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Rhodus, Elizabeth B.

Monterey, CA; Naval Postgraduate School

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**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

**AN EMPIRICAL EVALUATION OF NAVY METOC
PROJECTS USING PROJECT MANAGEMENT
STANDARDS**

by

Elizabeth B. Rhodus

March 2022

Thesis Advisor:

Robert F. Mortlock

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**AN EMPIRICAL EVALUATION OF NAVY METOC PROJECTS USING
PROJECT MANAGEMENT STANDARDS**

Elizabeth B. Rhodus
Civilian, Department of the Navy
BS, Art Institute of Pittsburgh, 2010
MS, Western Governors University, 2018

Submitted in partial fulfillment of the
requirements for the degree of

PROFESSIONAL MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
March 2022**

Approved by: Robert F. Mortlock
Advisor

Nicholas Dew
Academic Associate, Department of Defense Management

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ABSTRACT

Although project managers are in high public-sector demand, the Navy Meteorology and Oceanography (METOC) command studied has yet to adopt a project management requirement. With multiple facilities, acquisition elements, and mission-essential projects, cross-departmental dependencies exist that require proper project oversight. Without project management, mission-essential projects are done in a vacuum; personnel are often unaware of the impacts of specific tasks. By requiring a specific type of project management structure, Navy METOC commands would have an avenue to implement a hybrid project management office. This research examined a hypothetical group of projects within a Navy METOC command's area of the Department of Defense using the Project Management Body of Knowledge (PMBOK) standards. From requirements initiation to project schedules, this analysis identified gaps throughout a Navy METOC command's ad-hoc project management process. Using the PMBOK as a baseline, we recommend: 1) designate a person or position to support the ongoing creation, command support, and maintenance of project-based documents/templates, 2) implement a hybrid project management office where a position exists to support the command with information, techniques, and tools, and 3) encourage and authorize regular foundational training for one person in each department. With the insertion of project management, the command and its personnel would be more efficient, task-oriented, and aligned.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
COVID-19	SARS-CoV-2 virus
DOD	Department of Defense
EOL	end of life
FY	fiscal year
IOC	initial operational capability
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
PMO	Project Management Office
METOC	Meteorology and Oceanography
MS	Microsoft
SME	subject matter expert
SOP	standard operating procedure
WBS	Work Breakdown Structure
WG	working group

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EXECUTIVE SUMMARY

A Navy METOC command faces a serious issue: the lack of Project Manager positions. Despite the lack of funding to support these programs, commands should be able to find a way to integrate formalized project management to efficiently use resources.

The purpose of this research is to examine existing projects and determine the best way to move forward with applying project management to a Navy METOC command. The scope of this research is focused around analyzing a sample set of projects from a Navy METOC command, applying the PMBOK methodology to each project as a baseline, and comparing which aspects of the PMBOK each project had and which did not. Methods used to conduct this research included obtaining project documentation for three sample projects, searching for evidence in each project documentation set, and analyzing against a pre-determined PMBOK baseline. From there, statistical data was captured to represent the amount of evidence that each project had for each PMBOK-related area.

Findings and results from this research showed the following:

- Project A – cost, schedule, resources, and performance overrun
- Project B – scored well in most areas
- Project C – scored low in areas, but did not show signs of significant overrun

To summarize, this research makes recommendations on how to integrate a hybrid project management solution into a Navy METOC command. Additional recommendations include appointing a project management office to support, guide, and manage documentation as well as provide updates to leadership. Further recommendations include training for at least one employee in each department for a project management knowledge base.

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I. INTRODUCTION

I was once told that “project managers don’t grow on trees” and did not quite understand what that meant. Project managers have specific skill sets that should exist in all organizations, but especially in government branches. Because of the mission-oriented nature of the military, it is even more imperative that project managers are a presence in a command and not an absence. Despite the lack of formalized project management in a Navy Meteorology and Oceanography (METOC) command, I have seen a small amount of project management training and collaboration start to exist throughout the course of this research. Unless the need to integrate a project management-based culture into a command is given priority, however, it will not make a difference. If all drivers do not follow the rules of the road, eventually there will be accidents, mayhem, and injuries, and more people will be led astray. When there are multiple parties following a baseline set of rules for success, a group can follow those rules and most times, end up with success.

In this instance, success would mean that the government would save money or stay on track with funding (this includes time, resources, assets, etc.), perform well-planned projects with stakeholder buy-in, not waste personnel time, distribute duties so that bandwidth is not stressed, enhance quality of life and morale for existing employees, and possibly improve retention in commands that have a lot of civilian/contractor employees.

Some people see project management as a burden and project managers as police officers, but society needs police officers to ensure that everyone stays in order and plays by the rules. When it comes to taxpayer money for government initiatives, I would be content knowing that my money was properly managed.

With project management being expensive to implement and maintain, it is not shocking that some government organizations have yet to create formalized billets for project managers. However, without project management, uniting the “iron triangle” of delivering projects on time, on budget, and within scope while uniting clients/teams does not often occur (Aston, 2021). While existing leaders are managing projects, people,

department matters, and mission-essential needs, one command in the Navy METOC sector is seeing high turnover rates—good people are leaving for better quality-of-life opportunities, less stress, and more balanced positions. To support and invest in existing personnel, this research studies whether formalized project management training and project manager positions should be an investment in a Navy METOC command.

Project management sets the standard for providing added value in any organization, as it ensures focus to what is being delivered, validates its authenticity, and provides for strategic alignment with mission-based objectives (Aston, 2021). Bringing leadership, focus, and direction to projects is also a key element of project management, as not having project management on projects “can be like a ship without a rudder; moving but with direction, control or purpose” (Aston, 2021). Project managers integrate team members utilizing distinct accountability and motivational techniques; with the addition of templates, practices, and attention to detail, project managers cohesively unite teams so that plans can be in place (Aston, 2021). Starting in the 1960s, The Project Management Institute (PMI) was created over dinner as two people decided that a centralized organization for project managers should exist (Project Management Institute [PMI], n.d.). PMI now publishes the internationally and ANSI-accepted PMBOK as well as PMI certifications. To support a project management foundation of knowledge, a publication called the Project Management Body of Knowledge (PMBOK) exists; serving as a “Bible” for project management, the PMBOK is a high-quality reference tool for anyone needing project management-based information. Additionally, PMBOK knowledge areas, such as quality control, risk management, and continuous oversight on one project, are value-added to having a project manager lead an effort versus placing the onus on the manager of an entire department (Aston, 2021).

With the integration of a project manager into an organization, companies could be saving time, money, and resources that are used elsewhere (Aston, 2021). A survey from the PMI says that approximately 58% of organizations can apply and understand how project management concepts will benefit their environments (Kissflow, 2021).

Projects fail for a variety of reasons, but some of the main ones that Kissflow (2021) indicates, include:

- **Resource deficiency**—Inadequate resources to complete the project
- **Inadequate timeframe**—Not enough time to complete the project
- **Unclear goals**—Lack of detailed documentation and/or understanding
- **Poorly managed stakeholder expectations**—Lack of communication at the beginning
- **Inadequate risk management**—Failure to plan for what could go wrong
- **Inadequate planning**—Failure to properly spend enough time identifying what needs to be done (Kissflow, 2021)

The following (Figure 1) is a snapshot of where some organizations spend their resources.



Figure 1. The importance of project management.
Source: Guide to Project Management (2021).

