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Policy, Culture, and People: A Digital Transformation Strategy for NAVSUP now and in the Future

December 2022

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Department of Defense Management

Naval Postgraduate School

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

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ABSTRACT

The Naval Supply Systems Command is currently conducting an information technology modernization plan. Since the 2018 National Security Strategy was released, the U.S. has been in a declared state of great power competition with China and Russia. The nexus of great power competition and NAVSUP's modernization arrive at digital transformation. The current threat environment for the U.S. military revolves around the idea that war will occur in all domains and for NAVSUP that means that logistics for U.S. forces will be contested. To help succeed in providing warfighters with the requirements they need, digital transformation at business levels such as NAVSUP need to be successful in order to increase the lethality of U.S. forces. Digital transformation is the act of using technology to improve processes, not just modernizing components of the information technology infrastructure. Through interviews with members of companies in the emerging technology sector and with members of NAVSUP, I garnered insights that I developed into recommendations on how NAVSUP can successfully conduct a digital transformation through innovation and education.



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LIST OF ACRONYMS AND ABBREVIATIONS

AI/ML	artificial intelligence/ machine learning
CNO	Chief of Naval Operations
DLA	Defense Logistics Agency
DoD	Department of Defense
DON	Department of the Navy
DT	digital transformation
ERP	enterprise resource planning
GAO	Government Accountability Office
GNN	graph neural networks
I4.0	industry 4.0
IoT	Internet of Things
LOE	line of effort
NAVPLAN	Navigation Plan 2022
NAVSUP	Naval Supply Systems Command
NDS	National Defense Strategy
NLP	natural language processing
NPS	Naval Postgraduate School
OSD	Office of the Secretary of Defense
OTA	Other Transaction Authority
PME	professional military education
SES	Senior Executive Service



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EXECUTIVE SUMMARY

The Covid-19 pandemic highlighted numerous supply chain disruptions in both the commercial industry and government. The increased focus on supply chains and the speed with which emerging technology is developed is creating an environment in which Naval Supply Systems Command (NAVSUP) has the opportunity to implement a digital transformation that can potentially lead to increased readiness – or value – for the warfighter. The current threat environment that the United States finds itself in is one of competition with peers. Much of this competition is considered operations below war, yet these operations can still have detrimental effects on the United States and its allies (Ryan, 2021). These operations make use of emerging technology and information and the United States must be able to react to these technologies and use them as well. Digital transformation closely aligns with emerging technology because digital transformation can only happen when processes are improved whilst using novel technology or older technology in a new way. Another component directly related to NAVSUP is the fact that in any future conflict that the United States may be part of, there is a likely chance the logistics operations will be highly contested. To help be successful in the act of contested logistics, the U.S. military needs to find innovative ways to provide for the warfighter through emerging technology that can increase the current logistical capability. As the Navy’s supply chain manager, NAVSUP is in a prime position to conduct digital transformation to help the warfighter and to demonstrate to the rest of the military how a digital transformation can succeed. NAVSUP has the ability to use its highly capable workforce to innovate in both technology and processes leading to increased readiness across the force.

For this report, I determined that there were three themes across the literature and interviews that provided insights on how a digital transformation could be successful. The three themes related to a successful digital transformation are people, process/policy, and culture. The main findings are as follows:

- The current workforce has neither the skillset nor authority to allow for digital transformation to result in a success. Skillsets can be learned;



however, processes must be changed in order to allow for more authority at lower levels.

- Innovation adoption (in this case for digital transformation) is often the result of an individual's impact. More specifically, people with a certain position or personality are more likely to have an innovation adopted. One way to combat this is to create a foundation of excellence where there is focus on process improvement and innovation adoption when it will make processes better.
- The process of digital transformation must start with finding the problems that exist in current processes or policy. Only once a problem is determined should NAVSUP determine which technology can be used to create a successful transformation.
- The training process for NAVSUP personnel needs to be tailored to the skills that leadership desires in the workforce. The skills that are required to benefit from a digital transformation are not currently required by NAVSUP. NAVSUP would benefit from training personnel in different areas such as innovation implementation, coding, data analytics, etc.
- An organization's ability to understand how to adopt innovation is key to that organization's success. There are many theories on how to successfully innovate and NAVSUP could benefit from policy focused on how innovation could be successful in its organization.
- Organizations that are successful at digital transformation often have three factors that play into the organization's culture. The factors are having an innovation culture, an experimental culture, and a culture that is not afraid to take risks.

