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**IMPROVING INTERACTION BETWEEN  
TECHNICAL AND CONTRACTING  
PERSONNEL AT NAVAL SURFACE WARFARE  
CENTER, PHILADELPHIA DIVISION**

Ostrom, Erica M.; Jones, Richard Jr.; Nguyen, Nicholas J.

Monterey, CA; Naval Postgraduate School

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**CAPSTONE APPLIED PROJECT REPORT**

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**IMPROVING INTERACTION BETWEEN TECHNICAL  
AND CONTRACTING PERSONNEL AT NAVAL SURFACE  
WARFARE CENTER, PHILADELPHIA DIVISION**

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**September 2022**

**By: Erica M. Ostrom  
Richard Jones Jr.  
Nicholas J. Nguyen**

**Advisor: Robert F. Mortlock**

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**IMPROVING INTERACTION BETWEEN TECHNICAL AND CONTRACTING  
PERSONNEL AT NAVAL SURFACE WARFARE CENTER,  
PHILADELPHIA DIVISION**

Erica M. Ostrom, Civilian, Department of the Navy  
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Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN PROGRAM MANAGEMENT**

from the

**NAVAL POSTGRADUATE SCHOOL  
September 2022**

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Academic Associate,  
Department of Defense Management

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# **IMPROVING INTERACTION BETWEEN TECHNICAL AND CONTRACTING PERSONNEL AT NAVAL SURFACE WARFARE CENTER, PHILADELPHIA DIVISION**

## **ABSTRACT**

Organizational policy changes in contracting have created a competency gap in the pre-award phase contracting activities for acquisition professionals working in technical departments seeking procurement of products or services. Considering current contracting policies and perceived knowledge gaps in the technical community with respect to contract development, the goal of this research is to examine the organizational structure and policies of Naval Surface Warfare Center, Philadelphia Division (NSWCPD) to ensure maximum efficacy of the contracting process. The primary objective of this research is to determine what organizational policies, capability gaps, or other challenges hinder communication and collaboration between the technical and contracting departments at NSWCPD. A secondary objective of this research is to determine what initiatives can be taken at NSWCPD to improve interaction between these two working groups and to document a comprehensive strategic plan for implementation. The research team found several areas worth addressing to improve the efficacy of contract artifact development at NSWCPD. Recommendations are provided to address the communication gap, including establishing an integrated product team to improve the quality of contracting artifacts and networking amongst those teams through working groups, and to capitalize on modern technologies to ensure the production of contracting artifacts are up to speed with current technology.



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## LIST OF ACRONYMS AND ABBREVIATIONS

AM	Acquisition Manager
CDRL	contractor document requirements list
CMBOK	<i>Contracting Management Body of Knowledge</i>
CMMM	Contract Management Maturity Model
COR	Contracting Officer Representatives
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DOD	Department of Defense
FAI	Federal Acquisition Institute
FPDS	Federal Procurement Data System
GAO	Government Accountability Office
IGCE	independent government cost estimate
IPT	integrated product team
MAC	multiple award contract
NAVSEA	Naval Sea Systems Command
NCMA	National Contract Management Association
NSWCPD	Naval Surface Warfare Center, Philadelphia Division
OJT	on-the job training
PALT	procurement administration lead time
PMBOK	<i>Project Management Body of Knowledge</i>
PMI	Project Management Institute
PMS	Procurement Management System
POA&M	plan of actions and milestones
PR	procurement request
R&D	research and development
RFI	request for information
RFP	request for proposal



SAP	simplified acquisition procedure
SOW	statement of work
SWOT	strengths, weaknesses, opportunities, threats
TLO	Technical Liaison Officer

## **EXECUTIVE SUMMARY**

This thesis targeted the interaction between the technical and contracting personnel at Naval Surface Warfare Center, Philadelphia Division. The primary goal of the research was to assess the current contracting policies and perceived knowledge gaps in the technical community with respect to contract development, with an expected outcome to document a comprehensive strategic plan to improve upon interactions at NSWCPD for implementation. The research focused on the interactions during the pre-award phase of defense acquisition. The goal of the research was to improve upon the work practices and interactions at NSWCPD between technical and contracting personnel.

The methods used in the research included current and future state process mapping with an emphasis on lean thinking, Strengths, Weaknesses, Opportunities, and Threats analysis, self-assessment and interviewing, and organizational analysis. By using the research methods, the research team strived to identify if there are currently any areas for potential improvement in the communication practices between the technical and contracting personnel at NSWCPD.

The results obtained from the research associated with this thesis solidified the original thinking that improvements between contracting and technical personnel could be made at NSWCPD, specifically in the pre-award phase. The strategic plan of implementation decided on was providing the Command with recommendation ideas for improving interaction between the technical and contracting personnel, with the hopes of improving the overall contracting artifacts produced by NSWCPD.

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## **I. INTRODUCTION**

How can we ensure a good contract is being developed when technical personnel of naval activities are experiencing a competency gap with the contracting department? Can improvements on the interaction between technical and contracting personnel during the contracting process improve the program as a whole? Prior to awarding a contract, a key element in the contracting process is the development of a good contract to ensure that the fleet, and the warfighter, gets the specific capability desired. Contracting and technical personnel at naval activities should be always on the same page during the program's/project's life cycle, but a large part of ensuring program success falls on the development of the contract. This is a relevant issue believed to be prevalent across not only naval activities, but also in the private sector. Locally, at Naval Surface Warfare Center, Philadelphia Division (NSWCPD), acquisition professionals nested within the technical departments realized a potential competency gap with the contracting activities, specifically during the pre-award phase.

This thesis examines what organizational policies, capability gaps, or other challenges hinder communication and collaboration between the technical and contracting departments at NSWCPD. Furthermore, this thesis studies what initiatives can be taken at NSWCPD to improve interaction between these two working groups and document a comprehensive strategic plan for implementation.

### **A. RESEARCH OBJECTIVE**

The objective of the research conducted associated with this thesis is two-fold. The first part of the research concentrates on if enhancements can be made in the interaction between the technical and contracting personnel. The second research objective focuses on determining what the Command can do to improve this working affiliation. Additionally, the research led to the generation of a strategic plan to implement at NSWCPD, with the goal of enhancing teamwork and partnership between the working groups.

## **B. RESEARCH QUESTIONS**

The research for this thesis attempts to address and answer the following questions which relate to improving interactions between technical and contracting personnel at naval activities:

### (1) Primary

- What (if any) current policies, plans are currently in place to ensure proper communication between technical and contracting personnel?
- What is the root cause for the potential disconnect between technical and contracting personnel at NSWCPD, and what actions can we take to address this issue?

### (2) Secondary

- With respect to acquisition and contract management/development, what training is in place at the Command-level to ensure the personnel are qualified to satisfy job requirements?

## **C. RESEARCH APPROACH**

This thesis is focused on improving relations between the technical and the contracting personnel at NSWCPD. The project's intent is to review current policy and procedures and identify if and how the relations between contracting and technical personnel can be improved.

The foundation of references used for this project includes but is not limited to the following frameworks of knowledge: National Contract Management Association's Contract Management Standard, *Project Management Body of Knowledge* (PMBOK), *Contract Management Body of Knowledge* (CMBOK), NSWCPD Contracting Policy/Procedures, Government Accountability Office Reports, as well as previous academic research relevant to the subject matter. The literature review of the references will provide

a better understanding of what the DOD envisions for the relationship between technical and contracting personnel to embody, as well as how private industry addresses this issue.

The appropriate and relevant data and information that bears on the problem/issue will be collected on the current policies at NSWCPD from subject matter experts at the department, division, and branch level. Additionally, this thesis will analyze procurement administration lead time (PALT) after workable package is approved by the contracting department at NSWCPD. The team will also review NSWCPD policies and instructions, Government Accountability Office (GAO) reports, and previous applicable academic research for relevant information that supports the issue of the project.

The data gathered from literature review and data collection from subject matter experts at NSWCPD will be qualitatively analyzed for implementation and intermediate outcomes. Statistical analysis of technical and contracting department metrics will be conducted to quantitatively analyze organizational policy effectiveness. Collectively, a strengths, weaknesses, opportunities, and threats (SWOT) analysis will inform the scope of the problem and areas for improvement. Furthermore, lean thinking through process flow mapping—identifying current and future (ideal) states will be utilized to illustrate areas of improvement at NSWCPD.

#### **D. SUMMARY**

In this chapter, the introduction and research outline for the thesis was presented. The research outline depicts the way in which data will be gathered to support the thesis's conclusions and results. The brief information provided in this introduction describes the fundamental objectives, process, and way the results and conclusions will be developed. The research questions and approach dictate the way research will be conducted for this thesis. A literature review of the research conducted is discussed in Chapter III of this thesis. The background information on how NSWCPD's current interaction between contracting and technical personnel is covered in the next chapter.



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## II. BACKGROUND

### A. CURRENT RELEVANT INFORMATION

The NSWCPD contributes technical proficiency and provides facilities to the Department of the Navy for the Ship and Ship Systems Product area. The command's primary areas of support include system integration and cybersecurity, acquisition support, integrated logistics support, research and development, in-service engineering, and test and evaluation for Naval hull mechanical and electrical systems. Acquisition, procurement, and service contracts are fundamental elements of providing solutions to Naval machinery needs. The contracting process is divided into three phases: pre-award, award, and post-award. Because the technical departments have greater familiarity with fleet and project needs, NSWCPD solicits these personnel to develop pertinent contracting documentation during the pre-award contracting phase. Figure 1 depicts the current process flow of the pre-award phase development process at NSWCPD developed by the research team.