While it is somewhat beneficial for department heads to lead projects, it is often overlooked that those department heads are also engulfed with other management responsibilities. As a department head, those leaders are managing personnel, administrative efforts, delegation of tasks, and ownership of other tasks, along with responding to daily operational needs. Based on oversight, most talented, high-performing individuals in government organizations who lead departments as well as detailed projects are maximizing their bandwidth. Quality of life cannot be fully

preserved in this instance for either the individual leading the project, their department, and/or their subordinates. Often, leaders in these positions fail, miss details, undergo a high level of stress, and/or eventually move on to less stressful jobs. Based on these notions, I opine that separate project managers are important for organizations to invest in if the requirements exist to maintain personnel, reduce turnover rates, increase retention rates (especially for government civilians), and contribute to a balanced quality of life. Regarding high-level project goals, my research should depict how the lack of a formalized project management basis in a Navy METOC command impacts the outcome of projects.

A. RESEARCH MOTIVATION

Why Is there a Need for Project Management Practices in a Navy METOC Command?

In all areas of the Navy, there is a need for individuals, teams, and organizations to be able to effectively manage projects. In the case of a specific Navy METOC command, no formalized education, training, or knowledge base in project management and/or positions as formalized project managers exist. Although not every position would justify a certification requirement, basic project management fundamentals should exist (Olivier, 2018).

When verbiage such as the word *scope* makes even the smartest of personnel confused, it is understood that project management terms and concepts have not been introduced into that culture. With a project management foundation in each department of a command, departments will be able to work well together, potentially creating an elevated level of high-performing teams. Additionally, a project management knowledge base supports those managing projects to be more efficient and content employees who will inevitably display powerful results (Teamwork, n.d.). Saving time and money are two important outputs of a project management foundation, as without proper planning, projects can result in budget overruns and stretched personnel (Teamwork, n.d.). When organizations do not use project management, leaders take more time to determine how to run their projects, time is wasted when personnel create documents from scratch and

attempt to organize without a framework, and chaos ensues. Utilizing project management fundamentals, leaders can be empowered to make stronger decisions and have a higher success rate, higher quality-of-life levels, and enhanced visibility into issues before they occur (Teamwork, n.d.). One survey found that 80% of people running projects spend at least half their time in rework (Teamwork, n.d.); rework results in more time, money, and resources being exhausted when proper planning could have eliminated rework from the beginning. In addition, well-executed projects result in happier teams, satisfied customers, and stronger leaders (Teamwork, n.d.).

What are the most effective strategies to implement project management practices into projects?

The Project Management Body of Knowledge (PMBOK) is a guide created by the accredited governing body known as the Project Management Institute (PMI). With an established history for project management standards, PMI's PMBOK sets the tone for project management knowledge in the profession (PMI, N.D.). With a few major areas of the profession (project, program, portfolio, and organization) "representing the foundation on which project standards and industry-specific extensions are built industry professionals look to the PMBOK as the authoritative source for project analysis" (PMI, n.d.). To implement industry-standard project practices to existing projects, a calculated approach to integration is needed. When organizations implement project management too rapidly into a culture that needs to adapt, the culture will most likely reject the standards (PMI, N.D.). Working Groups (WGs) are a relaxed, initial approach of integrating project management fundamentals into an organization, as templates (such as a formalized charter) can be created for the WG itself and standardized for the command later. After the WG members are assembled, the charter can be created using a PMI template as a guide or with knowledge from an experienced project manager (or personnel with PM experience). Once established, the WG now has a baseline document where standards are displayed, and the group members have been introduced to/educated on fundamental concepts of project management. Moving forward, the facilitator of the WG could eventually become the project manager of that project; however, separate

approval documents, along with an established position, would have to be initiated for the project manager to formally be assigned to the project.

To successfully implement project management, a tool such as Microsoft Project or a suite of tools like Atlassian should be integrated into the existing infrastructure. Although these resources are a financial investment, leaders need collaborative tool sets to be able to create schedules and manage efficiently. If no tools currently exist in the infrastructure, the creation of a Project Control Book in Excel (with multiple tabs for Schedules, Issues, Risks/Risk Register, and Plan) works as well.

The integration of project management needs to be an effort between management, vendors, and employees, but it should also initiate from executive leadership. If project management is not part of a strategic goal and/or command priority, it may not receive proper attention. Enforcement will need to come from executive leadership, as well as be enforced regularly by individuals with proper project management knowledge, training, and/or education.

Why is there a lack of project management in a specific Navy METOC command?

Within the federal government, an emphasis exists on program and project management that directly supports acquisition-related requirements—personnel are trained to lead projects and/or programs that have an acquisition or procurement focus. Outside of the acquisition workforce, personnel leading projects are not fully equipped with the necessary skill set and/or tools to successfully lead projects. Without a defined career path in project management as well as education/training in business and information technology/infrastructure within non-acquisition organizations, both civilians and military will continue to suffer and potentially fail at leading projects in an efficient manner. Project/program managers do not just require the training to lead a program, but they also need the foundational skills and business knowledge to complete projects (Langley, 2017). The government has identified, and acknowledged, that a gap exists in project management; however, that gap is mainly due to inadequate training for those specified positions (Langley, 2017). Most project/program managers are trained on the

acquisition process instead of in technical, business, or industry-related aspects (Langley, 2017). If more government organizations were to focus on not just the certification aspect of project management, but also the education, training, and experience, more well-rounded personnel would exist to fill niche positions. While obtaining a Project Management Professional (PMP) certification from the PMI is an outstanding achievement, without practical project management application experience, the credential will not prove fruitful (subject to auditing by PMI).

What are the benefits of incorporating project management into a specific Navy METOC command?

At one focused Navy METOC command, 80% of the projects sampled were overrun by either time or cost; in particular, one of those projects was extremely over budget, and it was not due to lack of organization by the project lead. More surprisingly, the overrun in cost was due to improper planning at the initial project stages and a failure to correctly scope the project's budget from the start. Given this statistic, no formalized project management was involved at the start of this project and the leader did not have the necessary tools. If project management had already been integrated into the organization, this leader would have been able to get multiple assessments from the start of the project, plan properly, obtain stakeholder sign-off for accountability, and have continuous oversight. Time and money would have been saved, and existing bids on this project would not have run more than \$2 million over budget. Improved communication with stakeholders would have potentially tracked these issues and allowed the project to be scrutinized to save dollars. Additionally, those managing this project would have had the ability to make stronger decisions based on data and focus, connected teams in a way that all personnel understood the objectives, and given the project manager an increased ability to foresee and manage risks (Teamwork, n.d.).

B. METHODOLOGY AND RESEARCH QUESTIONS

To organize my research, it was necessary to create research questions as well as the data collection methods used. The following explains how my research was collected, organized, and prepared based on PMBOK foundational aspects.

1. First Research Question

The first research question encapsulates where the gaps are in an existing sample set of projects when compared to PMBOK standards, and an analysis of those gaps.

- Where are the gaps in a sample set of METOC projects from a specific command, and how do they compare to industry-standard baselines?

2. Second Research Question

The second research question encapsulates how many of the actual PMBOK standards are implemented within a sample set of projects and should the benefit of formalized PMBOK methods be added what the benefit would be.

- How many of the PMBOK standards are implemented in sample METOC projects (from a specific command), and what would be the benefit if additional standards had been implemented?

3. Data Collection

For this research, I utilized a qualitative approach to collect and analyze the data. As my analysis involved projects at an existing Navy METOC command, communications with existing leadership were able to occur. Based on these communications, subject matter experts (SMEs) for each project were able to provide existing documentation for their projects. Using the PMBOK knowledge and process areas, I validated what each project did or did not have so that I could identify process gaps, strengths, and weaknesses for each project. For initial collection purposes, I used the software application known as Evernote for visual interpretation of thoughts, outlines, and raw data. I chose to use Evernote due to its unique ability to organize this data in a visual and customizable manner.

Using the PMBOK checklist as a guide, I created a template of this checklist and compared each project against it. For example, does this project have an identified project sponsor, charter, and assumption log? After this checklist was completed, a thorough and detailed review of each project's documentation was needed; to fully assess the strengths and weaknesses of each, an in-depth knowledge of each project needed to occur.

