oversee core processes, including technology development, systems engineering, cost estimating, and test and evaluation
  - Operate and sustain the most efficient technical infrastructure to support acquisition, fielding, and in-service support
  - Support Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RD&A)) and CNO for analysis of mission areas, systems, and requirements

Technical authority provides a range of technically acceptable alternatives with risk and value assessments to the Program Offices and the Fleet

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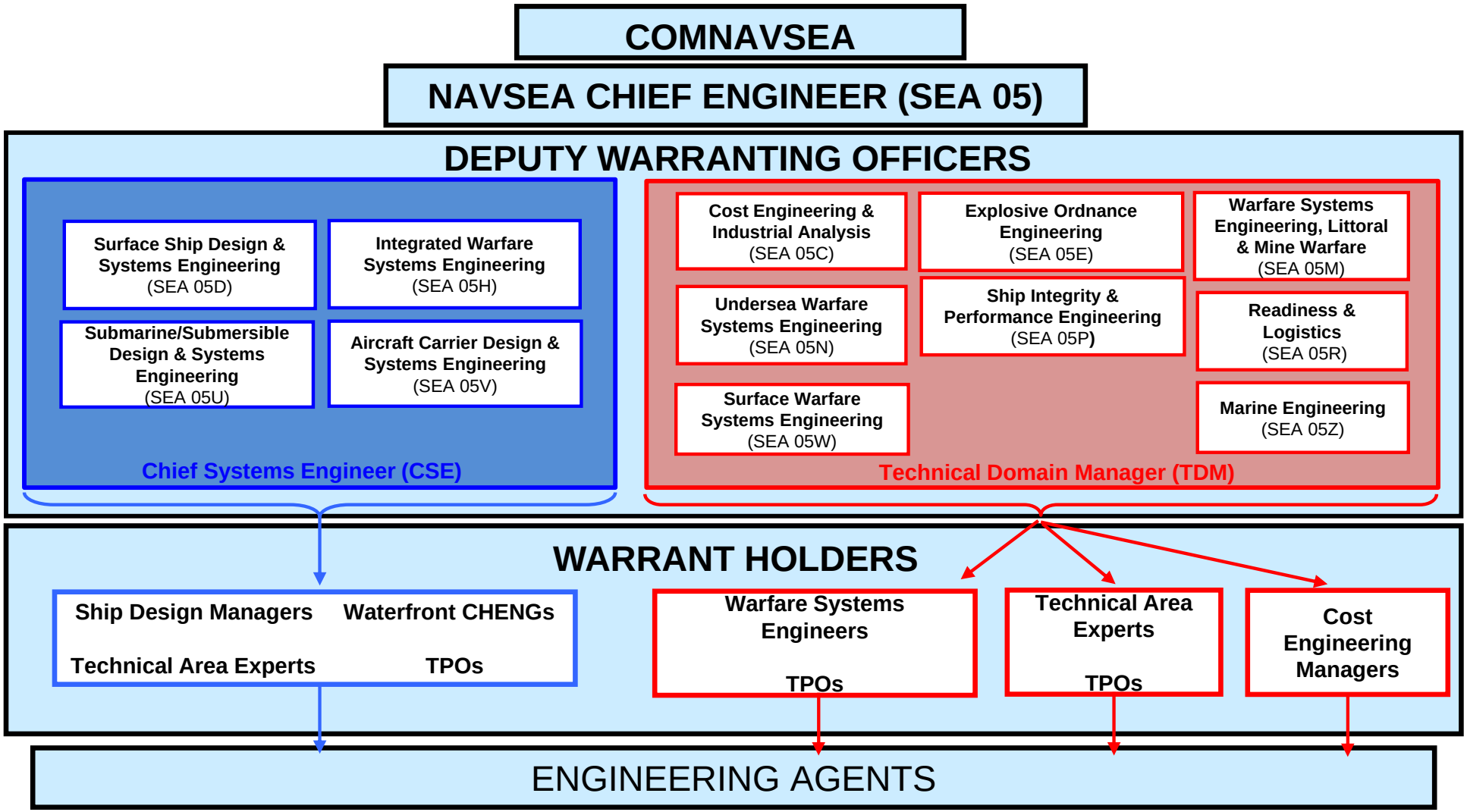
Technical Authorities

- Chief Systems Engineer (CSE) – facilitate, collaborate, and coordinate with Technical Domain Managers within their warranted area to ensure proper oversight of TA (Ballistic Missile Defense (BMD), C4ISR, Space, etc.)
  - "Mile wide and inch deep" and "blue box" warrant holders
- Technical Domain Manager (TDM) – provide deep technical expertise to programs and activities (marine engineering, structures, fluid mechanics, etc.)
  - "Inch wide and mile deep" and "red box" warrant holders
- Senior Technical Authority (STA) – certify sufficient risk mitigation and maturity for critical systems to proceed past Milestone B
  - Title 10 USC §8669b requires SECNAV establishes STA for each naval vessel class
  - STAs are dual hatted as CSE Deputy Warranting Officers