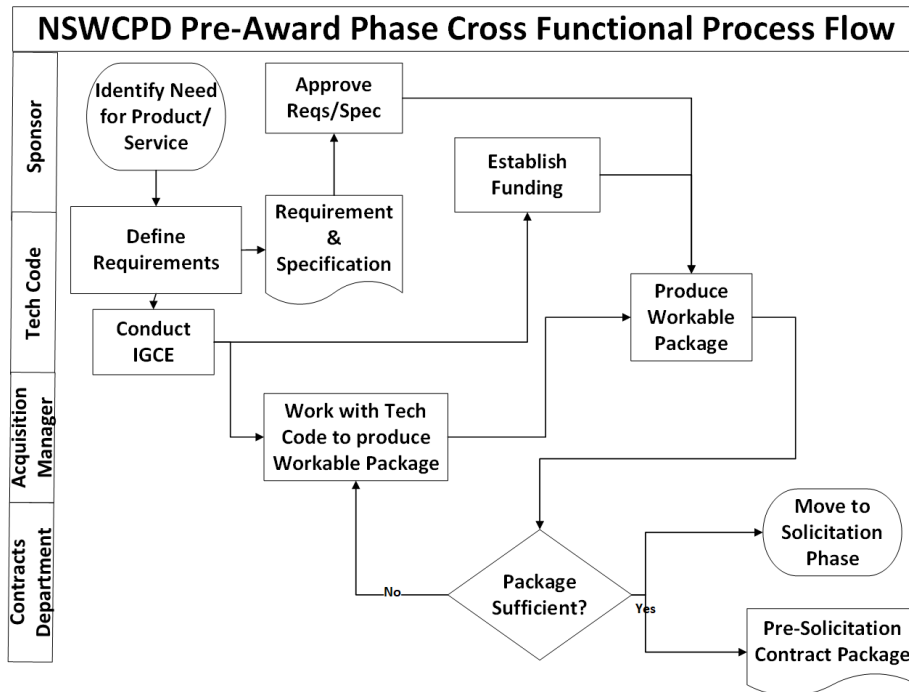


Figure 1. Current State Process Map of NSWCPD Pre-award Phase Cross Functional Process Flow

## **B. CURRENT STATE PROCESS MAP ANALYSIS**

In most cases, the technical departments are tasked to define the requirements for the product or service required to support the fleet, resulting in development of requirement and specification documentation. If an outside entity is required to accomplish the task, the technical department provides an estimate of the task. With these artifacts, the contracts department enlists technical personnel to develop a “workable package,” a term utilized by the NSWCPD contracting department. The frequency at which engineers and other technical personnel are asked to develop these packages to support the acquisition of services or products is rapidly increasing. This increase is due to the growing demand for providing in-service engineering support to the Navy’s fleet, which is performed by engineers and augmented and/or supplemented by contractor support. NSWCPD relies heavily on contractors as key workforce members to supply engineering and program management expertise to support timely completion of tasks.

A major challenge for the technical departments when tasked with developing contract packages is the lack of experience and training in the contracting career field. The cognizant engineer is unfamiliar with the nomenclature associated with the contracting community. Language such as market research, Independent Government Cost Estimate (IGCE), commerciality determination, just to name a few, is a foreign language to an engineer working at NSWCPD. Only by struggling through the contracting process, with assistance from AMs (Acquisition Manager), CORs (Contracting Officer s Representative), TLOs (Technical Liaison Officer), etc., does the engineer progress through development of the necessary contracting artifacts.

Although support from the AM is critical to the success of the artifact’s development, the onus is on the cognizant engineer to author the associate deliverables. The lack of experience and/or training leads to extended lead-times to complete development of each artifact. Currently, NSWCPD and the NAVSEA organization does not track metrics from requirement identification (the need for service contract or product) to complete development of a workable package. However, the current contracting PR preparation guide estimates 30 days (about 4 and a half weeks) to develop and submit a workable package to the contracting department. There have been cases where the

workable package took multiple months to develop, submit, and receive acceptance from the contracting department. The primary contract tracking metric, the PALT starts when the contracting department receives a workable package, which ameliorates apparent contract development metrics. The following is an example list of required contracting artifacts for a large multiple award contract (MAC): procurement request (PR) prep guide, market research, commerciality determination, sole source or brand name justification, statement of work (SOW), contractor document requirements list (CDRL), sections L and M of the request for proposal (RFP), source selection plan, findings and determination for single award, Seaport waiver, and Quality Assurance Surveillance Plan.

A large sole source contract requires can take up two years for engineers at NSWCPD to complete, depending on urgency and average lead-time to obtaining senior level approvals. This level of inefficiency contributes to delayed contract award, increase cost in labor hours from the technical departments, loss of valuable time resource that the engineer could have allocated to other high priority task(s), and potential loss of funding due to taking multiple fiscal years to establish a contract (Naval Surface Warfare Center, Philadelphia Division [NSWCPD], 2022).

### **C. NSWCPD CURRENT PROCEDURES AND PRACTICES**

The CMBOK and Contract Management Standard both provide details on the competencies and requirements essential for an effective contract manager. NSWCPD's pre-award activity of workable package development aligns to the CMBOK Domain A—Develop Solicitation, with sub activities of planning the solicitation and requesting offers. NSWCPD currently assigns different areas of responsibility associated with these tasks between the technical codes requiring the product or service and the personnel in the contracting department.

Figure 2 was developed by the researchers to depict the division of responsibilities currently in place at NSWCPD. However, there is no body of knowledge or standard to guide an engineer to develop the pertinent contracting competencies to produce contracting artifacts effectively and efficiently.

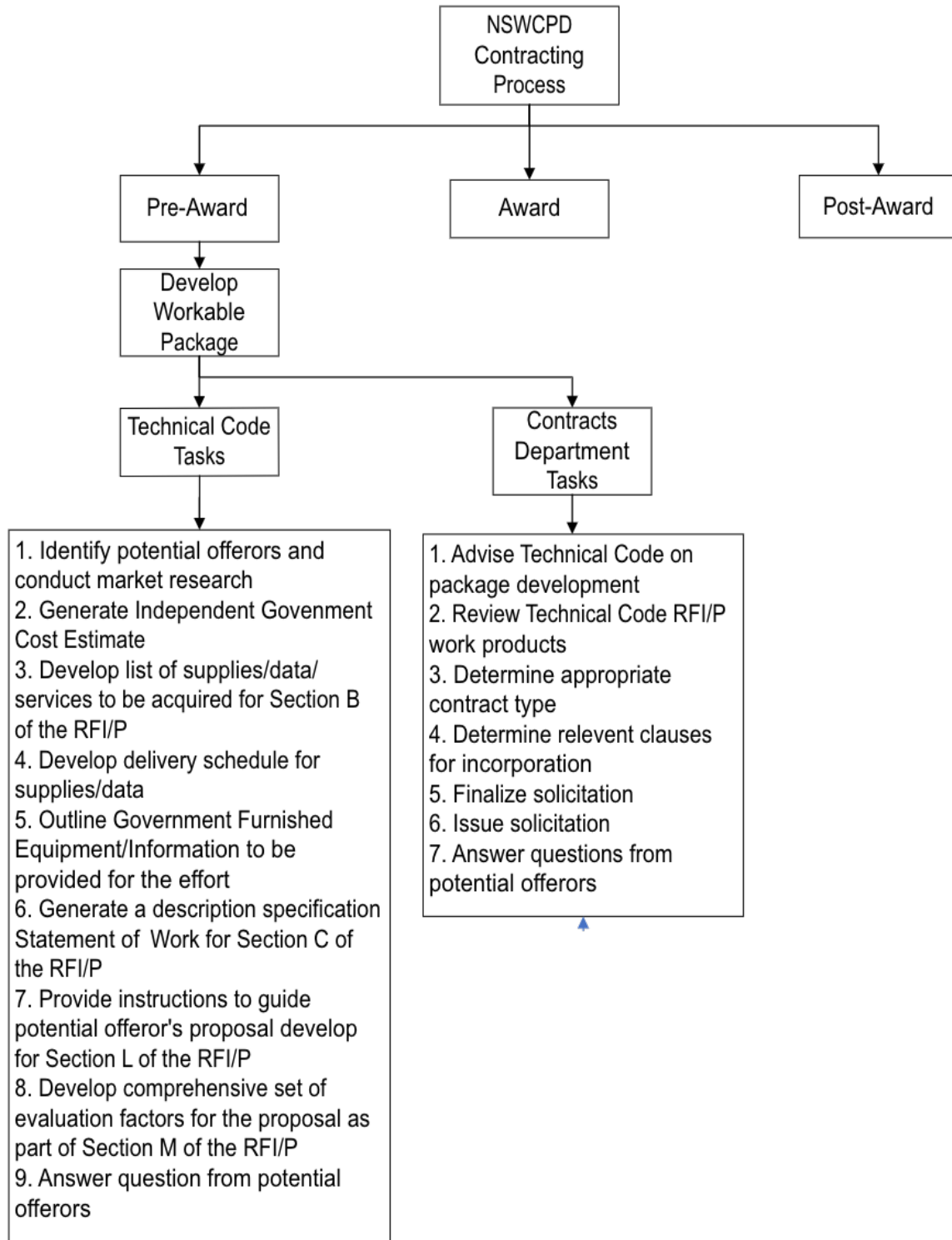


Figure 2. Breakdown of Responsibilities During Pre-award Phase at NSWCPD.

Currently, the only mandatory contracting training provided to the acquisition workforce, excluding the contracting personnel, is DAU course 0070 Source Selection Training, which attempts to familiarize the engineers with the source selection process. No other mandatory training is required to qualify an engineer to develop contracting artifacts. Only recently has the NSWCPD Command rolled out contracting training to include SAP, an SAP package reviewer, Information Technology Purchase Request, and Procurement Request using the PMS.

#### **D. SUMMARY**

This chapter presented a summary of the current pre-award phase contract documentation generation practices at NSWCPD to include delineation of technical and contracting personnel responsibilities and process flow. Additionally, the problem statement outlining several key factors prohibiting communication and interaction between the technical and contracting workforce was identified. In the next chapter, a literature review of material highlighting methods to characterize and assess contracting actions and organizational performance is provided.

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### **III. LITERATURE REVIEW**

#### **A. INTRODUCTION**

This chapter provides a review of literature applicable to characterizing and assessing the contracting actions and organizational performance. The literature review begins with an overview discussion, followed by a discussion of key processes and milestones associated with project and contract management activities during the contract pre-award phase. Then, the chapter includes a discussion on the importance of measuring performance and current contract performance measurement standards. Next, the literature review provides an overview of training relevant to the acquisition and contracting professions. Finally, a discussion of organizational assessments presents methods to identify factors impacting organizational performance and opportunities for change.

#### **B. OVERVIEW**

The United States GAO noted contract management within the Department of Defense as an area of “high-risk” in its *2019 High-Risk Report*. Specifically, the GAO recently published a report GAO-19-556, *Defense Workforce: Steps Needed to Identify Acquisition Training Needs for Non-Acquisition Personnel*, on training needs/requirements and access to them for non-acquisition personnel. The gist of the report focuses on ensuring the non-acquisition personnel involved in contracting and contract management receive the appropriate and applicable acquisition-related training(s). The GAO states that the DOD currently employs acquisition training only for those who develop contractual requirements and oversee contracts – and not those who are considered non-acquisition personnel, but still contribute to the acquisition in a broad manner (Government Accountability Office [GAO], 2019).