With the lack of project management existing throughout a Navy METOC command, I began this research motivated by a noticeable gap. While examining this topic, it was relevant to explore not only an under-researched topic but also to establish a cause-and-effect relationship. To meet these goals, I utilized qualitative data that depicted the Navy's efforts to create project managers via education/training, the lack thereof, and specified quantitative data at an existing Navy METOC command. Using past/completed projects, I was able to display how they were either over schedule or over budget due to the lack of formalized project management. To preserve the integrity of the command and its personnel, I gathered descriptive data from past/completed projects. I utilized virtual/online resources and references.

Regarding my analysis of existing data for past and present projects, I obtained historical Navy METOC command-based information on projects as well as source existing documentation from specified projects. Through MS Teams and e-mail communications, I obtained project documentation for analysis. Selection of the projects was highly challenging, as the focus was on selecting projects that displayed a wide depth of knowledge areas (i.e., technology, science, and meteorology). Despite the large gap in articles and/or knowledge as to why a specific Navy METOC command does not possess a formalized project management foundation, I efficiently utilized the limited segments of information that were published to support this analysis.

In conclusion, one major contribution to my research was the ability to gather project documentation from a METOC command. To establish a baseline for analysis, I contacted multiple SMEs, obtained documents, and conducted interviews for clarification. Additionally, companies and websites that have published white papers and articles as to why project management practices are fundamental were instrumental in this research.

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II. BACKGROUND

Project management standards were formulated in the 1950s, yet management of complex projects began with the construction of the Great Pyramid of Giza in 2570 BC (Haughey, 2014). Despite a lack of documentation, some ancient records indicate management over each of the four faces of the Great Pyramid that supported areas of planning, execution, and control (Haughey, 2014). Moving forward, the Great Wall of China was yet another project with historical data showing organization into groups with management over the project (Haughey, 2014). With the Gantt chart being developed, the critical path method invented, and the Department of Defense (DOD) mandating a work breakdown structure (WBS) approach (from 1917–1962), the PMI was launched in 1969 to promote project management as an industry-accepted profession (Haughey, 2014). Introduced by the PMI in 1987, the PMBOK was named a standard by the American National Standards Institute (ANSI) in 1998, paving the way for methods such as agile to become introduced in 2001 (Haughey, 2014).

Today, project management is value-added to any organization when it is done correctly. With benefits such as allowing teams to focus on the task at hand without worrying about budget, time, or managing tasks, personnel are free to execute toward the best path of success (Teamwork, n.d.). Although project managers and integration of project management can be costly, the long-term benefits to an organization and its people are extremely visible (Teamwork, n.d.). To understand all the intricacies surrounding project management, my research had to first display the various levels of the project life cycle.

The following is a description and history of each project that was analyzed for this research, as well as the scope of each.

A. DESCRIPTION/HISTORY OF THE PROJECT (PROJECT A)

Within a specific Navy METOC command, needs of the Navy are supported by providing operational weather models that transmit data throughout the fleet. However, to run these weather models around the clock, the need for a solid infrastructure exists. In

2016, a lack of power to operations at one specific Navy METOC command was identified. Because the Navy recognized that this Navy METOC command's mission was extremely vital and the requirement to support 24/7 operations existed, Project A was initiated. For a period, the project manager in charge of Project A was executing their duties as a manager while also running Project A in parallel; however, Project A became large enough that the project manager was relocated to another department, where they were solely allocated to manage Project A.

The scope of this project included replacing infrastructure elements such as fire suppression systems, power generators, and flooring. As the DOD's acquisition process required that government-approved vendors have equal opportunity to bid, the current estimate for this project is approximately \$2 million over budget (fiscal year [FY] 2021); despite multiple commands working diligently to fund this effort, the main issue was scope creep due to the bid cost being far higher than the original estimates.

B. DESCRIPTION/HISTORY OF THE PROJECT (PROJECT B)

In 2017, an analysis was conducted to determine which systems were reaching critical storage levels; because specific operational data was being run and stored continuously, there was a high probability for equipment failure/outages. The project timeline was approximately 12 months and required the procurement of physical and virtual assets. Project B had one project manager, and additional resources were requested via the necessary department head; however, the project manager indicated was also working on other projects/daily tasks in parallel with Project B.

Upon completion of testing, new assets had to be put into operation while the end-of-life (EOL) assets were taken offline. Due to the 24/7 nature of the Navy METOC command, extreme management, coordination, communication, and project management were necessary to minimize operational impact. The product was a fully deployed and tested database upgrade solution the operations department could utilize to meet mission needs.

C. DESCRIPTION/HISTORY OF THE PROJECT (PROJECT C)

In 2019, a capability was requested that would allow warfighters to run an application with faster turnaround times than the existing capability, which took a long time to run. By executing this capability, local computational resources would be freed up for short-term requests that needed immediate and quick action. Because warfighters use this application to generate data that supports the mission, this new capability was introduced and estimated to be in use for years. With a team of four to 10 working in parallel on this project and with others throughout the command, the lead government personnel on Project C were also managing a few other projects (in addition to their daily/operational work).

Throughout a rigorous series of tests, Project C met all required critical elements to continue and be placed into initial operational capability (IOC). Project C had eight personnel, with one chair and one lead, to complete the project; however, all eight personnel also had other projects/daily tasks that they were executing in parallel with Project C.

D. DESCRIPTION/SUMMARY OF THE PMBOK PROCESS GROUPS

According to the PMBOK, which is an industry-standard guide, there are five main process groups for projects (Project Management Institute, 2021):

- **Initiating:** This step is required to start a new project or project phase. This is the stage during which a project is started, formally approved, and associated with a project manager. This group includes two main processes, which are Developing the Project Charter and Identifying the Project Stakeholders (Figure 2, Prakash, 2017).
- **Planning:** This step involves processes related to the completion of any projects and their associated tasks. This is the stage during which the total scope of the project is determined, objectives are established, and courses of action are developed. A great deal of time should be spent on this stage to eliminate any rework (Figure 2, Prakash, 2017).
- **Executing:** This step is where the planned projects/tasks are completed. This stage uses the most time and resources and may cost more than the other stages (Figure 2, Prakash, 2017).
- **Monitoring and Controlling:** This step is where the project is tracked and reviewed, the health of the project is examined, quality control is

completed, and any changes to the plan are identified (Figure 2, Prakash, 2017).

- **Closing:** This step is where the project is closed out, documentation is signed off, resources are released, costs are finalized, and final reports/products are delivered to the stakeholders (Figure 2, Prakash, 2017).

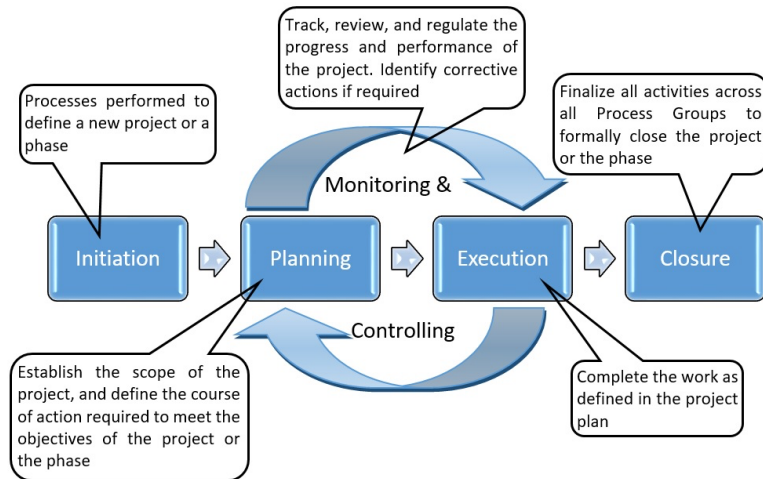


Figure 2. The project process groups. Adapted from Prakash (2017).