To conclude, in NAVSUP's ecosystem, emerging technologies can change how NAVSUP manages the Navy's supply chain. The nation's adversaries will not aim to use old systems and processes to compete with the United States. They will use emerging technology to their utmost ability and NAVSUP must aim to do the same. NAVSUP can implement a methodical strategy and that starts with not only an information technology modernization plan, but also a digital transformation policy that is focused on educating the force and creating a culture of innovation, experimentation, and not being afraid to take risks.

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I. INTRODUCTION

For this research, I focus on digital transformation that can provide value to Naval Supply Systems Command (NAVSUP) as well as what policy and organizational changes must occur at NAVSUP to accelerate its digital transformation process. I examine current organizational processes and interviewed members of NAVSUP as well as industry to garner a wide range of views related to digital transformation.

A. PURPOSE AND EXPECTED BENEFITS FROM RESEARCH

The purpose of this research is to:

- identify strategies that NAVSUP could use to successfully implement digital transformation at an accelerated pace,
- identify policy recommendations that would accelerate digital transformation, and
- identify organizational changes that would accelerate digital transformation.

This research developed out of my interest in technology and belief that the Navy is not good at organizational change or innovation implementation which is based on my experiences and observations as a naval officer. My goal is to provide insights to NAVSUP leadership that can help guide their decisions related to digital transformation for the NAVSUP enterprise. A successful digital transformation has the potential to increase warfighter readiness across the Navy, and NAVSUP could be an example of how to successfully conduct a digital transformation on a large scale.

B. RESEARCH QUESTIONS

- What should NAVSUP's strategy be for digital transformation?
- Which NAVSUP policies need to be changed or created to foster an environment conducive to implementing digital transformation?
- What changes to culture can NAVSUP aim to adopt in order provide an environment conducive to implementing digital transformation?

C. SCOPE AND LIMITATION

With an increase in supply chain disruptions around the world and an increased dependence on technologies to make supply chain decisions, emerging technology is



poised to change the way organizations manage their supply chains. Emerging technologies have the best chance to be adopted in large organizations through digital transformation, which focuses not only on technology, but also on aspects of organizational change. As the Navy's supply chain manager, NAVSUP is in an ideal position to undergo digital transformation. To help me plan this undertaking, I gather insights from industry members and NAVSUP personnel who are knowledgeable about emerging technologies and digital transformation. In this study, I analyze NAVSUP's information technology modernization plan and its culture regarding digital transformation. Regarding industry, I aim to determine best practices of digital transformation to glean insights that can inform NAVSUP's digital transformation strategy. The scope of the study is restricted to NAVSUP and three companies that create emerging technologies. I analyze perspectives relating to digital transformation from NAVSUP personnel and industry personnel.

D. ORGANIZATION

This research is organized into six chapters. The next chapter covers the background, including a discussion of emerging technologies that are part of digital transformation as well as what digital transformation and organizational change are. Chapter III covers the literature review, the government's view of digital transformation, and how literature describes digital transformation. Further, I look at the themes in current literature that are divided into what digital transformation is and how it can be implemented. Chapter IV covers the methodology I use for this research. Chapter V covers my analysis of the data. I use the analysis to determine how people, process/policy, and culture affects the likelihood of a successful digital transformation at NAVSUP. Chapter VI is a summary of the report, including my conclusion and recommendation on a strategy for NAVSUP's digital transformation.