The report goes on to detail that a lot of the courses that the Department of Defense (DOD) offers through its Defense Acquisition University (DAU) online are surface-level basic classes, and that the more advanced classes are only offered in a classroom setting. The GAO identified that those participating in the online, more basic DAU courses were made up of over 50% of non-acquisition personnel, while the in-classroom enrollment for



more advanced classes was merely 10% for non-acquisition personnel. This data was taken over the course of three fiscal years and indicates that non-acquisition personnel are enrolling in DAU training, but not in the advanced courses and not enough to support some of their duties/tasks on the job. The report goes on to state that the DOD does not necessitate the non-acquisition personnel to take the advanced level courses in the DAU but does provide them the ability to take the basic courses via online learning. The reason this fracture of training may be occurring is the prioritization of access to classroom training offered by the DAU. Non-acquisition personnel do not take priority over any acquisition personnel group according to this GAO report, making it sometimes difficult to gain access to the advanced courses.

The report concludes by recommending two courses of action to remedy the perceived issue: the first is for the DOD to designate an official at each activity that is responsible for properly identifying those non-acquisition personnel who are contributing to the acquisition process at the activity, and the second is for the DOD to better communicate information about the non-acquisition personnel training needs to the DAU so that they can better cater their courses' access to those who necessitate it.

This report provides insight and value to the thesis topic because it outlines the need for those in non-acquisition, technically focused positions to be professionally trained if they are contributing to the service's acquisitions. While the DAU is a great resource for the DOD, it is difficult for non-acquisition personnel to be trained if they do not have easy access to the advanced courses offered by the DAU. The report provided great insight into the way training was administered to non-acquisition personnel in the DOD. However, details of competencies required for the non-acquisition personnel involved in services acquisition were not clearly outlined. The goal of our research is to identify these areas of improvement in training for technical/non-acquisition personnel as well as provide a strategic training plan that allows NSWCPD to have a road map of training for the non-acquisition personnel, as well as the ability to take the higher-level advanced acquisition courses offered by the DAU.

## **C. KEY PRE-AWARD PROCESSES AND MILESTONES**

### **1. Project Management**

The PMBOK, sixth and seventh editions, written by the Project Management Institute (PMI) gives the framework for standardizing project management across organization(s). In this case, this thesis reviewed both the 6th and 7th editions of the PMBOK because both are currently still in use and deemed as current issues of text.

Section 2.2.3 of the 7th edition of the PMBOK outlines the ideal “high-performing project team” and recognizes the importance of open communication. Open communication within a project team allows for the best work product to be produced through brainstorming, problem solving and efficient, productive meetings within the team. This is important and applicable to the thesis because the PMBOK puts a high emphasis on ensuring that all members of the project team, in the thesis case, both technical and acquisition workforce remain on the same page during the life cycle of the project. The life cycle, in this case, being the pre-award portion of the contract development, in addition to the management of the contract once awarded.

Section 10 of the 6<sup>th</sup> edition of the PMBOK focuses solely on Project Communications Management. The PMBOK breaks it down into three specific parts: planning, managing, and monitoring communications during the life cycle of the project. The PMBOK emphasizes the importance of fluid communication throughout all stakeholders of the project, which allows for the best path to success. This thesis’s focus remains to improve upon communication between the technical and contracting personnel at NSWCPD, specifically when developing a workable contract in the pre-award acquisition phase.

### **2. Contract Management**

The CMBOOK, 2019 produced by the National Contract Management Association (NCMA), serves as the adopted standard of contract management processes across the DOD. It provides a basic outline of contract management activities and specifically addresses best practices for contracting officers and managers to promote, “individual competence and organization capability,” (CMBOOK, 2019). As a living body of

knowledge, it evolves to adopt current applicable practices and thus leads to effective and efficient contract management when fundamentally understood and consistently applied.

The CMBOK, which is written with perspective from both the buyer and seller of the contract, establishes a competency system as shown in Figure 3 and divides the contracting life cycle into three primary phases: pre-award, award, and post-award (CMBOK, 2019).

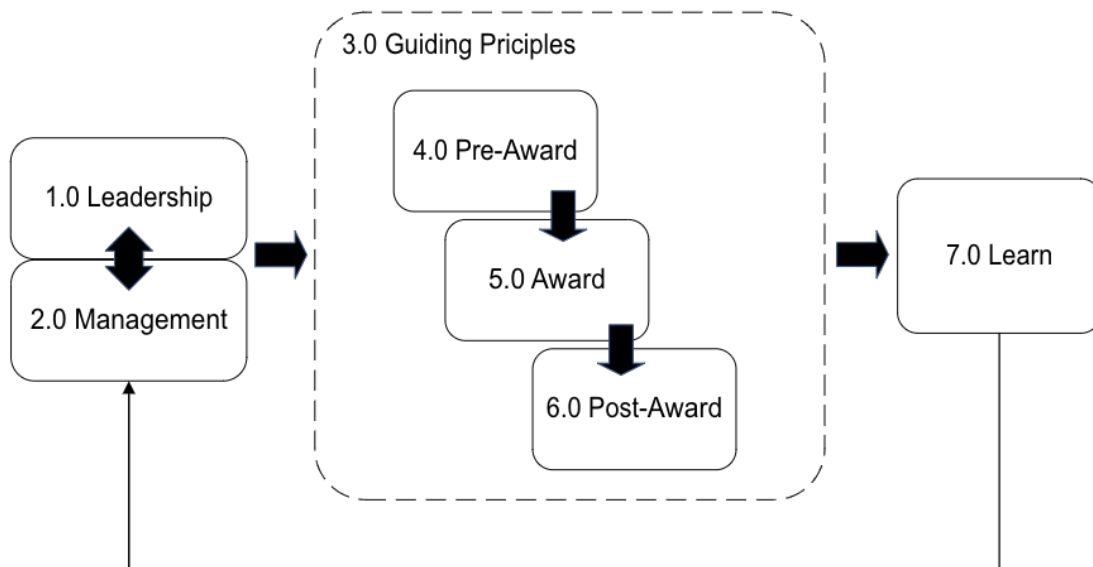


Figure 3. The CMBOK Competency System. Source: CMBOK (2019).

The pre-award and award phases from the seller's perspective demonstrate increased interaction between the project and contract managers and this correlates well to the interaction between the technical and contracting personnel at NSWCPD. Interfaces between the project manager and contracting official during the pre-award and award phases inform essential processes of the contracting life cycle. Table 1 defines the interactive input required by the contracting official during this portion.

Table 1. Project Manager’s Interface during the Pre-award and Award Phase.  
Adapted from CMBOK (2019).

<b>Phase</b>	<b>Process</b>	<b>Project Manager Input to Contracting Official</b>
Pre-Award	Requirements Definition	“Provides knowledge, experience, and information that enables accurate determination of the requirements.”
Pre-Award	Requirements Specifications	“Provides input that enables accurate specifications for each requirement.”
Pre-Award	Source Selection	“Provides advice and input about experience of provider’s capabilities and performance (if known).”
Award	Evaluation	“Provides input that helps the Contract Manager evaluate each proposal to ensure the requirements have been properly addressed and included in the contract draft documents. Provides input about experience with provider’s past performance and capabilities.”
Award	Contract Drafting	“Provides advice and input for deliverable definitions and acceptance criteria, definitions for obligations and deliverables, change control process, governance roles and authorities, other items specific to the project.”
Award	Negotiation	“Provides advice and input during negotiation to ensure they don’t commit to anything that can’t be met or achieved.”

#### **D. PERFORMANCE MEASUREMENT**

According to Butler and Velasco (2014) in their Analysis of the Department of Defense Pre-Award Contracting Process, “performance measurement improves communication within the acquisition community because establishing performance goals and disseminating performance measures will set expectations” – thus, performance measurements within contracting activities are vital to setting expectations for the activity. The research goes on to state “studies indicate that individuals with a greater understanding of performance evaluation have a higher commitment to process improvement, more confidence in their performance, and a better sense of contentment in the workplace.” Being that performance is a key constraint in contract management, evaluating performance using proper measurements allows for highly effective contract management.

The Auditability Triangle shown in Figure 4 provides a conceptual framework for performance measurement areas with respect to personnel, processes, and internal controls (Rendon and Rendon, 2015). Establishing performance goals and measurements in each area will promote efficiency within the organization.

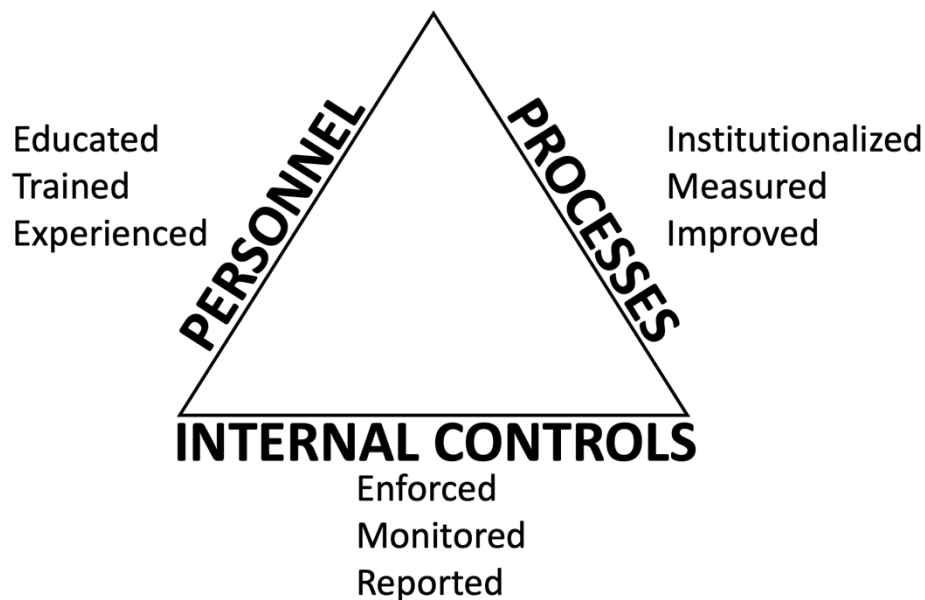


Figure 4. Auditability Triangle. Adapted from Rendon and Rendon (2015).