Project management process groups are part of the project life cycle, which includes a series of intricate steps necessary to efficiently execute a project from start to finish (Project Life Cycle, 2021). Within the five process groups are 10 knowledge areas; within those knowledge areas are a multitude of processes, inputs, outputs, tools, and techniques that allow personnel to lead projects with a proper foundation.

E. DESCRIPTION/SUMMARY OF THE PMBOK KNOWLEDGE AREAS

While there are only five process groups, there are 10 knowledge areas that fall into each process group. Knowledge areas include specific inputs, outputs, tools, and techniques for each area, meaning that something tangible must feed into the process and come out because of the process, using specific tools/templates and methodologies.



Figure 3. The major knowledge areas. Adapted from Project Manager Society (2021).

The 10 knowledge areas (Figure 3) are:

- **Integration Management**—Identifying and defining the work in the project and integrating changes (six processes)
- **Scope Management**—Defining scope, requirements, work, breakdown structures, baselines, and managing scope (six processes)
- **Time Management**—Estimating how long tasks will take, as well as putting tasks in order, allocating resources/labor hours, and creating the overall schedule (seven processes)
- **Cost Management**—Creating the budget baseline, estimating, and managing project costs/initial bids (four processes)
- **Quality Management**—Planning quality deliverables, determining quality analysis and criteria, and monitoring/fixing any issues (three processes)
- **Human Resources (HR) Management**—Defining how HR is created, secured, and managed (four processes)
- **Communications Management**—Planning how to communicate with project team members and stakeholders and how to control information flow (three processes)
- **Risk Management**—Managing risks, mitigations, controls, and initial identification (six processes)
- **Procurement Management**—Planning and acquiring assets needed to complete the project, managing/controlling installation, and ensuring assets are correct (four processes)

- Stakeholder Management—Managing all personnel affected by the project, including sharing communications, expectations, and boundaries (Project Manager Society, 2021)

While my research does not go into the multitude of processes within each of the process groups and/or knowledge areas, there is a great deal of processes for which project leaders need to account. Although PMs, leaders, and managers may not be experts in all these process groups and/or knowledge areas, the education and baseline tools are available for those who wish to utilize them. Having attempted to manage complex projects prior to being educated about PMI and the PMBOK, personnel may succeed but by a thin line and with additional help. This research developed a checklist comprised of the five process areas and 10 knowledge areas, for project personnel to use to analyze whether the basic principles of project management apply. Projects today may not use all these tools/processes, as they may be executed by other departments or personnel, but individuals can still work to track execution in some of these areas.

III. LITERATURE REVIEW

Looking at a non-acquisition organization, there is a significant lack of trained and formalized project management personnel in a specific Navy METOC command within the DOD. Though project management positions are seen as trivial, existing personnel are being stretched to their limits managing projects with little or no training, education, and experience. Valuable personnel are leaving positions due to increased stress levels, lack of quality of life, and stretched bandwidth. Although active-duty personnel rotate in and out of positions every few years, civilian employees, with their extensive training and knowledge, remain at commands. If the DOD wants to retain its civilian employees long-term, it should focus on and invest in project management positions, train, and educate existing employees on project management, and establish a Project Management Office (PMO).

In this literature review, I discuss the need for PMs and industry-standard practices, the pros and cons of both project managers and project management-related work, and the rising perception that project managers and associated practices are simply a waste of money. My research within this literature review is focused around supporting recommendations for how projects are executed in a specific Navy METOC command.

A. THE NEED FOR PROJECT MANAGERS AND INDUSTRY-RELATED PRACTICES

Large organizations such as Facebook and Google have project managers in almost every department, so why does the DOD have hardly any in specific commands? Project management is becoming extremely essential to organizational success; if the project has a lot of tasks with multiple people involved that simply means there is more room for chaos (Brown, 2021). One of the primary functions of project management is to clear the path of any confusion by outlining a vivid plan and process from start to finish (Brown, 2021). With the added benefits of a project manager, discipline can be utilized to ensure that the schedule is followed, delays are mitigated, collaboration occurs, and resources are maximized (Brown, 2021). A dedicated project manager can keep specific

control of costs for that project and manage the quality of the project, process, and tangible product from beginning to end, as well as provide continuous and focused oversight (Brown, 2021).

For organizations that have a few projects annually, one failed project may not seem like a large issue; however, for organizations that have simultaneous, ongoing projects at any given time (such as the government, Navy, and a METOC command), the “importance of project management increases manifold” (Brown, 2021). More than ever, project deliverables must be tracked, as the lack of project management can lead to chaos and create high failure rates, a lack of work/life balance, a waste of resources, poor quality, and high risks (Brown, 2021). Even in the government, competition exists to continuously provide high-end products to sailors in support of the overall mission. On this note, agencies are constantly seeking the best products and providers for those services. Success is highly likely when innovation, creativity, and project management are included, as project management helps complete tasks systematically (Majeed, 2012).

Based on a report from the Economist Intelligence Unit in 2009, approximately 80% of leadership personnel agree that project management practices ensured their companies stayed in the competitive market during a time of economic hardship (PMI, 2010). With a focus on project management in a Navy METOC organization, the command can also choose to establish a PMO. Having a PMO means there is a centralized department within the organization that oversees, determines, and categorizes projects for the organization. Based on a study completed in 2010, the number of failed projects decreased by 31%; additionally, approximately 30% of projects stayed under or near their budget, had an increase in productivity by 21%, and provided an overall cost-savings to companies by approximately \$567,000 for each project (PMI, 2010).

Project managers are key personnel who ensure that requirements for delivery are met. Additionally, scope must be adhered to, engagement with stakeholders must occur, and translation of technical documentation into non-technical updates for stakeholders are all parts of proper project management. Because subject matter experts are often executing the work, leaders who transpose their SMEs into project managers as well are asking them to take on two full-time roles.

With the rise and fall of nationwide health situations such as the COVID-19 pandemic, overall trends (such as a greater dependency on teleworkers) create the need for project management. Project managers have the unique ability to work both from a physical office and remotely as they help to manage people in many facets of an organization. Because of COVID-19, it is estimated that up to 50% of U.S. workers are now telecommuting. This will most likely continue despite the pandemic eventually subsiding (Stobierski, 2020). Collaborative tools such as Microsoft Teams are gaining even more momentum, as they allow workers located anywhere on the globe to edit and review a document in real time. With the added flexibility of teleworking, personnel are now improving their work-life balance, which also means that they are multi-tasking on the home front while working. As such, project managers are needed even more to keep teleworkers on task at home while faced with other duties such as caring for family members (Stobierski, 2020).

B. POSITIVES AND NEGATIVES OF PMS AND PM-RELATED WORK

There are certainly both positive and negative aspects to having project managers, PMOs, and the work that surrounds the project management practice. During times of economic crisis, funds are stretched thin, jobs are lost or discontinued, and companies must analyze existing processes to trim back on unnecessary items. However, it is unrealistic to think that every department head will not only continue to manage their department and their department's projects, cut costs, and continue to find ways to help the command—all without support.

The positives of implementing a PMO, training project managers, and getting a project management focus set up in an organization are long- and short-term: the project management culture is introduced, personnel see that the organization is taking project management seriously, and the burden of a too-heavy workload is lifted off the shoulders of many employees. A PMO and the organization set criteria for what is to be categorized as a project and what is not, and projects are analyzed from this baseline. For an executable that might only take 10 minutes by one person, this most likely would not qualify as a project that requires a project manager, charter, team, etc. However, for a

small-scale project to meet the criteria to be managed by a PMO, it would need to have multiple elements, departments, personnel, and tasks to be coordinated by a focused point of contact. In short, managing projects takes focus and time; a PMO would be able to support appointing project managers to meet the needs of the organization without necessarily placing the burden on existing personnel.