II. BACKGROUND

The fourth industrial revolution, also known as Industry 4.0 (I4.0), is an idea that information and communication technologies will result in revolutionary process improvements for both consumers and producers by using technologies such as the Internet of Things (IoT), artificial intelligence/machine learning (AI/ML), additive manufacturing and more (Nascimento et al., 2019). NAVSUP is not a traditional producer in the business sense, but since its inception, it has provided readiness for military members in both peacetime and war. NAVSUP is responsible for implementing the Navy's supply chain and ensuring that members of the Navy are equipped with everything that is needed for completing any missions that they are assigned. As I4.0 technologies are increasingly used in industry, it is likely that NAVSUP will use these technologies to continue supporting the warfighter and improving processes that can save both time and money. It is also likely that NAVSUP will undergo a digital transformation, and there are a range of outcomes—from success to failure—that can occur. This transformation can be described as a digitization of the Navy's supply chain and all related aspects (Bertram & Schrauf, 2016). Transformations of this scale do not happen without purposeful effort. NAVSUP needs to have a focused effort on implementing a digital transformation so that organizational improvements will allow for increased value to warfighters.

The Navy aims to be innovative and create efficient processes, but it has failed in past attempts to implement new technology and business processes. The Navy currently uses enterprise resource planning (ERP), which is “an automated system using commercial off the shelf software consisting of multiple, integrated functional modules that perform a variety of business-related tasks such as payroll, general ledger accounting, and supply chain management” (Kutz & Rhodes, 2005, p. 2). In 2005, it was reported that the Navy spent “approximately \$1 billion in four ERP pilots without marked improvement in its day-to-day operations” (Kutz & Rhodes, 2005, p. 2). The Government Accountability Office (GAO) deemed that the Department of Defense (DoD) business systems modernization plans, including ERP, had been at risk since 1995. (Kutz & Rhodes, 2005, p. 1). I4.0 technology is marketed to streamline many tasks that are part of



ERP, but like history has shown, it is difficult for the Navy to implement transformative technologies like ERP. Compared to the Navy, industry has implemented quicker and more successful digital transformations, and utilizing lessons learned from organizations that have successfully digitally transformed can help NAVSUP achieve a digital supply chain. Ultimately, the Navy is hindered by its inability to unify the disparate entities that constitute the Navy's supply chain, and an all-encompassing and integrative strategy must be developed if a digital transformation is to occur.

To fully comprehend the potential process improvements that I4.0 technologies can provide NAVSUP, a further look into technologies that make up I4.0 is necessary. I provide overviews of AI/ML, digital twins, and IoT to show how these technologies can have beneficial effects when implemented into a supply chain process. These technologies are not an all-encompassing collection of I4.0 technologies, but rather a sampling.

According to Pournader et al. (2021), AI “is a field in computer science encompassing the development of systems capable of performing tasks that normally necessitate human intelligence” (p. 2). Many of the business practices that occur throughout NAVSUP's enterprise are only facilitated by humans, and so AI could potentially lead to changes in business processes that could result in saved time, effort, and money. Pournader et al. (2021) described AI as being grouped into three components which are sensing and interacting, learning, and decision making. Each component has different ways to support improvement in the supply chain. For example, natural language processing (NLP) falls under the AI category of sensing and interacting, and Wichmann et al. (2018) described how NLP is able to pull open-source data and potentially help map a supply chain. A map of the supply chain increases the visibility for supply chain managers and so use of AI in this way could benefit NAVSUP. An example of the learning component of AI is a type of machine learning called graph neural networks (GNN). Researchers suggested that GNN can be used to determine supply chain visibility gaps and that ML “presents a desirable improvement upon existing supply chain visibility improvement methods as it mitigates companies' reliance on the explicit disclosure of supply chain members” (Kosasih & Brintrup, 2021, p. 1). According to Banks et al. (2021), ML “involves using mathematical and statistical approaches that



have the ability to identify similarity between data groups and sort data into categories” (p. 11). Specifically related to the supply chain and business practices that NAVSUP engages in, Banks et al. (2021) also stated that strengths of ML include being effective at process optimization, system forecasting, and fraud detection. The third aspect, decision-making, is described as “optimization, expert systems, as well as methods related to planning and scheduling and simulations and modelling” (Pournader et al., 2021, p. 3). NAVSUP leaders who make decisions about the Navy’s supply chain could use these decision-making AI methods to make better-informed decisions based on what the AI suggests.