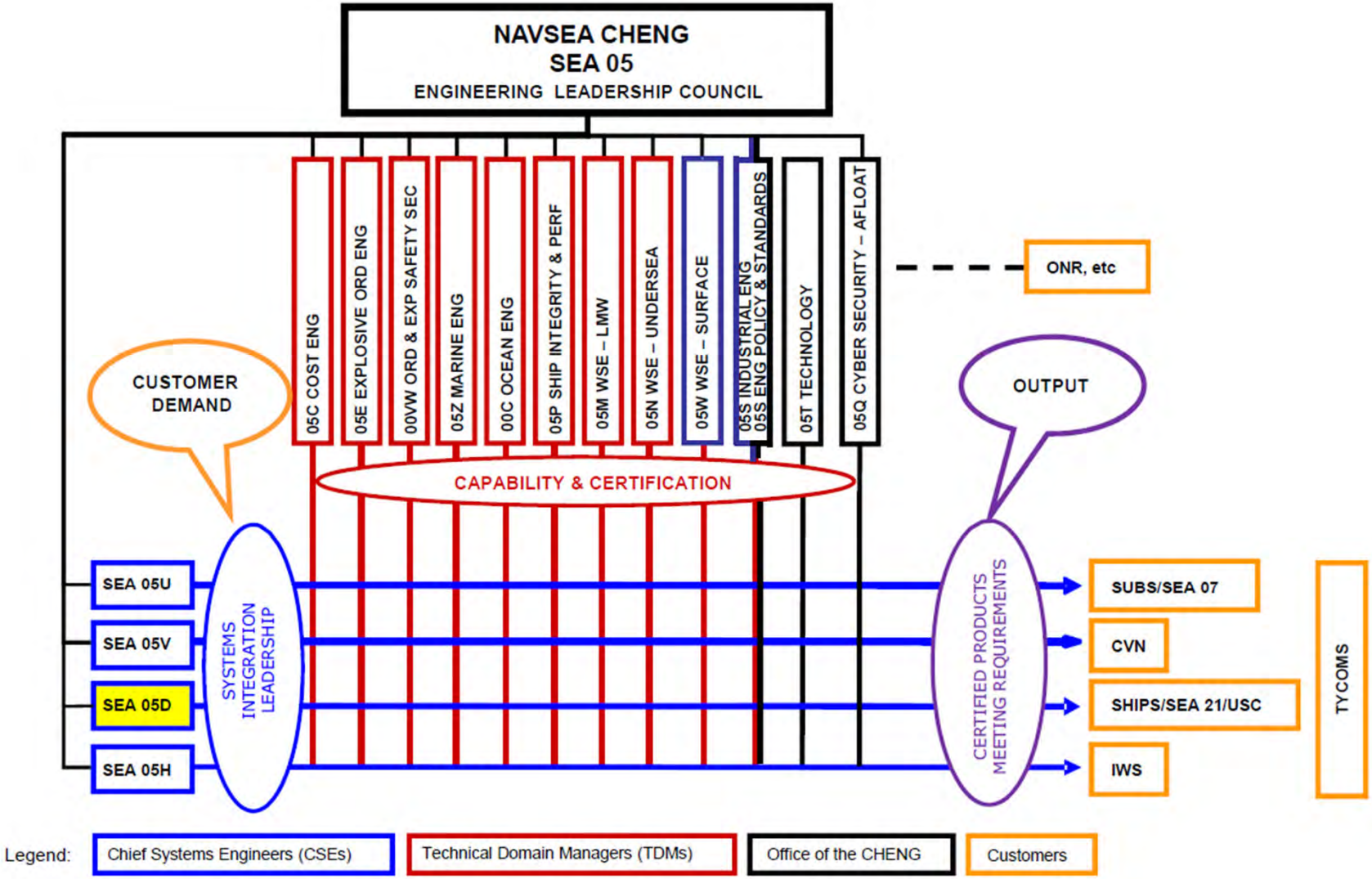
Technical Warrant Holders (TWHs)

- Ship Design Manager (SDM) - manage systems engineering and design efforts for assigned platforms (in-service, new construction, future design)
- Systems Integration Manager (SIM) - assist SDMs in systems engineering integration of complex warfare systems into platforms (Anti-Submarine Warfare (ASW), DDG51/CG47 class Combat Systems)
- Cost Engineering Manager (CEM) - ensure independent cost engineering & estimating in support of Navy programs (CVN, subs, surface platforms)
- Technical Area Expert (TAE) - the Navy's expert in the assigned product technical area (propulsion, missiles, shock, combat systems)
- Technical Process Owner (TPO) - provide definition and documentation for the assigned technical processes
- Waterfront Chief Engineer (WFCHENG) - lead and focus technical efforts of the SYSCOMs from the waterfront (NSY, RMC, SUPSHIPS, NAVWAR)