There are negatives to implementing a PMO, training project managers, and working to integrate formalized project management practices into an organization—specifically, time, money, and resources. An organization must rack/stack its priorities for funding, and this means that implementing project management must be included on that list (or else, get funding from another source). Additionally, a champion must be appointed to lead the integration effort, establish the PMO and its practices, and determine how the staffing will be executed (PMO lead, analysis, project managers, etc.). Overall, the implementation effort will take time away from existing resources, as these personnel would have key insights to contribute. For some organizations, there is no direct need to implement project managers or a PMO when they can simply use existing personnel.

Project managers focus on implementing projects, along with all the communication, documentation, and management that accompanies it. For existing personnel to shoulder this load means that they will spend significant time (and money) making schedules, updating tasks, and being a point of contact when project-related tasks go wrong. While appointing existing personnel to manage projects can save money, there is a good chance it will exhaust those personnel in the long term. Quality of life is often linked to tenure in employees, so some of the organizations might find they are losing experienced personnel who are seeking an improved quality of life. Organizations need to determine if the quality of life of their existing personnel is more important than spending resources on additional personnel to support mission-essential needs.

C. DEBATES ABOUT PROJECT MANAGERS AND PRACTICES BEING A WASTE OF MONEY

It becomes tough to estimate how costly hiring a project manager and integrating project management practices into an organization can be. While it entirely depends on the organization, hiring a project manager for a salary of at least \$100,000 (plus benefits) as well as integrating practices, education, Standard Operating Procedures (SOP's), and so forth into the organization could be a hefty initial investment. Prime examples already exist throughout the DOD today, in which managers are leading their own projects, teams, a department, and a budget and are succeeding. However, are these individuals using proper, industry-standard business practices? Are they succeeding in meeting their timelines and delivering projects to higher leadership on time and under budget? The establishment of a PMO is seen as consuming a great deal of resources, but if a Navy METOC command makes implementation a focus, the command will see results.

With leaders asking questions such as “Why can't I use an engineer as a project manager?” the expense of hiring an additional person to manage a project may seem like a waste of project funds. However, while engineers can become project managers, doing so will not only distract them from executing the project to the fullest of their abilities, but also open the door for many possible mishaps (PM Problems, 2021). While engineers and other jobs may overlap with those of a project manager, having expert knowledge in a field is only a supplement to being a project manager. Project managers often have knowledge in business, construction, information technology, acquisition, procurement, and so forth to provide a well-rounded approach to completing a successful project. An engineer must also be able to provide routine updates to stakeholders of all levels; complete the necessary project management documentation (charter, schedule, risk management plans, etc.); handle unhappy clients and personnel; manage resources, contractual disputes, and external communications from commands regarding project status/funding; complete procurement; manage a budget; and complete an engineer's regular responsibilities (PM Problems, 2021). Having a project manager separate from an SME's job means that the SME can focus on the task at hand without the extra work, avoid burnout and potential job loss, and be able to handle what they do best (PM

Problems, 2021). If companies use existing personnel such as engineers to manage their projects, those personnel also must deal with managing the people on the project (who may not respect them and whom they have no direct authority over). In turn, this means the engineer is managing multiple personalities on a project while trying to oversee technical and administrative tasks versus completing engineering work while a project manager handles the rest (PM Problems, 2021).

Despite the limited debates that exist today, some still think that project managers are a waste of money. However, consider a modern-day approach to any household issue, such as expanding a home. Some people do not want to buy another home and want to just add on to what they already have. Managing the updating of a kitchen, wrap-around patio, bathroom, or other areas might soon require a planner, interior designer, and maybe a project manager. Homeowners could try to manage the project themselves, but around a household, work, children, and other commitments, one needs to examine if this sort of time exists. Additionally, without the proper knowledge, commitment, and attention to detail that the project itself requires, it makes the most sense to hire a construction project manager (Fyffe, 2014).

There is a specific skill set that project managers can bring to an organization. Although existing personnel can possess these skills, project managers can think forward toward an organization's needs and past the individual tasks at hand. While personnel engulfed in project completion may not see the bigger picture, it is the job of the project managers to see ahead to identify risks, issues, and potential problems to mitigate them ahead of time. If an organization were to use existing personnel to manage projects, that personnel may not have the bandwidth that a focused project manager has because personnel are also potentially managing a department, people, teams, schedules, and other priorities.

Currently, there is not enough evidence present today that informs companies about project managers and/or PMOs being a waste of money—most, if not all, evidence points to how incorporating project management into an organization is eventually a good choice (Saad, 2019). However, it does take time, effort, priority by higher leadership, and

a champion to move the entire process forward. If the organization does not have all these characteristics in existence, the integration most likely will not occur.

In conclusion, one major contribution to my research was the ability to gather project documentation from a METOC command. To establish a baseline for analysis, I contacted multiple SMEs, obtained documents, and conducted interviews for clarification. Additionally, companies and websites that have published white papers and articles as to why project management practices are fundamental were instrumental in this research. There were significant gaps in opposing arguments and documentation related to this research topic. I was therefore unable to provide a balanced argument, as opposing research simply does not exist.

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IV. DATA AND ANALYSIS

Within the PMBOK, there are five overarching project process groups and 49 project knowledge areas. To effectively analyze each project and how the PMBOK applies to each, I executed an in-depth comparison of both process groups and knowledge areas to each project. Furthermore, my research depicts how or if each project is currently utilizing project management practices, how I would apply PMBOK principles to the gaps in each project and provides opinions/suggestions on the potentially improved outcomes. Overall, any scores over 50% were highlighted to show a good amount of project-related documentation.

A. APPLICATION OF PMBOK TO PROJECT A

To compare PMBOK processes against Project A, I utilized a blank template (Figure 5); using the PMBOK template as my guide, I color-coded each PMBOK area where some type of documentation existed from the sample set of research. For example, if a project had documentation that could pertain to a scope or charter, that part of the PMBOK process template was color-coded as green; if it did not exist, it was color-coded as red. To compile a summary of percentages (Figure 4), a total average was taken based on green and red colors, which can be seen in Figure 4.

To address my first research question, my analysis executed against Project A determined that 51% of the project documentation served as a PMBOK or industry-standard equivalent, and 49% had no project documentation (see Figure 4). For each of the five project process groups, my research showed that most processes where project documentation existed were in the Planning and Executing phases. From the summary below, the highlighted areas in yellow are where Project A scored the highest and had the most documentation. For the areas left unhighlighted, these are the areas where Project A lacked the most documentation.

	INITIATING	PLANNING	EXECUTING	MONITOR/ CONTROL	CLOSING
Used	0%	63%	40%	50%	1%
Not Used	0%	38%	60%	50%	0%

Figure 4. PMBOK Project Process Groups for Project A

The key areas that were not focused on for Project A and/or had no project documentation included Scope, Quality, Resource, Communications, and Stakeholder Management (see Figure 5). Had Project A included time spent in the project knowledge area of Scope Management, a proper collection of requirements, allocation of resources, scope, and work breakdown structure would have been initially completed. Project A currently has an overrun of time and, particularly, cost, at an estimated \$2,000,000 over budget; to this note, if more time had been spent in the initiating and planning process groups, the overrun could have been avoided.