However, it is imperative that leadership supports and commits to creating performance metrics and an evaluation system to be successfully implemented and utilized (Butler & Velasco, 2014).

With respect to contracting performance metrics, PALT has been utilized for the last 30 years to provide data on the contract award process (Escobar, 2021). According to the Federal Acquisition Institute (FAI) *Project Manager's Guidebook*, (Federal Acquisition Institute [FAI], 2015), PALT is describes as a metric that “acquisition offices across Government use to estimate the amount of time it will take to award the contract.” The guidebook goes on to state that PALT is a specific point during the pre-award phase, specifically “only the timeframe from when a full requisition package is submitted to the acquisition office to begin solicitation development. It does not include the time the PM

and program office needs to complete the requisition package documents.” Figure 5 depicts the PALT estimates by procurement actions, in days, provided by FAI.

<b>Procurement Action</b>	<b>Range in Days</b>
Simplified Acquisitions	
\$3,000 and under	4-6
\$3,000 to \$25,000 non-competitive	15-19
\$3,000 to \$25,000 competitive	18-22
\$25,000 to \$100,000 competitive	49-61
\$25,000 to \$100,000 non-competitive	39-47
Negotiated Procurements	
Competitive under \$10 million	175-215
Competitive \$10 million to \$100 million	211-259
Competitive over \$100 million	243-297
Non-Competitive under \$10 million	126-154
Non-Competitive \$10 million to \$100 million	144-176
Non-Competitive over \$100 million	162-198
Competitive Commercial Items	72-88
Non-Competitive Commercial Items	99-121
GSA Schedule Orders	
Competitive Orders	76-94
Non-Competitive Orders	36-44
Sealed Bidding	112-138
R&D Competitive	243-297
R&D Non-Competitive	157-193
Sealed bid Construction	
Competitive under \$10 million	130-160
Competitive \$10 million to \$100 million	144-176
Competitive over \$100 million	157-193
Negotiated Construction	
Competitive under \$10 million	184-226
Competitive \$10 million to \$100 million	220-270
Competitive over \$100 million	252-308
Non-Competitive under \$10 million	126-154
Non-Competitive \$10 million to \$100 million	144-176
Non-Competitive over \$100 million	162-198
A-E Procurement	166-204
Modifications	
Unilateral-Admin. Change or Incremental Funding	9-11
Unilateral-Change Order	18-22
Unilateral-Option Exercise	36-44
Bilateral	81-99

Figure 5. FAI PALT Estimates by Procurement Action. Source: FAI (2015)

One method of creating performance measurements for the contract package development timeline is presented in Escobar’s analysis of the time it takes to build requirement packages, referred to as the Acquisition Requirements Lead Time. The analysis posits using the request for information (RFI) and the delivery of the requirements

package as milestones marking the beginning and ending points for performance monitoring for competitive packages (Escobar, 2021). However, this wording may lead to ambiguity with respect to the review and rework cycles the contract package may be subject to. A preferred method for tracking this time is to consider the release of the RFI and acceptance of the contract package as the start and finish of the performance period.

Unfortunately, most DOD organizations do not track the performance metrics for developing a workable package, from the time procurement requirement is identified to submitting the package to the contracting department. Although tracking this performance metric would have no direct impact on comprehensiveness of the contract package, it would however provide valuable data to identify contracting competency gaps among technical personnel. The lack of contracting experience by personnel in the technical department, whether education, training, or experience, affects the use of employees' time and effort. Additionally, a far greater consequence is realized if the employee fails to develop and submit a workable package by the cutoff dates to award the contract within the fiscal year. This leads to delays in procuring necessary resources including material and labor, which affects timely support to the warfighter.

#### **E. TRAINING REQUIREMENTS**

While the CMBOK provides contracting personnel with a good basis of understanding on the entire contract management process, as well as a framework for continual learning within contract management, the text does not include prerequisites for technical personnel involved throughout the life cycle of a contract.

Current acquisition training received by the technical workforce at NSWCPD does not truly reflect what is required and needed of them in support of the contracting process. This issue needs to be addressed because the development of workable contracting packages is an inherent responsibility of the technical workforce at NSWCPD. At the time of the research for this thesis, current requirements of training at NSWCPD include Defense Acquisition Workforce Improvement Act (DAWIA) training for Engineering Level 1 and Level 2. This group of training does not include contracting competencies.

More broadly, the Navy is moving toward increasing competencies within technical management positions and created the Engineering Technical Management functional area as part of the DAU curriculum. This field encompasses approximately 40% of the acquisition workforce with responsibilities inclusive of, “developing and implementing products and services with an integrated technical approach across the total life cycle,” (Possehl, 2022). Similar to the Engineering Level 1 and 2 positions at NSWCPD, the certification requirements for this career field are equally lacking in contracting competencies. This indicates the lack of mandatory basic contracting training required by the technical acquisition workforce may be a systemic problem warranting an expansive review of the acquisition workforce training requirements, though that is beyond the scope of this thesis.

Although the applicable contracting training courses, such as those offered through the DAU are available through the DAU courses, these courses are not mandatory for engineers. Currently NSWCPD does not require technical personnel (engineers) to take contracting training. Furthermore, NSWCPD does not have training(s) in place for the competency requirement for engineers supporting development of the contracting workable package. If the mentioned training(s) were required for the technical workforce at NSWCPD, the command could see improvement in efficiency to development of the workable package, indirectly saving cost and improving the program’s schedule.

Since the field of contract management has become professionalized with certification requirements for the contracting officers, providing the technical workforce with basic contracting training is paramount. The only instance where the technical workforce is required to complete contracting training is in support of the technical evaluation process during source selection.

## **F. ORGANIZATIONAL ASSESSMENT METHODS**

Organizations should strive for continual improvement of their processes and services. By conducting periodic assessments, organizations can identify capability gaps and knowledge growth opportunities, and use the outcome to construct roadmaps for improvement. Since procurement is vital for obtaining goods and services in support of the



warfighter, conducting regular organizational assessments can help align the government to this type of strategic focus and improve overall performance (Rendon, 2008). For the purposes of this thesis, two organizational assessment methods are considered and discussed below.

### **1. Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis**

A SWOT analysis is an organizational assessment method used to increase efficiency and effectiveness by highlighting areas of improvement with respect to problems facing the organization. At an elevated level, a SWOT analysis baselines the current position from an internal and external perspective. By examining the internal and external inputs, a SWOT analysis provides the critical details required to develop a sound strategic plan to meet future operating goals

Strengths and weaknesses are analyzed from an internal point of view, while opportunities and threats are measured externally. The goal of the SWOT analysis is to, “Capitalize on strengths, eliminate weakness, identify threats, and invest in opportunities,” (Gomer, 2015). For this thesis, the SWOT analysis will be conducted from the technical aspect, with the relationship to the contracting department considered an external interface.

### **2. Contract Management Maturity Model (CMMM)**

The CMMM provides a tool for measuring the capability and maturity of contract management processes within an organization and is comprised of six key process areas: procurement planning, solicitation planning, source selection, contract administration, and contract closeout (Rendon, 2008). A description of the key process areas is presented in Table 2.

Table 2. CMMM Process Areas. Adapted from Rendon (2008).

<b>Key Process Area</b>	<b>Description</b>
Procurement Planning	Involves all inputs into the make/buy decision as well as key parts of contract management activities to including stakeholder analysis, requirements development, market research, procurement avenue determination, contract selection
Solicitation Planning	Constitutes development of required solicitation documentation to include RFI/RFP and sections L&M of the contract
Solicitation	Comprises information gathering from prospective offerors to include advertisement and hosting industry days
Source Selection	Includes all steps required to evaluate proposals received from potential offerors.
Contract Administration	Involves all steps required to maintain contractual oversight to ensure compliance with the contract terms.
Contract Closeout	Upon completion of the contract terms, involves contract closeout activities as defined in the CMBOK.

Each focus area within the key process is analyzed based on the contract management process standardization and integration throughout the organization and given a rating of Level 1 through 5. Rating definitions are presented in Table 3.

Table 3. CMMM Rating Definitions. Adapted from Rendon (2008).

<b>Level</b>	<b>Description</b>
1 – Ad Hoc	Informal documentation, lacking accountability, no standardization through the organization
2 – Basic	Some processes institutionalized and standardized, but lacking consistency in application
3 – Structured	Standardized processes, policies, and procedures for contract management throughout organization
4 – Integrated	Contract management processes and policies meet the criteria of structured and are integrated into together organizations increasing efficiency. Periodic use of performance metrics provides input for process improvement
5 – Optimized	In addition to achieving an integrated rating, continuous process improvement is implemented incrementally through consistent use of performance metrics

An example of a completed CMMM for six example organizations labeled A through F is shown in Figure 6. Additional exposition on the key process areas and rating factors can be found in Rendon (2008). With respect to this thesis, an analysis of the procurement planning and solicitation planning key process areas will inform a process improvement recommendation.

CONTRACT MANAGEMENT MATURITY MODEL						
MATURITY LEVELS	CONTRACT MANAGEMENT KEY PROCESS AREAS					
	Procurement Planning	Solicitation Planning	Solicitation	Source Selection	Contract Admin	Contract Closeout
5 OPTIMIZED						
4 INTEGRATED	A	A	A	A		
3 STRUCTURED	B, D, E	B, C, D, E, F	B, C, D, E, F	B, C, D, E, F	A, C, D, F	D, F
2 BASIC	C, F				E	A, C, E
1 AD-HOC					B	B

Figure 6. Completed CMMM Example. Adapted from Rendon (2008)

## G. SUMMARY

The literature review for this thesis provided good insight into the areas where improvements can be made at NSWCPD contract development, specifically in the pre-award phase. Utilizing the CMBOK, PMBOK, GAO Reports, along with current procedures in place at NSWCPD and previous applicable academic research, the thesis aims to improve the interactions between technical and contracting personnel at the Command.

In the next chapter, we will introduce information collected through information discussions with NSWCPD leadership. This includes a description of specialized contracting positions created at NSWCPD as well as trends in contracting activities at the Command. Finally, the SWOT analysis and CMMM assessment is provided.