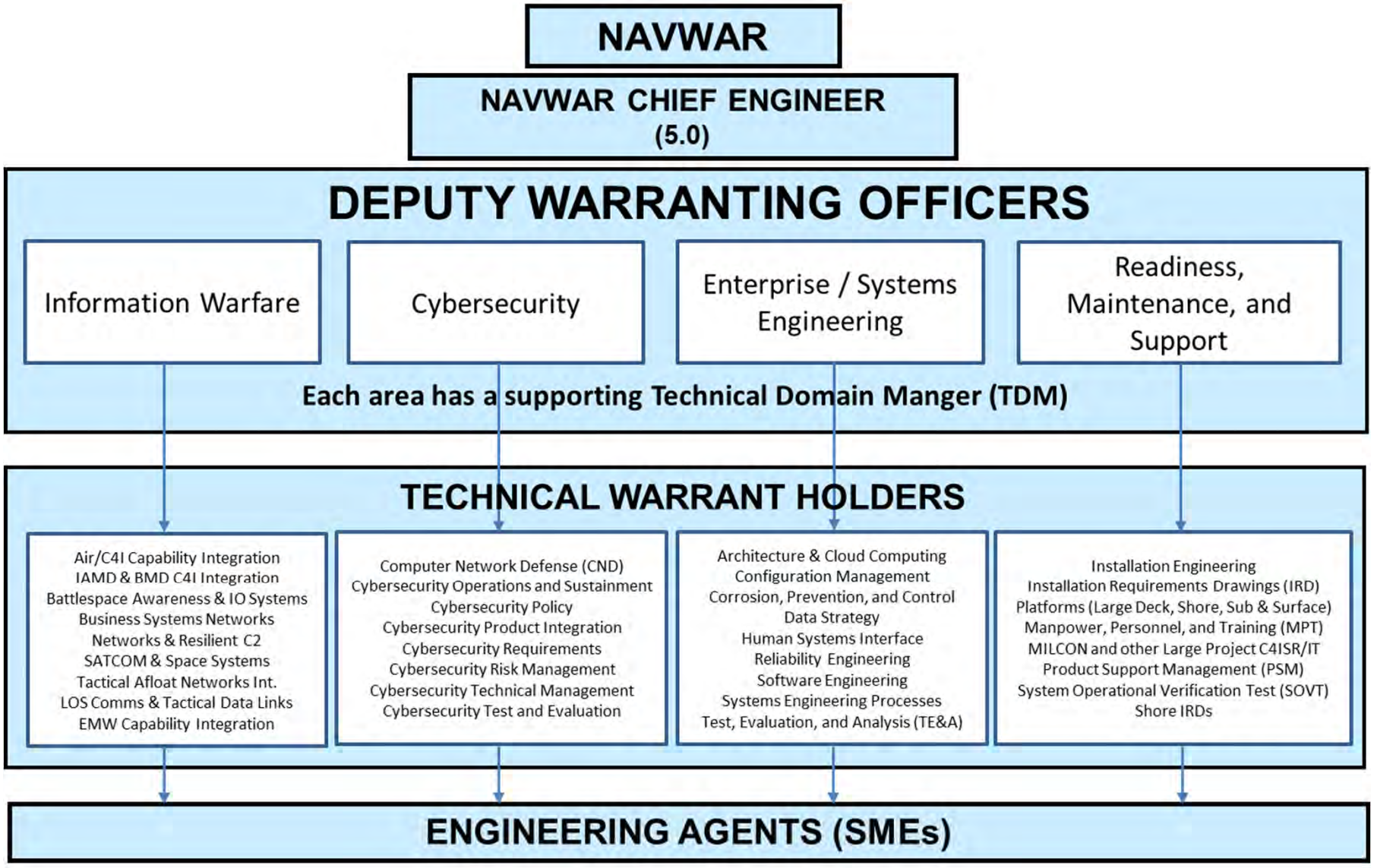
NAVSEA Warranting



TDMs and CSEs



NAVWAR Warranting



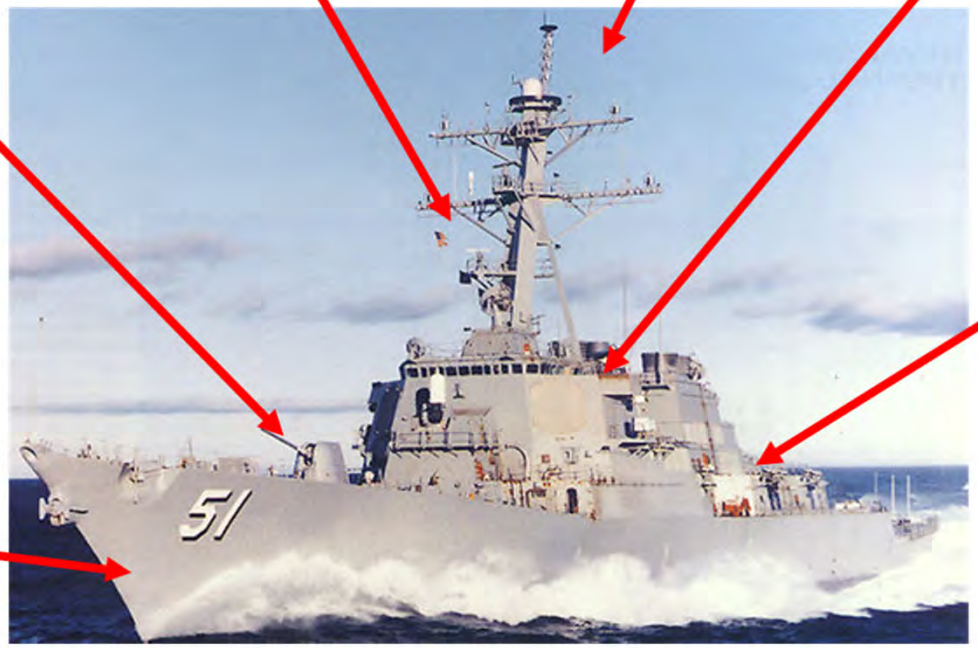
Examples

TAE Guns/surface ships: NSWC DD G30

TPO Architecture Standards: NAVWAR 05