Project A did not have industry-standard project management documentation, but many of the PMBOK process groups and knowledge areas were represented in the project documentation that was created. A master file consisted of data in the knowledge areas of Integration, Schedule, Cost, Risk, and Procurement Management (see Figure 5). Overall, Project A used a fair amount of project management principles to cover the bare minimum of documentation, but I found significant gaps. To apply project management and PMBOK principles to the gaps, a plan would need to incorporate research for Project A in the areas of Scope, Quality, Resource, Communication and Stakeholder Management (see Figure 5). To integrate these elements into Project A, a plan for scope determination and statement and/or a plan to control scope would need to occur. Additionally, quality control, resource identification, and allocation plans would need to be created and approved. Lastly, a communication and stakeholder matrix could be intertwined in a simplistic format that shows the frequency and type of communication and identifies the stakeholders associated with each.

	Process Groups				
Knowledge Areas	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Integration Management	Develop Project Charter	Develop Project Management Plan	Direct and Manage Project Work	Monitor and Control Project Work	Close Project or Phase
			Manage Project Knowledge	Perform Integrated Change Control	
Scope Management		Plan Scope Management		Validate Scope	
		Collect Requirements		Control Scope	
		Define Scope			
		Create WBS			
Schedule Management		Plan Schedule Mgt		Control Schedule	
		Define Activities			
		Sequence Activities			
		Estimate Activity Durations			
Cost Management		Plan Cost Mgt		Control Costs	
		Estimate Costs			
		Determine Budget			
Quality Mgt		Plan Quality Mgt	Manage Quality	Control Quality	
Resource Mgt		Plan Resource Mgt	Acquire Resources	Control Resources	
		Estimate Activity Resources	Develop Team		
			Manage Team		
Communications Mgt		Plan Communications Mgt	Manage Communications	Monitor Communications	
Risk Management		Plan Risk Mgt	Implement Risk Responses	Monitor Risks	
		Identify Risks			
		Perform Qualitative Risk Analysis			
		Perform Quantitative Risk Analysis			
		Plan Risk Responses			
Procurement Mgt		Plan Procurement Mgt	Conduct Procurements	Control Procurements	
Stakeholder Mgt	Identify Stakeholders	Plan Stakeholder Engagement	Manage Stakeholder Engagement	Monitor Stakeholder Engagement	

Figure 5. Analysis of Project A

To address my second research question, if all the PMBOK and project management principles, industry-standard baseline documents, and processes were applied, Project A would have seen a significant decrease in the amount of cost overrun. Additionally, Project A would have had a defined scope for the project that the project manager would have been able to refer to (or, if another project manager was to take over the project, the new project manager would have that for reference). In the government, there are compliance principles and standards set in place, so quality management would become a lighter portion of the documentation. However, the need for resource identification, allocation, and management is high so that the project manager could ensure that these resources are approved to be dedicated to this project. A communication and stakeholder blended matrix are recommended since this matrix would improve the expectations from stakeholders regarding regular reporting. Until the past year, Project A was not on regular reporting methods for the entire command and was reporting on an ad-hoc basis. Currently, there are updates sent to all command employees as well as updates provided regularly at leadership/all-hands meetings.

B. DATA APPLICATION OF PMBOK TO PROJECT B

To compare PMBOK processes against Project B, I utilized a blank template; using the PMBOK template as my guide, I color-coded each PMBOK area where some type of documentation existed from the sample set of research. For example, if a project had documentation that could pertain to a scope or charter, that part of the PMBOK process template was color-coded as green; if it did not exist, it was color-coded as red. To compile a summary of percentages (Figure 6), a total average was taken based on green and red colors, which can be seen in Figure 4.

To address my first research question, my analysis executed against Project B determined that 86% of the project documentation served as a PMBOK or industry-standard equivalent, and 14% had no project documentation. (See Figure 6). For each of the five project process groups, my research showed that the processes in which project

documentation existed were nearly equal in all phases. From the summary below, the highlighted areas in yellow are where Project B scored the highest and had the most documentation. For the areas left unhighlighted, these are the areas where Project B lacked the most documentation.

They key areas of Project B that I did not focus on and/or had no project documentation for included Cost, Budget, and Procurements (see Figure 7). Had Project B included time spent in these areas, the entire project would have been up to PMBOK standards. Because another department managed the procurement process for this project, the project lead/manager did not find it necessary to plan, conduct, or control procurements (see Figure 7). Additionally, as the budget/cost was fixed depending on the procurements, decisions from leadership, as well as resource allocation that was pre-existing (utilizing existing employees versus hiring additional ones or contractors), the project lead/manager did not find the areas of plan cost management, estimate costs, determine budget, or control costs necessary to track (see Figure 7).

	INITIATING	PLANNING	EXECUTING	MONITOR/ CONTROL	CLOSING
Used	100%	83%	90%	83%	100%
Not Used	0%	17%	10%	17%	

Figure 6. PMBOK Project Process Groups for Project B

Project B did not have industry-standard project management documentation, but many of the PMBOK process groups and knowledge areas were represented in the project documentation that was created. As the project manager/lead had previously taken some project management courses, the manager/lead had some experience in industry-standard practices. Overall, Project B used a great deal of project management principles to cover the documentation needed, and this was a well-done project. To apply project management and PMBOK principles to the gaps, a plan would need to incorporate research for Project B in the areas of Cost, Budget, and Procurements (see Figure 7). To

integrate these elements into Project B, a variety of cost estimates and proposals, the total budget, and a procurement tracker would need to be created and utilized. Lastly, stakeholders and leadership would be able to view real-time estimates from vendors and a baseline and total budget, and the project manager/lead would have the accountability from leadership to sign off on that budget. Should the project manager/lead go under/over the budget, that document would provide backup to account for spending and planning.

To address my second research question, should all the PMBOK and project management principles, industry-standard baseline documents, and processes were applied, Project B would have been a model case to support the need for project management in the organization. Unfortunately, the manager/lead in charge of this project has left the command; while the author of this research is unable to speculate as to the reasoning, there is some belief that the multiple job duties (to include managing projects, a department, personnel, etc.) provided an uneven quality of life balance. Because there was not a dedicated project manager/lead in this position to manage/lead the project, or at least support the project and assist with documentation, the manager/lead in charge could have very well left due to work burnout.

	Process Groups				
Knowledge Areas	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Integration Management	Develop Project Charter	Develop Project Management Plan	Direct and Manage Project Work	Monitor and Control Project Work	Close Project or Phase
			Manage Project Knowledge	Perform Integrated Change Control	
Scope Management		Plan Scope Management		Validate Scope	
		Collect Requirements		Control Scope	
		Define Scope			
		Create WBS			
Schedule Management		Plan Schedule Mgt		Control Schedule	
		Define Activities			
		Sequence Activities			
		Estimate Activity Durations			
	Develop Schedule				
Cost Management		Plan Cost Mgt		Control Costs	
		Estimate Costs			
		Determine Budget			
Quality Mgt		Plan Quality Mgt	Manage Quality	Control Quality	
Resource Mgt		Plan Resource Mgt	Acquire Resources	Control Resources	
		Estimate Activity Resources	Develop Team		
			Manage Team		
Communications Mgt		Plan Communications Mgt	Manage Communications	Monitor Communications	
Risk Management		Plan Risk Mgt	Implement Risk Responses	Monitor Risks	
		Identify Risks			
		Perform Qualitative Risk Analysis			
		Perform Quantitative Risk Analysis			
		Plan Risk Responses			
Procurement Mgt		Plan Procurement Mgt	Conduct Procurements	Control Procurements	
Stakeholder Mgt	Identify Stakeholders	Plan Stakeholder Engagement	Manage Stakeholder Engagement	Monitor Stakeholder Engagement	

Figure 7. PMBOK Project Process Groups for Project B

C. DATA APPLICATION OF PMBOK TO PROJECT C

To compare PMBOK processes against Project C, I utilized a blank template (Figure 9); using the PMBOK template as my guide, I color-coded each PMBOK area where some type of documentation existed from the sample set of research. For example, if a project had documentation that could pertain to a scope or charter, that part of the PMBOK process template was color-coded as green; if it did not exist, it was color-coded as red. To compile a summary of percentages (Figure 8), a total average was taken based on green and red colors, which can be seen in Figure 4.