The next I4.0 technology I explore is digital twins. A digital twin is “a virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity” (Digital Twin Consortium, 2020). In terms of the Navy’s supply chain, a digital twin would be a real-time representation of the Navy’s supply chain that could show everything from sub-components of a supply chain to the final inventory that is placed on ships, submarines, and bases around the world. The increased visibility that digital twins could provide to decision-makers both in the NAVSUP enterprise as well as the rest of the Navy could enable better decision-making resulting from increased knowledge about a certain system’s or part’s supply chain. According to Marmolejo-Saucedo (2020), a digital twin has three parts: a data set, algorithms, and knowledge. These components would make a digital twin provide support to NAVSUP “through the sharing of data and information” between internal and external components of the Navy’s supply chain (Marmolejo-Saucedo, 2020, p. 1). Ozbilge (2022) stated that the key benefits of digital twins are:

- enhance operational and financial performance as a result of applying insights from internal operations, customers, suppliers, third-party providers, and other external data points,
- improved decision-making and interoperability, increasing responsiveness and agility,
- increased collaboration with external supply chain partners through increased connectivity and real-time responsiveness,
- proactive management, resulting in fewer incidents impacting operations, decreasing waste consumption and increasing revenue, and
- automated reporting with predictive capabilities enabling risk profiles, which change over time. (Ozbilge, 2022, para. 11)



These five benefits can be summarized as follows: Digital twins can bring information together that may not be evident in the current way supply chains are viewed. Increased knowledge, insights from AI that could be part of a digital twin, and overall increased visibility of a digital twin would help leaders make better decisions.

The final technology that I review is IoT, a technology that is able to bring AI, digital twins, and many other technologies together, which can make for quicker-reacting supply chains. IoT is the concept that things and humans can communicate with other things using the internet; in terms of a supply chain, IoT can bridge communication across all parts of a supply chain (Ben-Daya et al., 2017). Internet-connected parts of a supply chain like warehouses, trucks, factories, etc., which are connected because of IoT can provide supply chain leaders with data that can be used to make better decisions, increase visibility in a supply chain, and provide early signs of trouble that a supply chain may experience (Ben-Daya et al., 2017). IoT can help mesh the technologies of AI and digital twins, which, together, would enable supply chain leaders to make decisions that would benefit the end user. In the Navy's case, the warfighter is the end user and I4.0 technologies have capabilities that can increase a warfighter's readiness.

Part of the reason digital transformation is so hard in the Navy and NAVSUP is because many technologies within I4.0 are so new, and much of the personnel in these organizations have not been introduced to the technologies. Current employees' lack of knowledge about technologies such as AI, digital twins, IoT, etc., and their mindset about these technologies can be a roadblock to implementing transformational change that would use I4.0 technologies. According to Breunig et al. (2016), for an organization to get value out of a I4.0 transformation, an organization must have the skills and culture necessary to foster innovation. When an organization does not have an innovative mindset, there must be a leader and a strategy that can develop the policies and foster the culture needed to drive innovation.

Organizational change often does not just include one change. In NAVSUP's case, it is inevitable that NAVSUP will implement at least some I4.0 technologies in the future. Often, when new technologies are introduced, a cultural change often needs to occur. In this section, I review digital transformation from an organizational change standpoint in order to



understand what a digital transformation entails. Digital transformation is bringing an organization up to date with technology that can help the organization be more successful than it is in its current state. In a survey conducted to garner insights about digital transformation, Alicke et al. (2022) found that 99% of those who responded claimed to not have the talent necessary to enable a digital transformation of their supply chain. When organizations find themselves without a workforce skilled in the technologies that are part of a digital transformation, two things can occur: the organization can hire more people or the current personnel can be trained. Another component of this is the cultural side of an organization. Alicke et al. (2022) stated that if current personnel are invested in a digital transformation, then the digital transformation is more likely to be successful. Although skills can be gained that would help digital transformation be successful, Tabrizi et al. (2019) claimed that there are five lessons that senior leadership should follow. The five lessons are

- Determine a business strategy before making any investments.
- Leverage those with digital transformation skills within your organization.
- Gather input from your customer.
- Recognize employee’s fear of being replaced by technology.
- Inspire an innovative culture. (Tabrizi et al, 2019)

These five lessons are wide-ranging, and they provide the insight that digital transformation is a multi-pronged process in which leaders must be involved. If an organization must change, then a majority of people in the organization must believe that the change will benefit the stakeholders, which include the business, the workers, and the customers.