TPO EMI control: SEA 0623

Chief Systems Engineer (CSE) for DDG51/ CG47 class:, NSWC DD N05



TAE Machinery (Deck & UNREP gear): SEA 05Z8

TAE Material/ coatings: SEA 05M1

CHENG at MARMC → Total Platform Warrant Holders ← SDM, DDG 51

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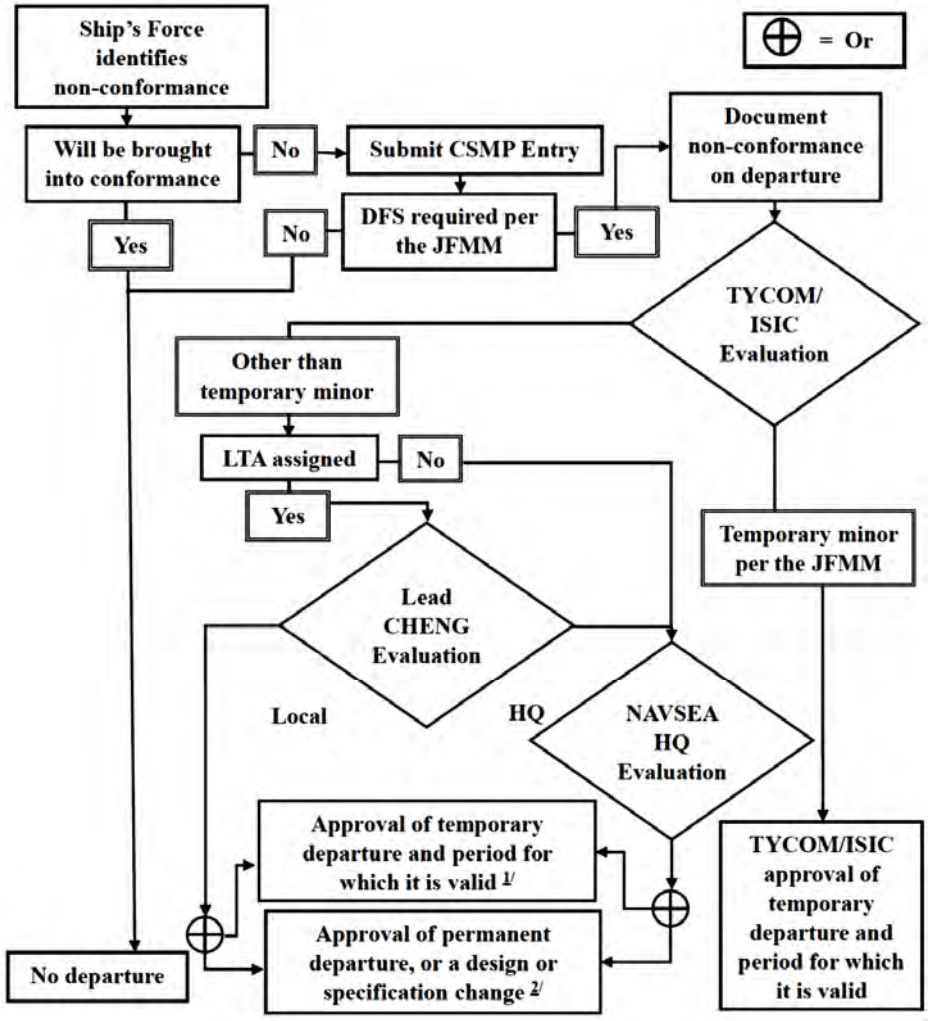
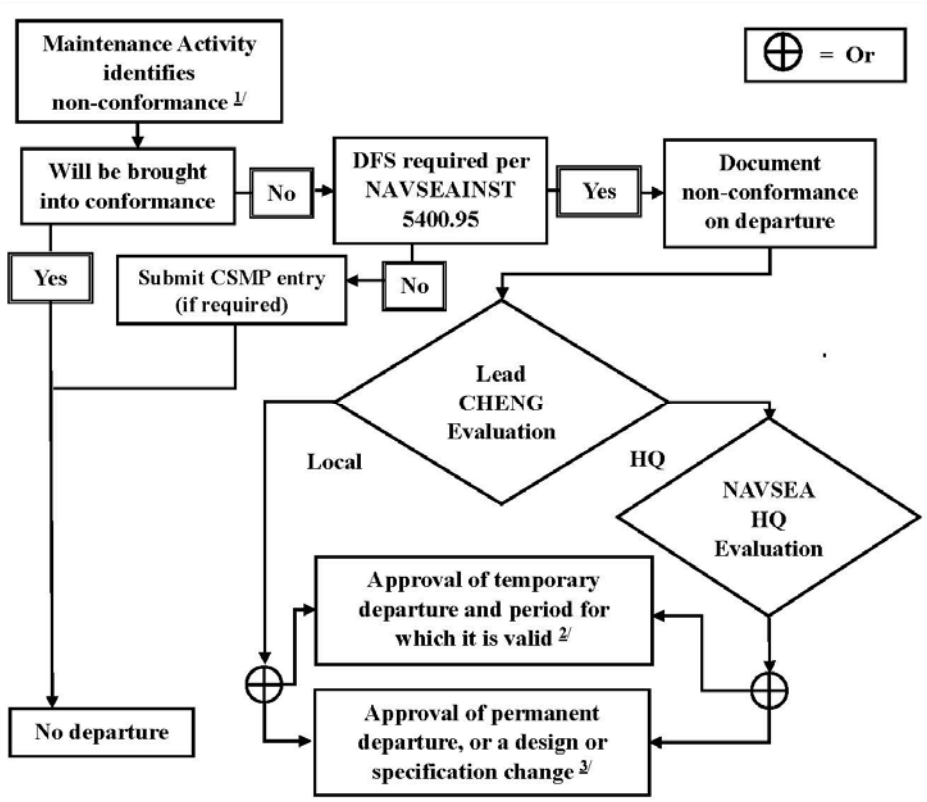
Resolving Waterfront Technical Issues Departure From Specification (DFS)