To address my first research question, my analysis executed against Project C determined that 33% of the project documentation served as a PMBOK or industry-standard equivalent, and 67% had no project documentation (see Figure 8). For each of the five project process groups, my research showed that most processes in which project documentation existed were in the Initiating and Executing phases (see Figure 9). From the summary below, the highlighted areas in yellow are where Project C scored the highest and had the most documentation. For the areas left unhighlighted, these are the areas where Project C lacked the most documentation.

The key areas that were not focused on for Project C and/or had no project documentation included Integration, Scope, Schedule, Cost, Quality, Resource, Communications, Risk, and Procurement Management (see Figure 9). Had Project C included time spent in the initial areas of Integration, Scope, Schedule, and Cost, a proper project management plan could have been created, approved, and authorized by leadership. To perform quality control checks along the way for this project's code, a Quality Management Plan should have been created to depict how code review would have occurred over time. Due to the software and user-based creation of Project C, a review was necessary prior to implementation into operations.

	INITIATING	PLANNING	EXECUTING	MONITOR/ CONTROL	CLOSING
Used	50%	25%	50%	33%	0%
Not Used	50%	75%	50%	67%	0%

Figure 8. PMBOK Project Process Groups for Project C

Project C did not have industry-standard project management documentation, and many of the PMBOK process groups and knowledge areas were not represented in the project documentation that was created. Project C lacked proper timelines and work breakdown structures and was informal due to the tight-knit nature of the project as well as fast-tracked timelines. Overall, Project C had a great deal of gaps to which proper documentation should have been applied. To apply project management and PMBOK principles to the gaps, a plan would need to incorporate research for Project C in the areas of Integration Management, Scope Management, Schedule Management, Cost Management, Quality Management, Resource Management, Communications Management, Risk Management, and Procurement Management (see Figure 9). To integrate these elements into Project C, the first step would be to create a master Charter and/or Project Management Plan, which would include information on scope, stakeholders, initial timeline, and additional items based on industry-standard documentation. Next, plans for Schedule and Activities, Cost/Budget, Quality Management, Resource Allocation and Team Development, Communications Management, a Risk Register with matrix/mitigations, Issue Log, and Procurement Tracker would need to be created. Despite all these plans sounding daunting, trackers could exist within a Master Project Control Book consisting of tabs for each plan with links to the Word documents of the actual plans themselves. Lastly, some form of Closure documentation could be established for stakeholder sign-off and to release resources as well as close off any project-related spending.

To address my second research question, if all the PMBOK and project management principles, industry-standard baseline documents, and processes were applied, Project C would have been able to provide more updates to leadership, be tracked in terms of resource costs, and not put all the project work onus on the main project lead/manager. Although the project lead/manager did identify various personnel for each overall part of the project, these were annotated in single line items and not effectively tracked with start/end dates. Additionally, Project C would have a defined scope for the project that the project manager would be able to refer to (or, if another project manager was to take over the project, the new manager would have that for reference). Lastly, prioritization within the command could have taken place at a higher level, and leadership could have had increased visibility into the areas of retention and where resources were lacking/overrun, potentially reassigned priorities to the project (or off the project) and been able to juggle the various needs of the mission.

D. SUMMARY

In conclusion, I assessed 3 projects that varied in adherence to their application of PMBOK standards. From the data displayed below, Project B did best overall vice Project A or C (Figure 10). Project A was the worst at delivering on time, on/under budget, and within scope; additionally, Project C lacked in execution documentation.

In the case of Project A, this project did not adhere to most PMBOK standards; as such, this project initially resulted in an overrun of project cost, scope, schedule, and performance. While Project B did have a lot of great documentation, essential pieces were lacking resulting in incomplete records; as such, the command is unable to use this project for a complete, historical depiction of the project efforts. For Project C, documentation was in disarray, resulting in only a few areas showing evidence of PMBOK standards.

	Process Groups				
Knowledge Areas	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Integration Management	Develop Project Charter	Develop Project Management Plan	Direct and Manage Project Work	Monitor and Control Project Work	Close Project or Phase
			Manage Project Knowledge	Perform Integrated Change Control	
Scope Management		Plan Scope Management		Validate Scope	
		Collect Requirements		Control Scope	
		Define Scope			
		Create WBS			
Schedule Management		Plan Schedule Mgt		Control Schedule	
		Define Activities			
		Sequence Activities			
		Estimate Activity Durations			
		Develop Schedule			
Cost Management		Plan Cost Mgt		Control Costs	
		Estimate Costs			
		Determine Budget			
Quality Mgt		Plan Quality Mgt	Manage Quality	Control Quality	
Resource Mgt		Plan Resource Mgt	Acquire Resources	Control Resources	
		Estimate Activity Resources	Develop Team		
			Manage Team		
Communications Mgt		Plan Communications Mgt	Manage Communications	Monitor Communications	
Risk Management		Plan Risk Mgt	Implement Risk Responses	Monitor Risks	
		Identify Risks			
		Perform Qualitative Risk Analysis			
		Perform Quantitative Risk Analysis			
		Plan Risk Responses			
Procurement Mgt		Plan Procurement Mgt	Conduct Procurements	Control Procurements	
Stakeholder Mgt	Identify Stakeholders	Plan Stakeholder Engagement	Manage Stakeholder Engagement	Monitor Stakeholder Engagement	

Figure 9. PMBOK Project Process Groups for Project C

A	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Used	0%	63%	40%	50%	1%
Not Used	0%	38%	60%	50%	0%

B	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Used	100%	83%	90%	83%	100%
Not Used	0%	17%	10%	17%	

C	INITIATING	PLANNING	EXECUTING	MONITOR/CONTROL	CLOSING
Used	50%	25%	50%	33%	0%
Not Used	50%	75%	50%	67%	0%

Figure 10. Summary of three projects and their amount of project documentation.

Based on this research, I conclude that all projects should have been included in an overall monthly update to leadership from the department head. To be included, regular updates, percentage completion, risks and/or issues would have to have been able to be reported, and without the proper project documentation, this could not have been tracked. Additionally, with a lack of start/end timeframes for each resource allocated on each task, it is extremely difficult to project how much time these tasks will take in the future when executing similar projects. With the amount of turnover that a command in Navy METOC faces (between contractors being cut from contracts, government personnel leaving for various reasons, and military personnel rotating out of positions every 2–3 years), when a government civilian/contractor leaves, they could potentially take years or decades worth of experience with them, leaving a large gap in a particular skill set. To this extent, it is important to have as much project documentation as possible to be able to track what was done in the past, what could be improved upon, the personnel with the knowledge/skill set to work on it (and if they are still there), how long tasks took on various timelines, etc. Lastly, when a similar project comes along in the future, the project personnel assigned to that project would not have to re-create documentation or spend valuable time, energy, and resources researching data.

When it comes to the individual projects, each project could be improved upon. Project A lacked some of fundamental formal project documentation as well as an upfront personnel focus that could have mitigated the cost overruns from the beginning. Proper and successful project management should have a project manager assigned from the start to the finish of that project to ensure consistency throughout the project's life cycle. Unfortunately, for Project A, the project manager did not have a sole focus on Project A until after the project had already been started. Because of this, additional duties of a project manager, department head, etc., were intertwined with leading this large-scale project and perhaps were a stretch of the project manager's bandwidth. Once the project manager was solely allocated to focus on Project A, there was an increase in efficiency, planning, attention to detail, and overall project quality enhancement.