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## **IV. DATA COLLECTION**

### **A. DISCUSSIONS WITH NSWCPD ACQUISITION COMMUNITY**

The research team reached out to members of the NSWCPD acquisition community to gain informal understanding of the contracting process and to understand the genesis behind some of the new acquisition roles, such as, the AM (Acquisition Manager) and TLO (Technical Liaison Officer). The research team gained valuable insights from the information obtained through these informal discussions. The first astounding discovery was that there is no formal policy documentation behind the establishment of the AM position and the TLO position. These two positions were stood up due to necessity. Both positions were stood up, at different periods, because a gap was identified between the technical department and the contracting department. The rationale provided by leaders within the NSWCPD acquisition community was that communication challenges between the technical department and contraction departments contributed to low quality in contracting artifacts and delays in contracting awards. One of the primary communication challenges was that the technical department and contracting department spoke different languages and were governed by different authorities. The technical personnel from the technical department did not understand the contracting language and terminology necessary to strategize and develop a contracting package. This communication challenge was compounded by the fact that personnel in the contracting department did not understand the technical requirements being contracted.

This communication challenge necessitated the formation of acquisition manager positions. The AM's primary responsibility is to interface, or liaise, between the technical department and contracting department. Therefore, it is paramount for the acquisition manager to be experienced and knowledgeable with contracting. Most of NSWCPD's acquisition managers possess technical backgrounds. The creation of the acquisition manager position and the expansion of their responsibilities has benefited the technical department by augmenting the contracting competency of the technical departments. The creation of the AM role mitigated some communication challenges between the two departments; however, the onus for contracting artifacts development during the pre-

solicitation phase remains with the technical personnel. Some responsibilities of the AM include the following: technical department contracting lead, provides contract initiation/package guidance, communication of policy changes and best practice, support contract knowledge transfer, and process improvement.

The TLO role was established to fill a need that would help expedite the development of contracting packages. These individuals would assist in authoring some of the contracting artifacts required for package development. The TLO position is intended to augment the acquisition manager position and aid the technical department. There are no clear criteria on when the TLO should be consulted to support contract artifact development. Currently, requesting support from TLO is subjective, solely based on the acquisition manager's discretion.

The NSWCPD TLO team staffing is low, consisting of three full-time employees. Therefore, the TLO is only utilized for high priority contract packages. The acquisition manager is responsible for coordinating with the TLO to support the technical department. The research team learned, through discussions with technical personnel, that most employees in the technical department are unaware that the TLO position exists. Based on personal experience and discussions with technical personnel who have experience in development contracting artifacts, acquisition managers are not frequently invoking the assistance of the TLO in contract artifact development.

The responsibilities of AM and TLO have expanded over time. However, the primary concern is that more TLO staff are needed to support the high volume of contracting packages being developed at NSWCPD. Figure 7 depicts the constantly increasing volume of NSWCPD contracting actions over each of the last fiscal years. Additionally, Table 4 depicts NSWCPD's FY21 contracting actions in terms of total dollar amount, and percentage of actions and dollar amounts compared to the other Naval warfare centers.

Table 4. FY21 Contract Obligations by Naval Warfare Center.

<b>WARFARE CENTER Contracting Office</b>	<b>Total Actions</b>	<b>Total Dollars</b>	<b>% Total Actions</b>	<b>% Total Dollars</b>
<b>NSWC CRANE (N00164)</b>	4,848	\$1,775,153,970.08	17.40%	26.60%
<b>NSWC DAHLGREN (N00178)</b>	7,375	\$972,179,233.46	26.47%	14.57%
<b>NUWC NEWPORT (N66604)</b>	2,519	\$912,769,609.03	9.04%	13.68%
<b>NSWC PHILADELPHIA DIV (N64498)</b>	4,885	\$793,756,933.87	17.53%	11.89%
<b>NSWC PORT HUENEME (N63394)</b>	1,080	\$540,579,756.59	3.88%	8.10%
<b>NSWC INDIAN HEAD EOD TECH DIV (N00174)</b>	1,653	\$442,515,562.30	5.93%	6.63%
<b>NSWC CORONA (N64267)</b>	1,375	\$335,440,141.49	4.94%	5.03%
<b>NUWC KEYPORT (N00253)</b>	983	\$325,615,593.60	3.53%	4.88%
<b>NSWC CARDEROCK (N00167)</b>	1,379	\$321,386,720.22	4.95%	4.82%
<b>NSWC PANAMA CITY (N61331)</b>	1,762	\$253,720,604.77	6.32%	3.80%
<b>Totals</b>	<b>27,859</b>	<b>\$6,673,118,125.41</b>	100.00%	100.00%



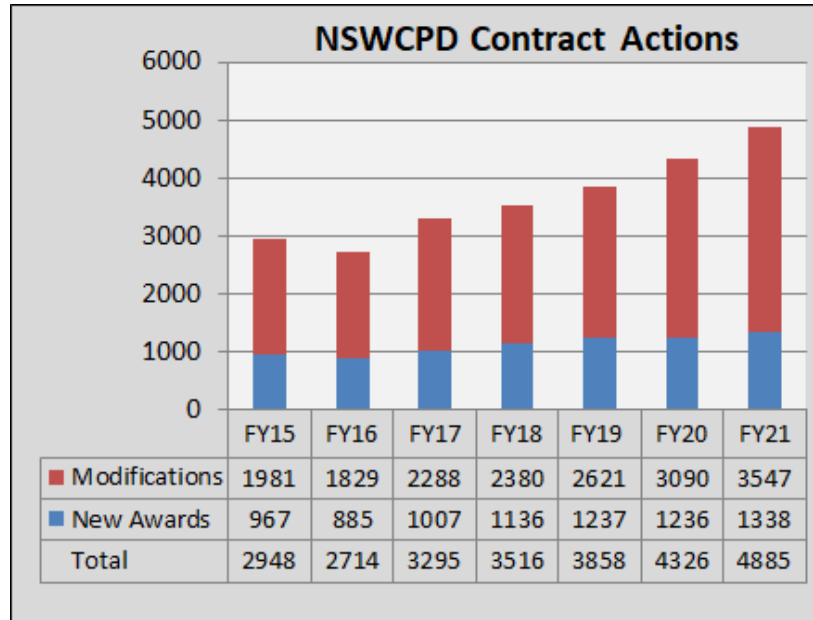


Figure 7. Trend of NSWCPD Contract Actions from FY15 to FY21.

Finally, Table 5 presents data collected from an NSWCPD Industry Day presentation given at the beginning of FY22 (2021) According to the data presented, the technical codes prepared for approximately \$1 billion dollars in projected FY22 competitive and sole-source announcements.

Table 5. FY22 Projected Contract Announcements at NSWCPD

Dept	Brief Description	ROM (\$M)	Anticipated Announcement Date (FY/QTR)
30	R&D Support Services (SEAPORT)	24	FY22/Q1
30	R&D Energy Conversion Program and Engineering Support Services (SEAPORT)	28	FY22/Q1
30	Damage Control, LBF, and Fire Fighting Engineering Service (SEAPORT)	10	FY22/Q2
30	Production and delivery of Lithium Battery Lockers (Supply)	10	FY22/Q2
30	Modernization of the Propulsion System Test Device Electronic Throttle Control Unit	17	FY22/Q3
30	Engineering Operational Sequencing System Support Services	15	FY23/Q1

<b>Dept</b>	<b>Brief Description</b>	<b>ROM (\$M)</b>	<b>Anticipated Announcement Date (FY/QTR)</b>
30	Gas Turbine Material Improvements Detailed Design Support	8	FY22/Q4
40	NCA Prototype Manufacturing & Qualification	0.5	FY22/Q2
40	NCA Design, Prototype, & Qualification	1	FY22/S2
40	Saturn T-1302 Engine Repairs	5	FY22/Q1
40	Engineering and Technical Services for Marine Gas Turbines (SEAPORT)	3	FY22/Q2
40	Gas Generator Repair	35	FY22/Q2
40	Low Pressure Turbine Blade & Vane Repair	5	FY22/Q2
40	Blade & Vane Repair Spec Development	0.25	FY22/Q3
40	RADCON Engine Services	14	FY22/Q2
40	Engineering and Technical Services for Towed Buoys	40	FY22/Q1
40	Engineering and Technical Services for Submarine Communication Systems	50	FY22/Q2
40	Engineering and Technical Services for Submarine Sails (SEAPORT)	10	FY22/Q2
40	Engineering and Technical Services for Sail, Hull, Deck & Auxiliary Machinery Systems	400	FY22/Q4
40	Computer Aided Radiography Inspection (Applus)	5	FY22/Q1
40	CAMS Material Contract	5	FY22/Q1
40	Engineering and Technical Services for Diesel Engines	15	FY22/Q1
40	Turbine Engine Repair	5	FY22/Q2
40	On-Site Representative Engineering Support	15	FY22/Q3
40	LCAC Gearbox Test Stands Repair & Overhaul	1	FY22/Q2
40	WDI Engineering Services	1	FY22/Q2
40	CPP Blade Universal Balance Arbor Material Contract	0.5	FY22/Q1
40	Engineering and Technical Services for Kuckleboom Crane	25	FY22/Q2
40	Circuitry Breaker Obsolescence Management	10	FY22/Q1
40	Material BOA	110	FY22/Q3

<b>Dept</b>	<b>Brief Description</b>	<b>ROM (\$M)</b>	<b>Anticipated Announcement Date (FY/QTR)</b>
40	Material BOA	100	FY22/Q4
50	LCS Freedom Variant in Service Engineering and Life Cycle Support for C5I system	10	FY22/Q2
50	SCS and MCS Engineering Services Support for LCS Freedom Variant	10	FY22/Q1
50	Navy EDICS and Control System OEM Hardware	15	FY22/Q1
50	SCSs and MCS Hardware	15	FY22/Q2
50	Machinery and Ship Control System Automation Hardware	15	FY22/Q2
50	Controls and Monitoring Engineering Services	15	FY22/Q2
<b>Total:</b>		<b>\$1048.25</b>	

**B. SWOT ANALYSIS**

The goal of the SWOT analysis presented in Figure 8 was to baseline the current position of NSWCPD’s development of contracting artifacts/packages, specifically in the pre-award phase. As shown in Figure 8, the SWOT analysis provided was conducted from the technical personnel point of view, with relationship to the contracting department considered an external interface. Thus, the strengths and weaknesses will be more catered to the technical personnel and/or the Command as a whole, and opportunities and threats will be more focused on the work of the acquisition personnel and contracting department.