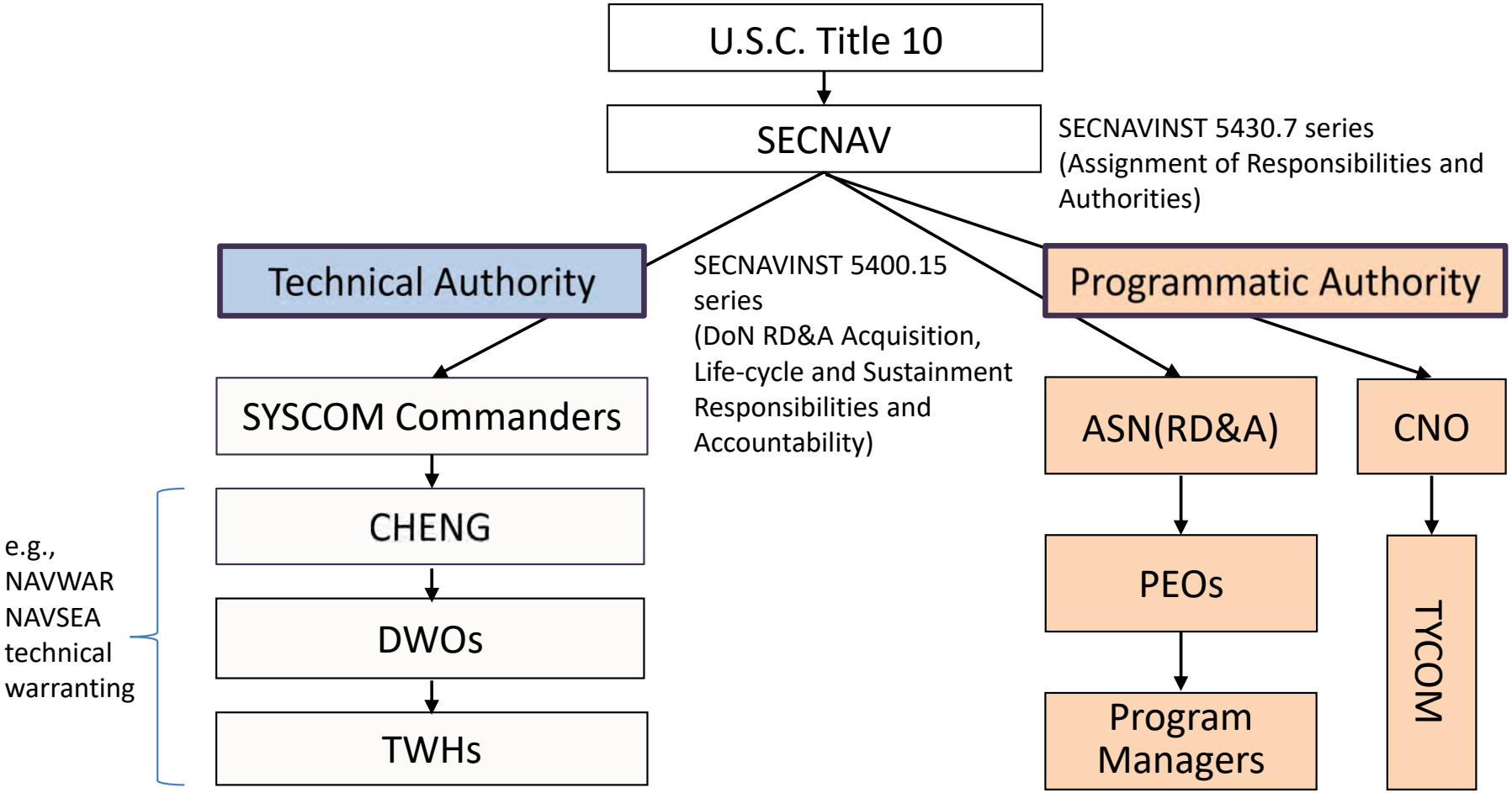


Lead technical authority (LTA)
Current Ship's Maintenance Project (CSMP)

Technical Issue Resolution

- Conflicts within the technical community, or between technical authority and other stakeholders, are resolved at the lowest level
  - Have meaningful discussions about risk
  - Constructive tension often leads to better solutions
- "Get to yes" safely so that Sailors can focus on assigned missions and meet operational requirements. Technical authority should:
  - Avoid "saying no" whenever possible
  - Avoid analysis paralysis, and strive to use engineering judgement when data is not available
  - Succinctly explain why an operational restriction is needed
- The technical community must provide reasons and alternatives to stakeholders and the chain of command
  - Program Offices or Fleet may disagree and still want to proceed
  - Competing perspectives should not be silenced
    - Issues are elevated up the chain of command for adjudication

Approving Authorities



SECNAVINST 5400.15 series: SYSCOMs provide in-service support to Program Executive Offices (PEOs) and Direct Reporting Program Managers (DRPMs); serve as technical authority, operational safety, certification authorities for assigned areas. PEOs and DRPM shall act for and exercise the programmatic authority of the Naval Acquisition Executive to directly supervise the management of assigned programs. ASN(RD&A) is responsible for overall supervision of sustainment including maintenance. CNO is responsible for manning, training, and equipping their forces, including the resourcing of sustainment.

Technical Decision Making Chart

Suppliers	Inputs	Process	Outputs	Customer
Program authority (e.g., program teams supporting Project Managers [PM] and/or Type Commanders [TYCOM])	Problem that needs a technical decision, e.g., -Systems engineering plan (SEP) -Design specifications -Design -Engineering change proposals (ECP) -Casualty response -Certifications [1/]	Develop response plan and estimated completion date[2/]	Formal correspondence communicating alternatives w/ risk assessment -Acceptable -Not	PA chooses from acceptable solutions
Other requestors	Problem that needs a technical decision, e.g., -Set standards -Nonconformances -Casualty response -Certifications[1/]	Conduct market research	Formal correspondence communicating technical decision	Decision requestor
Sponsor (OPNAV)	Criteria/requirements -Performance -RAM -Safety -Cost -Schedule -Supportability	Identify and analyze alternatives		
DoD, DON, etc.	Higher-tier requirements	Perform risk analysis		
Interfacing Technical Warrant Holders (TWH)	Interfacing TWH requirements (e.g., shock, noise)	Coordinate with key stakeholders[3/]		
TWH and support network	Subject matter expertise	Obtain TA signatures[4/]		