Project B lacked only a few sets of documentation. I believe that had this project possessed the remainder of the baseline documents in some fashion, it could have been a model project for templates that a potential PMO in the command could have utilized. However, the owner/lead of this project chose to seek employment elsewhere, and despite this resource's efficiency and effectiveness on this project was unable to maintain an acceptable work/life balance. While I do believe that having additional personnel, who are not department managers or employees, to act as project managers/leaders on projects is beneficial, it is understood that this comes with great cost. However, when it comes to retaining top talent, skill, and employees who possess the motivation to continue working with extended bandwidth, some support/relief must be provided. Despite a PMO not being established, additional project support (such as personnel to provide templates and historical information, host meetings, create timelines, and/or submit routine updates to leadership) could have alleviated some of the pressure on this project lead/manager. Because the project lead/manager also held prior classroom experience in project management, they possessed the skill set to execute high-quality projects.

Project C lacked a great deal of project documentation. The project manager/lead did not possess formalized project management experience or knowledge, and I believe that with the support of a knowledgeable resource (external to this person's department), more project formalization could have occurred. While often it is necessary that the

person with the most experience executing on the project should lead it, there is also the lack of project management/PMBOK-related fundamentals that does not round out that person's skills. For example, if you have an engineer well-versed in cybersecurity, it will make the most sense for them to lead that project to completion. However, if that engineer does not have any project management knowledge, such as how to construct a schedule, allocate resources, or approach management for signoffs, this could result in a serious misallocation of resources, to include time, money, and effort. Looking at Project C, I believe that the project manager/lead did not possess a great deal of project management knowledge, and this was detrimental to their success in creating project-related documentation.

Overall, the education of not only department heads/supervisors, but also SMEs, in project management fundamentals is essential to the success of any project type. Education can be segmented to be provided at the department level, employee rank level, or job description, and eventually even to an administrative team. I truly believe that all types of employees within an organization should be taught the fundamentals of project management and be able to apply those skills to future endeavors. After the education piece has been completed, refreshers and one-page keynotes can be provided, as well as approved templates for use when any employee needs to create documentation. If an organization chooses not to integrate a PMO or detailed project managers into its culture, the education and documentation piece should be the bare minimum that should be provided and/or up kept. Additionally, a collaborative scheduling tool should exist so that interactive timelines can be viewed by various departments to provide visibility when needed.

V. CONCLUSIONS, RECOMMENDATIONS, AND FUTURE WORK

My research was framed around answering the following research questions:

- What are the gaps in a sample set of specified, Navy METOC command projects, and how do they compare to industry-standard baselines?
- How many of the PMBOK standards are implemented in sample projects, and what would be the benefit if implemented?

At one focused Navy METOC command, 80% of the projects within the sample were overrun by either time or cost; in particular, one of those projects was extremely over budget, and it was not due to lack of organization by the project lead (personal communications). More surprisingly, the overrun in cost was due to improper planning at the initial project stages and a failure to correctly scope the project's budget from the start. Given this statistic, no formalized project management was involved at the start of this project and the leader did not have the necessary tools. If project management had already been integrated into the organization, this leader would have been able to get multiple assessments from the start of the project, plan properly, obtain stakeholder sign-off for accountability, and have continuous oversight. Time and money would have been saved, and existing bids on this project would not have run more than \$2 million over budget. Improved communication with stakeholders would have potentially tracked these issues and allowed the project to be scrutinized to save dollars. Additionally, those managing this project would have had the ability to make stronger decisions based on data and focus, connected teams in a way that all personnel understood the objectives, and given the project manager an increased ability to foresee and manage risks (Teamwork, n.d.).

Overall, it is important to note that my research was based on a set of sample, hypothetical projects and does not reflect the current/actual status of similar projects.

A. CONCLUSIONS/SUMMARY

In conclusion, my research showed that while project management practices did exist at one Navy METOC command, the integration of a formalized project management structure could cover gapped areas. Additionally, once a focused resource was placed onto a particular project, that person was able to successfully manage the project to completion. Because existing resources were already managing multiple projects, people, and tasks (and sometimes a department, as well), bandwidth was limited, and morale was eventually impacted. To retain talented individuals with the proper skill sets to manage projects, those individuals must be given the proper project management education, tools, and time to execute successful outcomes, and quality of life must be given priority, as well. Additionally, my research does not account for any updated status regarding the projects.

There is a lack of formalized project management practices, offices, and/or positions in a specific Navy METOC organization due to the lack of prioritization (and funding) of this effort. Because commands can utilize existing government personnel to complete projects, there is no visible reason to add on existing positions, documentation, and/or structure to support a formalized project management office. However, as more government employees seek alternative job opportunities due to position burnout and/or quality of life issues, the need for formalized project managers and additional positions to provide support becomes a requirement. The benefits of incorporating project management into a government organization includes relieving some of the stress, pressure, and duties on the individuals who perform the actual work, as well as providing a centralized, authoritative, and neutral resource to house documentation and manage projects.

B. RECOMMENDATIONS

To support these ideas, my recommendation is to implement a hybrid PMO into a government command. If commands have one to two positions with the bandwidth to lead projects within a 12-department organization, supervisors will also need to approve any training/time spent on project management activities. Because there is no existing

opportunity for commands to prioritize funding/positions for project management, commands could use an existing one to two positions per department to train, implement, and utilize talent to properly manage projects. A separate (yet small) group within the organization would exist, and in it would be a project management officer; this project management officer would be responsible for leading mid-range projects, creating/updating project-based templates, supporting designated personnel who are leading projects, bringing designated personnel together regularly to gather intel/provide updates, and supporting the command by managing an Integrated Master Schedule. If a command were to implement a collaborative tool set such as Atlassian Confluence, the solution should include implementation, maintenance, training, support, built-in templates, setup, user licenses, and a warranty for at least the first few years. My recommendation of this tool stems from limited experience; however, it is user-friendly, colorful, includes many features (such as an embedded chat, vision board, project management tool set, and multiple templates), and brings an organization into the high-tech era of collaboration. While other products may have the functions to review data or export specific information, I do not believe they are tools that command users will enjoy or be motivated to use on a regular basis. Atlassian looks more appealing and less cumbersome, which will encourage people to log into it to update information. If an organization purchases a tool, but only one department uses it, there will not be good collaboration.

Because the command would be utilizing existing personnel, no additional costs to hire people would exist. However, to supplement the knowledge base that each department's allocated personnel would need, commands would need to a) provide vendor-based, onsite, fundamental project management training (and refresher courses) for each allocated personnel and b) provide funding for an entry-level certification opportunity via PMI for allocated personnel to obtain their Certified Associate in Project Management (CAPM) certification. Although the government does not have an approved project management certification, the CAPM is entry-level, provides fundamentals for those who need to lead projects, and is not as stressful, expensive, or expansive as the PMP certification. I believe an introductory-level certification, the onsite class, plus

annual refresher training (as well as dedicated resources to support along the way) are enough for resources in each department to lead successful projects.

If my research showed anything, it is that individuals who are put in positions to lead projects in their department possess the knowledge to do so. However, they are lacking the guidance, tools, techniques, and support to achieve proper project management documents and be a point person to lead toward the correct vision.

C. FUTURE WORK

Any future work related to my research would involve some of the following action items:

- Cost-benefit analysis
- Increasing the sample set of projects to 10
- Performing a deep dive into projects with interviews, command surveys, etc.
- Updating project status, documentation, performing a re-analysis

Going forward, future work would benefit a specific Navy METOC command by analyzing how project/program management is supported by the overall DOD, community, and if positions can be coded to include project management training. While my research focused on a command level, it did not consider higher echelons that need to also be included from a top-down level.

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