<p style="text-align: center;"><b><u>STRENGTHS</u></b></p> <ol style="list-style-type: none"> <li>1. Proactive approach to improve interaction between contracting and technical workforce by creation of AM and TLO roles.</li> <li>2. Constant increase in contract actions obligated by NSWCPD over each of the last six fiscal years.</li> <li>3. Over \$700M in obligated contract actions in the most recent fiscal year.</li> </ol>	<p style="text-align: center;"><b><u>WEAKNESSES</u></b></p> <ol style="list-style-type: none"> <li>1. Technical personnel assisting in developing the contracting artifacts are not trained in DAU/DAWIA acquisition courses.</li> <li>2. Acknowledged communication issues between contracting and technical departments at NSWCPD by both workforces and leadership.</li> <li>3. No formalized methodology to track contract artifact development prior to acceptance of complete package (PALT start).</li> </ol>
<p style="text-align: center;"><b><u>OPPORTUNITIES</u></b></p> <ol style="list-style-type: none"> <li>1. Allow cross-functional teams to naturally operate through implementing working groups made up of both acquisition and technical personnel, with the goal of improving efficiency and quality of awarded contracts out of NSWCPD.</li> <li>2. Clearly identify which training should be taken by technical personnel if involved in developing contracting artifacts.</li> <li>3. Utilize digital transformation agenda to develop, review, and route contract package documentation.</li> </ol>	<p style="text-align: center;"><b><u>THREATS</u></b></p> <ol style="list-style-type: none"> <li>1. Low quality contracting artifacts leading to increased costs for programs, and/or missed schedule milestones, and/or low level of performance by contracted personnel.</li> <li>2. Continued flawed work practices leading to cost overruns could result in less sponsored work for NSWCPD.</li> </ol>

Figure 8. SWOT Analysis of NSWCPD Contracting and Technical Interactions.

Strengths identified from the SWOT analysis begin with the Command’s proactive approach, and initial steps to identify and attempt to improve upon communication shortcomings between the technical and acquisition personnel. NSWCPD created two roles, the AM and TLO to help aid both the technical and contracting departments at NSWCPD by having a liaison between the two entities who could help both parties communicate more effectively to develop the best contracting artifacts possible. Furthermore, as displayed in Figure 7 and Table 4, NSWCPD’s contract actions obligated have constantly increased over each of the last six fiscal years. NSWCPD also obligated

well over \$700M in contract actions in this past fiscal year. The increase in contract actions and high dollar amount of obligations is a strength for the Command because it shows the consistent increase in work managed by NSWCPD, thus more reason to strive for improvement in the realm of contract management.

Weaknesses recognized because of the SWOT analysis are areas where the research team wanted to focus its attention on potential areas of improvement at NSWCPD. In discussions with technical personnel at NSWCPD, it was determined that there were some instances where technical personnel were asked to develop contracting artifacts for a program they were working on, having never taken the relevant DAU acquisition training courses. This stuck out as a weakness because even if that person received OJT from a more senior person in a similar position, the technical person still may not know exactly what is required of them to generate that specific contracting artifact for the overall contract package. Moreover, another weakness identified by the research team was the basis under which this thesis was developed – the idea that there are some communication mishaps between the technical departments and contracting department at NSWCPD. The communication issues often lead to delayed awards to programs, delaying funding to the program and inherently increasing the risk for the program. The last weakness identified because of the SWOT analysis found there is no formalized methodology to track contract artifact development prior to acceptance of complete package (PALT start). Without the ability to track contract artifact development, the development, completion, and acceptance of the complete contracting package can easily be lost track of. Weaknesses, while difficult to identify without invoking an emotional reaction from the stakeholders, provide an opportunity for continuous improvement – improvement for high performing and efficient organizations.

Opportunities generated partially from the weaknesses are the strategies that the research team believes that the Command can implement to improve overall contract management and performance at NSWCPD. The first opportunity is a way to cross-pollinate the contracting/acquisition and technical personnel. By implementing an IPT with contracting/acquisition and technical personnel in each department at NSWCPD, the small IPTs would be able to improve efficiency and quality of awarded contracts out of

NSWCPD. They would be able to discuss best practices along with any outstanding action items needed before a contract may be completed with the pre-award phase. The next opportunity is to give the technical personnel the most knowledge of the acquisition process by offering the relevant training to them if they are currently working, or plan to work on contracting artifacts. By remaining current on relevant acquisition training, the Command can ensure that all the employees producing the contracting artifacts are well versed in the subject matters. Lastly, NSWCPD could benefit from the utilization of digital transformation agenda to develop, review, and route contract package documentation. By evolving its contracting process to meet the demands of the 21st century technology and innovation, the contracting process at NSWCPD would certainly be more efficient and effective.

Threats identified in the SWOT analysis are areas that the research team may believe the government could endanger its business and/or budgetary spending, or its overall competitive advantage. Threats from the SWOT were developed by thinking of what the effects could be if the weaknesses mentioned continue to exist, or if the opportunities identified are not capitalized on properly. The first threat to NSWCPD's contract management process could be the continual decrease in the quality of contracting artifacts which could lead to increased costs for programs, and/or missed schedule milestones for the program, and/or low level of performance by contracted entities; all of which are never easy for a program to recover from. The next threat is more of a second-order item that could be a result of the first threat mentioned. If NSWCPD continues to operate with flawed work practices mentioned in the first threat, it could lead to less sponsored work being offered to the Command and decrease in contract actions on the charts shown in Figure 7 and Table 4.

The SWOT analysis allowed the research team to look at NSWCPD's contract management process from a unique perspective and influenced the researchers to produce some key areas of strength, weakness, opportunity, and threat for the Command. While each area is different in the SWOT analysis, the reader can gain an appreciation of how each area is interrelated.

**C. CONTRACT MANAGEMENT MATURITY MODEL ASSESSMENT**

Using the CMMM tool to capture the NSWCPD capability and maturity of the pre-award phase contract management process, the areas of procurement planning, and solicitation planning received a rating of 2–Basic maturity level, displayed in Figure 9. A basic maturity level indicates that while there exists some institutionalization and standardization of contract management processes, a lack of consistency in process application presents across the command. Since the focus of this thesis is improving the communication between the technical and contracting department at NSWCPD during the pre-award phase, a rating for the solicitation phase is withheld. This is because the technical community has no direct involvement in the solicitation process despite being part of the pre-award phase key process areas.

CONTRACT MANAGEMENT MATURITY MODEL			
MATURITY LEVELS	CONTRACT MANAGEMENT PRE-AWARD PHASE KEY PROCESS AREAS		
	Procurement Planning	Solicitation Planning	Solicitation
5 – Optimized			
4 – Integrated			
3 – Structured			
2 – Basic	NSWCPD	NSWCPD	
1 – Ad-Hoc			

Figure 9. Completed CMMM Assessment of NSWCPD Pre-Award Phase Key Process Areas.

Figure 10 shows that most of the procurement planning at NSWCPD is carried out in support of acquiring services other than research and development. However, for the procurement of supplies and R&D services, the three technical departments independently work with their sponsors to integrate demand signals into the program schedule, with no standardization across the command for uniform requirements development, formalized Integrated Product Team development and support, or communication pathways for initiating new contract actions.

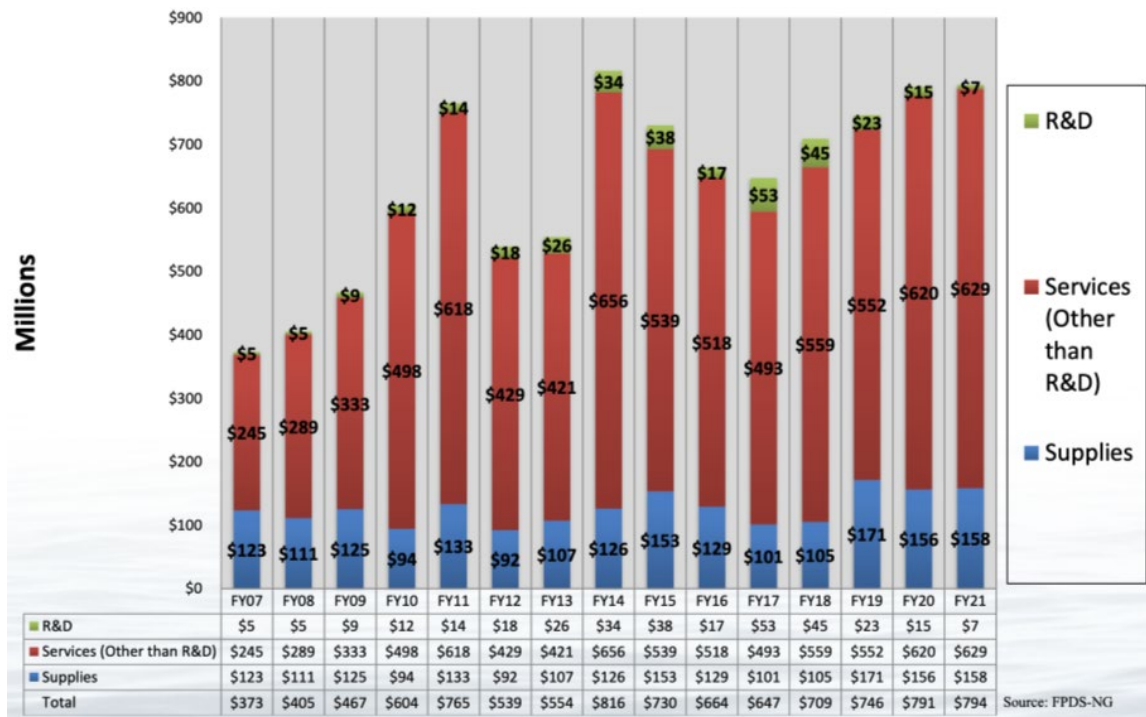


Figure 10. What NSWCPD Acquires: FY07 to FY21.

NSWCPD’s contracts department hosts solicitation planning documentation and procedural instructions on a local repository accessible by all warfare center personnel. It is an incredible resource for those already versed in the contract management field. However, a more intuitive approach is required for technical personnel to easily locate, digest, and apply the appropriate information for their program. A future state process map



presented in the next chapter will inform improvements in this and the procurement planning key process areas.