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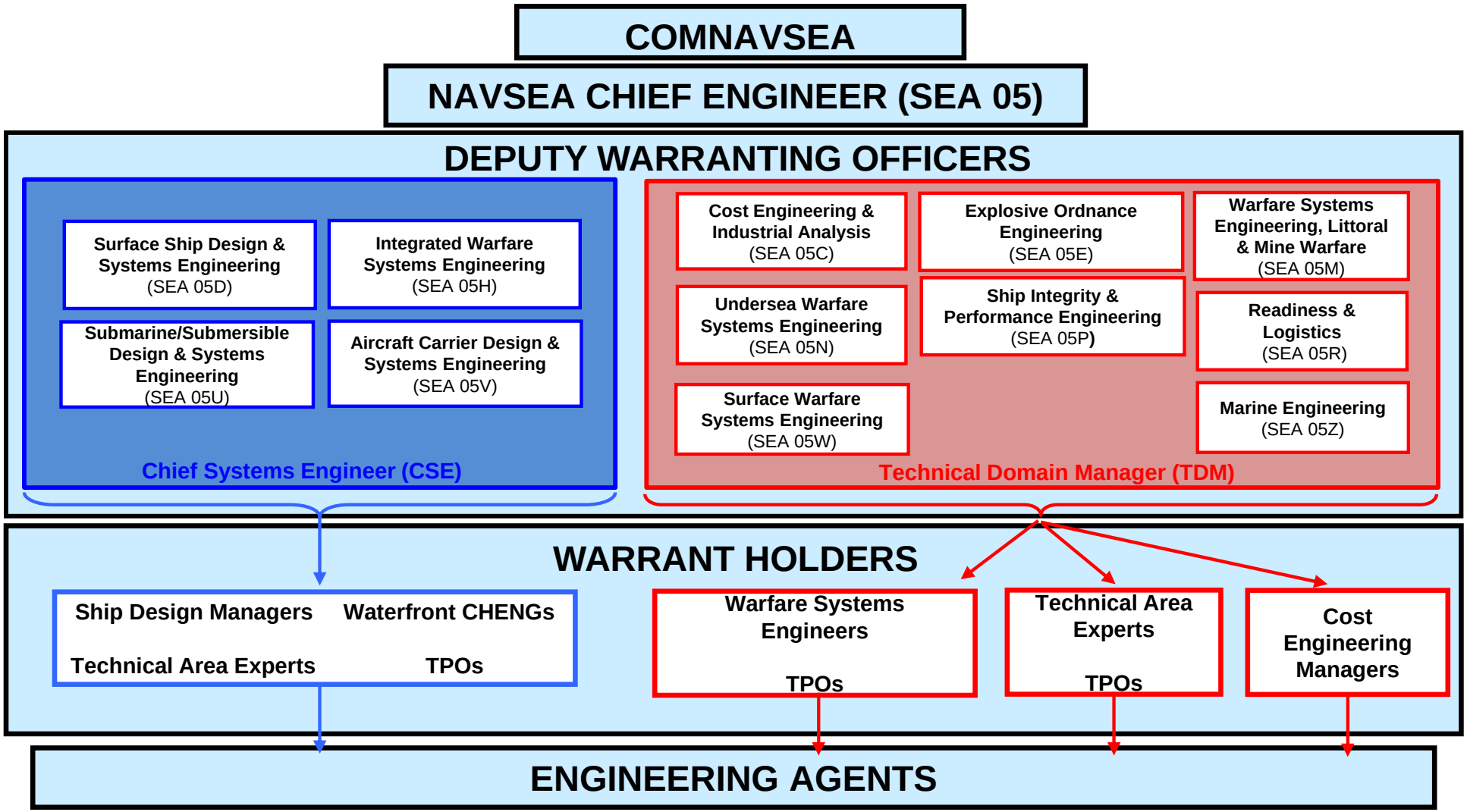
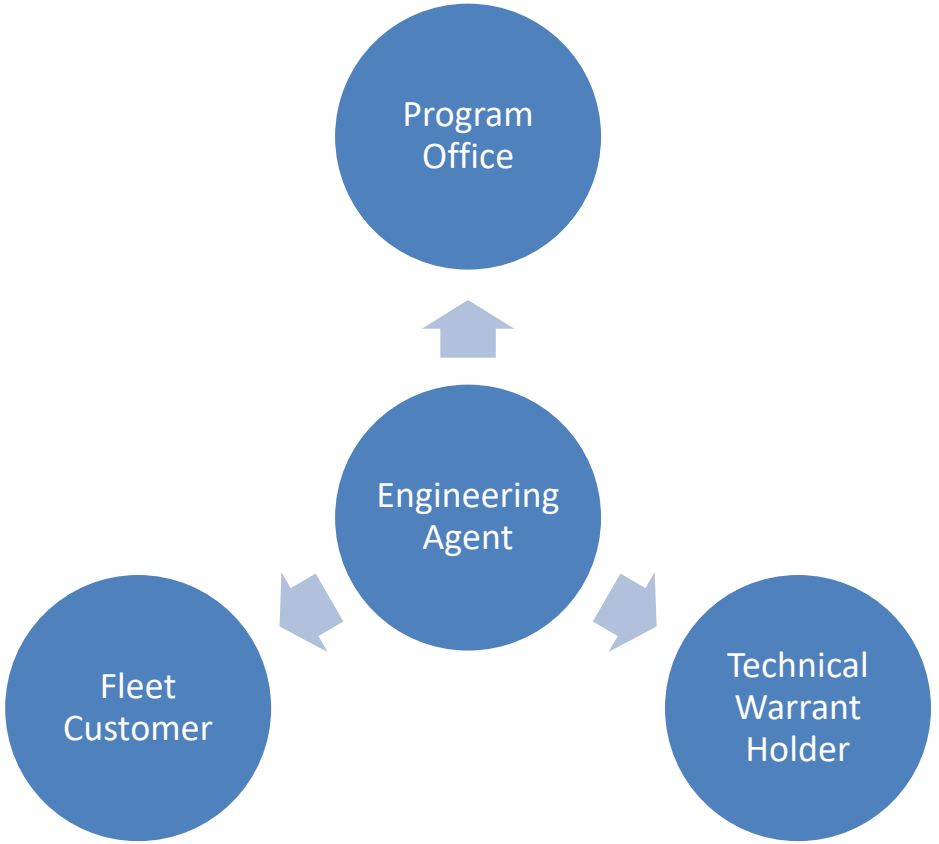