I aim to contribute clear actions that NAVSUP can implement to digitally transform its organization with the use of I4.0 technology. The United States’ adversaries will use these technologies to the best of their abilities and the United States must prepare to do the same. NAVSUP needs a digital transformation strategy that focuses not only on the technologies that will make the supply chain more resilient, but also—and more importantly—on how it can have the right people with the right mindset to function alongside these technologies that will make the nation more ready for any scenario with which it is confronted



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III. LITERATURE REVIEW

Numerous scholarly works have been published regarding organizational change within government and the private sector, yet there is a limited number of sources that cover organizational change from a digital transformation standpoint in relation to the U.S. military, specifically, the U.S. Navy (USN) Supply Corps. Many sources that cover digital transformation within the USN consist of government publications or articles. These sources lack the focus necessary to fully conclude the best digital transformation strategy for NAVSUP. To better understand digital transformation from an organizational standpoint, I reviewed literature focused on how to create a successful digital transformation in general.

This chapter presents an overview of digital transformation from a DoD perspective and then focuses on organizational change methods with particular attention on innovation adoption. I review digital transformation literature to gain a clear understanding of which methods have worked or could work in industry and government and which have not. The literature review helps to garner insight into organizations' actions that could benefit NAVSUP as well as show which methods of innovation adoption NAVSUP could use as it begins to incorporate I4.0 technologies

A. OVERVIEW OF DIGITAL TRANSFORMATION FROM A DOD AND NAVY STANDPOINT

In the 2018 National Defense Strategy (NDS), the DoD stated that one of its objectives is to ensure performance with affordability in a fast manner, which would occur as the department's "mindset, culture, and management system" changed (DoD, 2018, p. 4). The DoD (2018) stated in the 2018 NDS that another objective is to establish a "National Security Innovation Base" that results in more security and solvency. Additionally, the 2018 NDS details how the organization needs to modernize key capabilities. Two of the capabilities it specifically discusses and relates to the Navy supply chain are *advance autonomous systems* and *resilient and agile logistics* (DoD, 2018, p. 7). The DoD's focus on innovation and modernization is for continued defense



of the United States and it is meant to be translated through all components of the DoD. Each component must determine how the NDS guidance will affect its organization.

In 2019, the DoD released the DoD Digital Modernization Strategy. In the modernization strategy, the DoD (2019) stated that it can achieve digital modernization through four initiatives: “innovation for advantage, optimization, resilient cybersecurity, and cultivation of talent” (DoD, 2019, p. 3). The DoD (2019) goes on to state that collaboration with industry and academic partners is of the highest importance. Additionally, the strategy document included a statement that the DoD will improve logistics functions and that a main component of innovations that will help in the logistics realm will relate to software.

As part of innovating for advantage, the DoD (2019) describes in the strategy a list of goals that relates to logistics and the supply chain. The DoD (2019) is to “deliver a DoD enterprise cloud environment, treat data as a strategic asset, and to improve information sharing to mobile users” (pp. 53–54). These components are all items that can allow for logistics leaders to make decisions with real-time data, resulting in better outcomes. As part of the optimization goal, the DoD (2019) states that it must implement best practices from industry that are suitable with the DoD, and adoption of “proven technologies must be greatly accelerated” (p. 24). Related to this, the DoD’s (2019) stated goal is to “improve rapid technology deployment process” using three approaches: “streamlining the technology approval process, leveraging innovative technology development practices such as Digital Engineering, and leveraging approved processes such as other transactional agreements (OTAs)” (p. 27).

As for cyber security, one of the main goals is to protect sensitive information that lives on unclassified networks.. As digital transformation occurs in all aspects of the DoD, the modernization strategy singles out that “supply chain exploitation across the acquisition and sustainment life cycle” could be an issue and that is why cybersecurity is instrumental in ensuring a strong supply chain (DoD, 2019, p. 28). The final goal of the modernization strategy is to “cultivate talent for a ready digital workforce” (DoD, 2019, p. 33). The DoD’s aim is to have a workforce that can accomplish innovation at all levels where digital transformation will occur, and two large components of that workforce are



the acquisition professionals with expertise in emerging technology and personnel who are experts in other technical realms.