#### **D. SUMMARY**

This chapter outlines the research team's data collection to better understand the contract management and pre-award development process at NSWCPD. Through discussions with multiple stakeholders at NSWCPD, and development of a SWOT analysis by the research team, and an assessment of process maturity level using the CMMM tool, the team identified some areas for potential improvement at NSWCPD with the idea to increase the quality of the contracting artifacts involved in the final contract product to be awarded by NSWCPD. The following chapter will discuss and present potential recommendations and implementation strategies, along with process mapping of an ideal future state of the contract management and pre-award development process at NSWCPD.

## V. DATA ANALYSIS AND RESULTS

### A. FUTURE STATE PROCESS MAP

The current process for generating pre-award phase contracting artifacts was analyzed for efficiency and expediency, command institutionalization and standardization, as well as effective communication pathways using the information gathered through the research team’s informal discussions with NSWPCD leadership, the conduct of the SWOT analysis, and application of the CMMM tool, as described in the preceding section. Figure 11 presents the future state process map derived from our analysis, which is an expansion of the NSWCPD Cross Functional Process Flow presented in Figure 1.

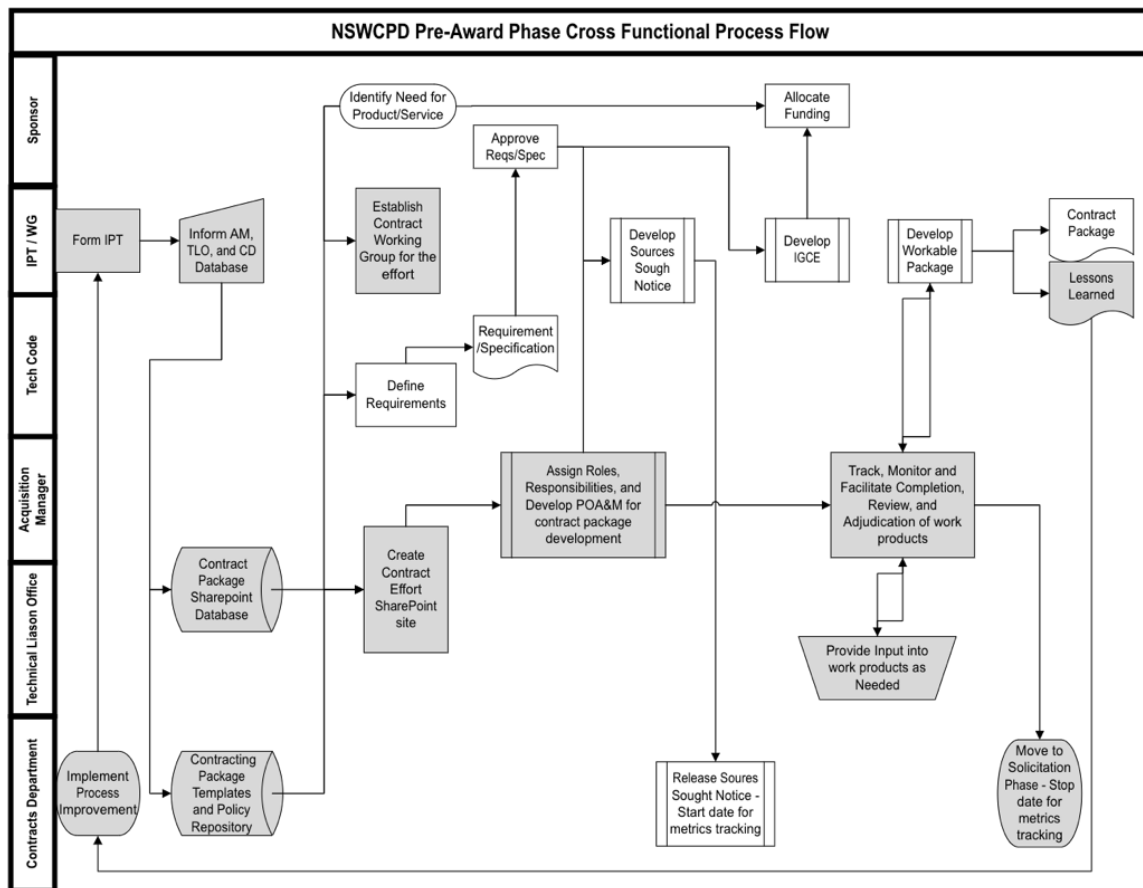


Figure 11. Future State Process Map of NSWCPD Pre-award Phase Cross Functional Process Flow.

It provides a visual representation of an idealized methodology to support improving the interaction between the technical codes and the contracting department. New additions are designated by the gray shading, and the proceeding paragraphs describe this process.

Lean principles aim to maximize value while reducing waste (*What is*, 2022). Continuous improvement is a tenet of Lean methodologies; because the Plan-Do-Check-Act Deming circle is a “never ending cycle that aims to help you improve further based on results,” the robustness of an organization is demonstrated through the incorporation of process improvement methods utilizing feedback loops (*What is*, 2022). In this case, lessons learned from contracting activities are integrated into future improvements through the contracts department and the formation of an integrated product team (IPT), discussed in Recommendation #1.

IPTs are cross-functional teams assembled to identify and resolve issues within a collaborative environment (Schwartz, 2020). More specifically, Overarching IPTs focus on conducting policy assessments and developing strategic guidance to ensure program success (Swartz, 2020). In the future state cross functional flow at NSWCPD, an overarching IPT would serve to provide input into the contract department’s documentation and policy repository, which requires a significant overhaul to be more informative and intuitive for non-contracting personnel, as well as the development of the contract package SharePoint database, respectively described in Recommendations #5 and #6.

Additionally, in preparation for each contract announcement, a working group including a technical and contracting lead with support personnel from the technical codes and legal department as necessary, the AM, and TLO where needed, will be established. This group is responsible for the contract package development, review, and adjudication in accordance with the roles and responsibilities outlined in the POA&M developed by the AM in preparation for the contract announcement. Recommendations #2 and #6 expand on this idea.

Finally, inclusion of metrics for time and hours expended in the development of the contract package can inform the contracting competency levels at NSWCPD as discussed

in Recommendation #3. The strategy for tracking metrics as presented in Recommendation #7 fulfills NSWCPD well and will provide additional input for the IPT to consider as they implement process improvement controls moving forward.

## **B. RECOMMENDATIONS FOR IMPLEMENTATION**

Based on the data collected, interpreted, and analyzed by the research team, seven recommendations for NSWCPD leadership to implement to further improve the interaction between the contracting department and technical department were identified.

Recommendation #1 is to establish an IPT that is inclusive of all stakeholders associated with contracting, including contracting officers, technical subject matter experts, acquisition managers, contracting officer representatives, technical liaison officers, and legal counsel. The objective of the IPT is to establish a unified contract language across all departments and to build a cohesive contracting team through social networking. Furthermore, the IPT should meet quarterly to discuss lessons learned, best practices and policy changes, as necessary. Implementing the IPT also offers the best way to network amongst colleagues at NSWCPD. Social networking between the stakeholders is essential to creating an effective and efficient acquisition workforce at NSWCPD. Social networking provides free flow of information and idea sharing among co-workers in a non-hostile environment.

Recommendation #2 is to establish a working group for each contract development effort. The acquisition manager in conjunction with the contracting department and technical code should nominate applicable personnel for documentation development and support based on resource availability. Establishing a working group and making connections specific to the contracting effort will increase the expediency of addressing issues within the development cycle.

Recommendation #3 is to increase the contracting competency of the technical personnel. This objective can be accomplished through strategic planning to identify targeted training, timing of training implementation, and frequency of recurring training. The command can and should take advantage of existing contracting training offered through the DAU, such as, statement of work development, market research, and source

selection. The DAU training courses should be supplemented with workshops that are developed through the IPT established in recommendation #1. For clarification, the research team only recommends imposing the contracting competency development training for technical personnel delegated and/or volunteered to support contract package development. The research team recognizes and agrees that not all technical personnel will have responsibility or requirement to support development of contracting artifacts. Therefore, technical personnel not required to support the development of contract packages should not be burdened with more training.

Recommendation #4 is to increase the TLO staffing levels, at the NSWCPD command, to support high volume of contracting artifact development. The TLO provides immense value in assisting with contracting artifact development. Therefore, an increase in TLO staffing empowers the acquisition manager to coordinate with the TLO at a higher frequency.

Recommendation #5 is to update the Contracting SharePoint site. Currently, the site contains various templates, procedures, and policies for contracting activities at NSWCPD. However, to make the site more transparent and utilizable, it should be updated following the outcome of building a uniformed contracting language included in Recommendation #1. Potential updates would include providing a comprehensive acronym list for personnel unfamiliar contracting language, establishing SharePoint sites that map to all types of contracting activities conducted at NSWCPD, providing a cohesive flow chart that technical codes can follow which will guide them to the correct SharePoint site based on acquisition type, cost, and other inputs.

Recommendation #6 is to utilize a standardized process that can be easily institutionalized across all technical codes to support initiation of a contract action, collaboration on contract package development, implement change controls to enhance configuration management, and assign actions for review to increase efficiency. Since the Navy recently transitioned to a more modern server under Operation Flank Speed which allows access to features and applications found in Microsoft 365 in the Microsoft Teams environment, it is natural to recommend SharePoint as an immediately available tool. Within this database, the AM can establish a dedicated SharePoint Site for each contract

announcement, with the requisite templates. Additionally, the AM can assign roles and responsibilities documented in the contract's POA&M, and track, monitor, and facilitate the completion, review, and adjudication of the contract package. This serves to expand advantageous information exchange, provide efficient feedback methods, and establish the workload expectations and timeline. This would increase the CMMM rating shown in Figure 9 from 2–Basic to either 3–Structured or 4–Integrated, depending on the use of metrics to track work completed during the development and review of the package.

Recommendation #7 is to adopt a uniform methodology for tracking the total time and hours expended on each document during the preparation of the contract package. The strategy of initiating metrics tracking when the RFI or sources sought notice is released and closing upon the acceptance of the package by the contracting department works well as a new performance metric to introduce into the process. This can also be easily integrated into the SharePoint site utilizing preexisting tools, applications, and extensions employable within the Flank Speed environment.

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## VI. CONCLUSION

### A. RESEARCH QUESTIONS ADDRESSED

This thesis attempted to address the primary and secondary questions posed below. An abbreviated version of the analysis and answers to the primary and secondary questions is provided.