Engineering Agents

- Engineering Agents are organizations (Government or private Contractor) with responsibilities delegated by an assigning document and tasking for functions within their assigned technical area, system, or mission
- Engineering Agents provide technical services to Technical Warrant Holders, Program Managers, and the Fleet customers throughout a system's life-cycle



Types of Engineering Agents

- The five types of Engineering Agents are:
  - Technical Direction Agent (TDA)
  - Design Agent (DA)
  - System Integration Agent (SIA)
  - Acquisition Engineering Agent (AEA)
  - In-Service Engineering Agent (ISEA)
- Engineering Agents exercise acquisition responsibilities throughout the acquisition life-cycle

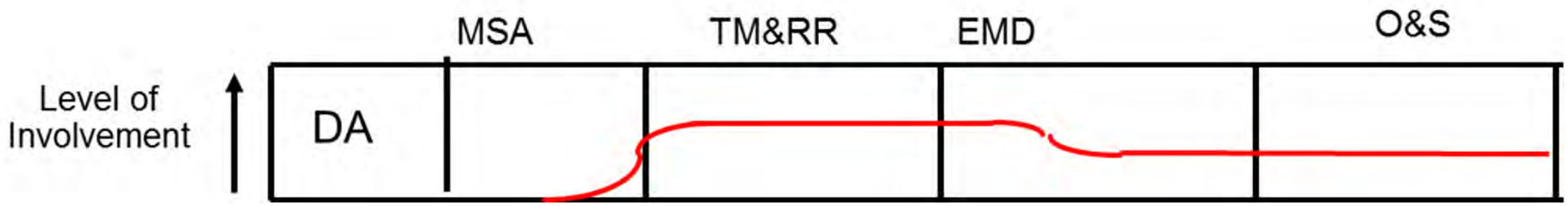
Technical Direction Agent (TDA)

- Responsibilities:
  - Develop and analyze engineering concepts
  - Develop system specifications
  - Evaluate Design Agent proposals (designs)
  - Assist in developing the Test & Evaluation Master Plan (TEMP)

Assists in the establishment of initial program concepts, performance specifications, RDT&E, and alternative technical approaches

Design Agent (DA)

- Responsibilities:
  - Develop initial and complete engineering design & prototypes
  - Prepare technical data
  - Prepare maintenance support documentation
  - Review Engineering Change Proposals (ECPs), waivers/deviations for impact on design, performance, safety, producibility, maintainability, life-cycle cost, training, and interfaces



Translates performance specs into engineering specs for the ship and its systems

System Integration Agent (SIA)

- Responsibilities:
  - Ensure equipment and software compatibility
  - Advise system manager of interface problems
  - Coordinate with other system managers
  - Support TDA in T&E as required
  - Review ECPs for impact on interfaces

Ensures compatibility of all elements that make up a system and its interface requirements

Acquisition Engineering Agent (AEA)

- Responsibilities:
  - Technical documentation – review technical manuals, Maintenance Requirement Cards (MRCs) for accuracy
  - Production support – analyze and report production costs and issues
  - Maintenance engineering – assist in developing maintenance concepts and criteria for all levels of maintenance

Provides support for logistics prior to production, or major modification for improvement programs

In-Service Engineering Agent (ISEA)

- Responsibilities:
  - Support/provide life-cycle maintenance
  - Recommend to system manager corrections to deficiencies in all areas of life-cycle support
  - Manage configuration of equipment
  - Provide engineering assistance to the Fleet

Delegated functions for the overall engineering, test, maintenance, and logistics of in-service equipment

Engineering Agent Assignment

*Not an all-inclusive list

*System	PMO	TDA	DA	AEA	SIA	SSA	ISEA
MK 31 RAM Guided Missile Weapon System	PEO IWS 11	JHU/ APL	Raytheon Missile Systems	NSWC PHD	JHU/APL	Raytheon Missile Systems	NSWC PHD
Diesel Engines	NAVSEA 05Z21	--	NSWC PD	NSWC PD	NSWC PD	NSWC PD	NSWC PD
AN/SLQ-25 Nixie Torpedo Decoy	PEO IWS 5	NUWC ND	Boeing	NUWC ND	--	NUWC ND	NUWC ND

- Programmatic authorities select, assign, task, and fund EAs
- In the case of private sector EAs, tasking and funding is via a contractual vehicle
- Engineering Agent Responsibilities Document (EARD) defines the scope and limits of technical responsibilities

Johns Hopkins University (JHU) / Applied Physics Laboratory (APL)
Naval Surface Warfare Center (NSWC) Port Hueneme Division (PHD) / Philadelphia Division (PD)
Naval Undersea Warfare Center (NUWC) Newport Division (ND)
Software Support Agent (SSA)

Summary

- What is the definition of technical authority?

- Who is the ultimate technical authority for ships and weapon systems?
- Who is the ultimate technical authority for C4ISR, Cyber and IT systems?
- What are the five types of Engineering Agents (EAs)?

Summary

- What are the six types of Technical Warrant Holders (TWHs)?