#### (1) Primary

- QUESTION: What (if any) current policies, plans are currently in place to ensure proper communication between technical and contracting personnel?
- DETERMINATION: NSWCPD recognized the difficulty in translating engineering and contracting terminology, requirements, and process and created the Acquisition Manager and Technical Liaison positions to bridge the gap between the contracting department and technical acquisition community. These personnel serve to interface with and guide the technical personnel during the pre-award phase process during the generation of contracting artifacts. The contracting department makes good use of digital repositories to house contracts policy, guidance, and templates, but accessing and understanding applicable information is cumbersome. There are no standardized methods for implementing the steps in the pre-award phase contracting process.
- QUESTION: What is the root cause for the potential disconnect between technical and contracting personnel at NSWCPD, and what actions can we take to address this issue?
- DETERMINATION: Root causes of the issue link to inadequate training of NSWCPD's technical acquisition workforce with respect to contracting competencies, a shortfall in staffing levels in



the Technical Liaison Office position given the increasing contracting workload, and no formalized, standardized, and institutionalized methodology in the pre-award phase process for generating, reviewing, and adjudicating contract package documentation. The research team presented seven recommendations to address the problem:

1. Recommendation #1: Establish a cross-organizational IPT for advising, recommending, and implementing policy changes for the contracting process.
2. Recommendation #2: Establish working groups with members from the technical and contracting community to generate the contract package documentation.
3. Recommendation #3: With input from the IPT, conduct a capability assessment with the technical acquisition community and identify adequate training to increase the contracting competency levels.
4. Recommendation #4: Increase TLO staffing levels to match the increasing contracting workload.
5. Recommendation #5: With input from the IPT, update the contract's department SharePoint site to be more user friendly and geared toward people with moderate contracting knowledge.
6. Recommendation #6: Generate a standardized process for generating the contract package. Flank Speed is an immediately available environment to support this at no extra cost.
7. Recommendation #7: Adopt performance metrics tracking in the pre-award phase of the contracting process.

(2) Secondary

- QUESTION: With respect to acquisition and contract management/development, what training is in place at the Command-level to ensure the personnel are qualified to satisfy job requirements?
- DETERMINATION: For the technical community, there are no methodologies in place to identify requisite personnel for contracting training. When asked to serve on Source Selection Boards, the technical personnel are required to take training for this specific effort.

**B. SUMMARY**

This research was intended to improve the effectiveness and efficiency between the relationship of the contracting department and the technical department at NSWCPD. Both departments play vital roles in the contracting processes, however, both departments speak different languages and are governed by different authorities. While both departments' responsibility is to do what is in the best interest of the government and the Naval fleet, contract officers first responsibility is to protect the Command from potential liability within contracts and the technical personnel is to provide technical solutions to the warfighter that are timely and cost effective.

The existing relationships between the contracting department and the technical department examined in this thesis are not efficient. However, the positive trend in reduced PALT time over the past ten fiscal years portrays the underlying issues, as described in this research. This research revealed that there is no current strategic plan existing to address this issue. The Command's creation of the acquisition manager position and the expansion of their responsibilities, including adding a liaison between the contracting department and technical, has benefited the technical department by adding a level of contracting

competency that was lacking. However, the development of contracting artifacts during the pre-solicitation phases falls entirely on the technical personnel.

The process mapping illustrated in earlier chapters outlines the current state and recommended ideal (future) state for the Command to achieve. Implementing the recommendations should result in improved interaction between contracting and technical personnel at NSWCPD. The recommendations provided in this thesis are intended to bridge the communication gap between all stakeholders in the contracting process, especially the contracting department and the technical department. Specifically, the establishment of a working group that is inclusive of all stakeholders provides a unified contract language across all departments at NSWCPD. This working group would continue to meet on a semi-regular basis to review open action items for the Command specific to contract management in the pre-award phase. Taking it one step further, we recommend building a cohesive contracting team through social networking within all parties at the Command. Social networking between the stakeholders is essential to creating an effective and efficient acquisition workforce at NSWCPD.

Increasing the contracting competency of the technical department through strategic planning of identifying targeted training, timing of training implementation, frequency of recurring training, and designating specific individuals to receive training will enhance the technical department's capability to developed contracting artifacts that supports the Command's strategic plans. The most important part of the targeted training would be determining if and what frequency of recurring training would be required. It is of the utmost importance to the Command to ensure that its acquisition workforce is continuously professionally trained to ensure that its contractual obligations are within the Command's best interests in terms of cost, schedule, and performance.

### **C. FUTURE RESEARCH**

Future research related to thesis topic considered centered around the idea of idea sharing between the Department of Defense's acquisition and contract management best practices with those of the private sector. The research team identified potential areas of future investigation to model the government's contract management after looking at

recommendations presented by the Section 809 Panel to the DOD. The Section 809 Panel provided the government with a pathway to transform the defense acquisition system to meet the current needs presented in the 21<sup>st</sup> century. Specifically, the Section 809 Panel offers information in volume 3 of its publication to simplify acquisition through streamlining and codifying acquisition regulation. In volume 3, the goal of the Section 809 Panel is to make the defense acquisition system more adaptable to change, and agile enough to support the swiftness of technology innovation present in the 21<sup>st</sup> century. Section 5 of volume 3 in the Section 809 Panel's publication focuses on the acquisition workforce, concentrating improvements to DAWIA qualifications and competency model improvements for the workforce. Section 5 continues to mention the defense acquisition system's inability to provide a public-private sector exchange of information for the acquisition workforce (Section 809 Panel, 2019).

The government could benefit from idea sharing and communication with the private sector by ensuring that the government is aware of any innovative technologies or concepts used in the industry to maintain more effective contract and/or acquisition management. Continued idea sharing between the private and public sector can be beneficial to both parties to ensure that the warfighter receives the best capabilities in the most efficient way possible.

Additional areas of potential future research could include various forms of data collection on related topics. Specific to NSWCPD, data collection on contract actions before and after the implementation of the ideal state process map to measure improvements. In doing so, the researchers would hope to find that the implementation of the ideal state process map should decrease the PALT times and improve the overall quality of contract artifacts at NSWCPD.

Another area of future research in the realm of data collection is to collect data on the efficiencies of contracting processes over time at NSWCPD. The data collected here would look at how efficient processes are prior to and after the technical personnel at NSWCPD took additional relevant DAU training and subsequently increased their contracting competency. Based on recommendation #3 presented in the previous chapter, the data collected should result in more efficient and effective contracting processes after

increase the contracting competency in technical personnel. Similarly, future research can also focus on exploring whether professional qualifications (e.g., Project Management Professional, Certified Professional Contract Manager) and education (e.g., Master of Science in Program Management or Contract Management) for technical personnel make a difference in overall contracting process efficiencies.

## LIST OF REFERENCES

- Butler, T. A. and A. Valesco. (2014). *An analysis of the Department of Defense pre-award contracting process*, [MBA professional report, Naval Postgraduate School].
- CMBOK 6<sup>th</sup> : National Contract Management Association. (2019). *Contract management body of knowledge (CMBOK)* (6<sup>th</sup> ed.) National Contract Management Association.
- Escobar, R. J. (2021). *Planning for acquisition success: An analysis of the time it takes to build requirement packages* [Joint applied project, Naval Postgraduate School].
- Gomer, J. and J. Hille. (2015). *An essential guide to SWOT analysis*. Retrieved 8 April 2022, from <http://mci.ei.columbia.edu/files/2012/12/An-Essential-Guide-to-SWOT-Analysis.pdf>
- Government Accountability Office. (5 September 2019). GAO-19-556, Defense Workforce: Defense Workforce: Steps Needed to Identify Acquisition Training Needs for Non-Acquisition Personnel.
- Naval Surface Warfare Center, Philadelphia Division. (16 March 2022). SAP Contract PR Checklist and Prep Guide.
- “NSWCPD Industry Slides.” (2021). *Warfare centers – Philadelphia division: Virtual industry day*. Retrieved 20 May 2022, from [https://www.navsea.navy.mil/Portals/103/Documents/NSWC\\_Phildelphia/Industry%20Day/NSWCPD%20Industry%20Slides%202021%20Consolidated.pdf?ver=d4mOLiXy1aCS8EQM4S7eyw%3d%3d](https://www.navsea.navy.mil/Portals/103/Documents/NSWC_Phildelphia/Industry%20Day/NSWCPD%20Industry%20Slides%202021%20Consolidated.pdf?ver=d4mOLiXy1aCS8EQM4S7eyw%3d%3d)
- PMBOK 6<sup>th</sup>: Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK guide)* (6th ed.). Project Management Institute.
- PMBOK 7<sup>th</sup> : Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK guide)* (7th ed.). Project Management Institute.
- Possehl, Stephanie. (2022) *Engineering and technical management for our future*. DAU News – Engineering and Technical Management For Our Future. (n.d.). Retrieved June 14, 2022, from <https://www.dau.edu/library/defense-atl/blog/Engineering-and-Technical-Management-for-our-future>
- Project manager’s guidebook*. (2015). Federal Acquisition Institute.
- Rendon, R. G. (2008). *Organization assessment of procurement management process*. 3<sup>rd</sup> International Public Procurement Conference Proceedings.

- Rendon, R. G. (2014). *Benchmarking contract management process maturity: A case study of the U.S. Army*. PMI Research and Education Conference.
- Rendon, R. G. and J. M. Rendon. (2015). *Auditability in public procurement: An analysis of internal controls and fraud vulnerability*. [Faculty and researchers' publications, Naval Postgraduate School].
- Section 809 Panel. (15 January 2019). *Report of the advisory panel on streamlining and codifying acquisition regulations*. [discover.dtic.mil/wp-content/uploads/809-Panel-2019/Volume3/Sec809Panel\\_Vol3-Report\\_Jan2019\\_part-1\\_0509.pdf](https://discover.dtic.mil/wp-content/uploads/809-Panel-2019/Volume3/Sec809Panel_Vol3-Report_Jan2019_part-1_0509.pdf)
- Schwartz, B. (2020, July 15). *A functional team is not an integrated product team engineering for humans*. Engineering for Humans. Retrieved June 14, 2022, from <https://www.engineeringforhumans.com/systems-engineering/a-functional-team-is-not-an-integrated-product-team/>
- What is continuous improvement? Definition and tools*. Kanban Software for Agile Project Management. (2022). Retrieved June 14, 2022, from <https://kanbanize.com/lean-management/improvement/what-is-continuous-improvement>

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