The next component of the DoD's (2022) modernization plan is the *Department of Defense Software Modernization Strategy*, in which the DoD states that the software development process must focus on commercial partnerships, software factories, adoption of the cloud, process transformation, and workforce development. Specifically related to logistics and the supply chain, the DoD states that in order to take advantage of new technology, many current processes must change in order to allow for adoption, and this will occur through policy updates that not only encourage innovation but also allow for experimentation. In theory, this does make sense; however a practice must also be in place to ensure processes change for the better. The DoD's (2022) "desired outcomes from transformation efforts include shortening acquisition timelines, providing economic incentives to breakdown siloed business practices and independently-managed services, and reducing the lead time for cybersecurity compliance" (p. 5).

The next strategy document related to digital transformation in the military is the *Chief of Naval Operations Navigation Plan 2022* (NAVPLAN). One of the main reasons the Chief of Naval Operations (CNO) released the NAVPLAN is because he realized that "the Navy needs a more continuous, iterative Force Design process to focus our modernization efforts and accelerate the capabilities we need to maintain our edge" (Office of the Chief of Naval Operations, 2022, p. 1). Additionally, the CNO states that an essential element in modernization is to foster a culture that can self-assess, "correct, and innovate better than the opposition" (Office of the Chief of Naval Operations, 2022, p. 1). In the NAVPLAN, the CNO recognizes that the military environment is awash in rapid innovation and the Navy must keep up to remain strong and able to defend American interests. Specifically related to logistics, the CNO states that a resilient logistics function is able to occur through secure communications and information technology that ensures warfighters get what they need, when they need it (Office of the Chief of Naval Operations, 2022). He goes on to state that investments must occur in systems, which will lead to resilient logistics so leaders can have "decision advantage" (Office of the Chief of Naval Operations, 2022, p. 8). As this document is written at the strategic level, it offers wide swaths of thought. Much of what the CNO discusses is work



that will be completed by mid-grade officers who understand the specifics of the technology and logistics at lower levels.

The final strategy document I reviewed is a Department of the Navy (DON; 2020) publication entitled *Business Operations Plan: Fiscal Years 2021–2023*. In the Navy’s *Business Operations Plan*, the DON aligns with the NDS on three lines of effort (LOEs). Of the three LOEs, two can be specifically related to innovation and organizational change. NDS LOE 1 is Rebuild Military Readiness as we [DoD] Build a More Lethal Joint Force. NDS LOE 3 is: Reform the Department’s Business Practices for Greater Performance and Affordability (DON, 2020, p. TOC). As part of NDS LOE 1, the DON’s (2020) business plan calls for setting a path for innovation and modernization, enhancing IT capabilities, and recruiting and maintaining the best workforce possible in the digital era (DON, 2020). In relation to NDS LOE 3, the DON (2020) aims to improve business operations by embracing department enterprise services and optimizing organizational structures. Supply Corps leaders must look at these sets of action and be able to implement them at NAVSUP so the Navy’s supply chain becomes more resilient and capable for both naval forces and the joint warfighter.

B. THEMES IN DIGITAL TRANSFORMATION LITERATURE

Change is a part of all organizations, and, often, change occurs because of a new technology. The kind of technology often determines how a portion of time will get its name. As I write this thesis in 2022, many people say that world is going through the Industrial Revolution 4.0 which is built upon emerging technologies. The way for organizations to take advantage of these technologies is to transform as organizations and end up better than they started. There are many works that describe this process as digital transformation. Digital transformation literature is divided into two themes. The first is the subject of defining what digital transformation is. The second set of literature focuses on how to implement digital transformation. I concluded that minimal research has been conducted on general digital transformation implementation in the military realm, so I aimed to review literature that would best position me to make objective and applicable conclusions on digital transformation in relation to the military.



The idea of digital transformation is often confused with digitalization, which is then confused with digitization. Bloomberg (2018) describes the difference between the three terms in order to deliver a basic understanding of digital transformation. To begin, digitization is the process of changing analog information and “encoding it into zeroes and ones so that computers can store, process, and transmit such information” (Bloomberg, 2018, para. 4). The author goes on to state that digitalization has multiple definitions ranging from being the way many aspects of social life are changed due to technology to a more business-focused explanation of “the use of digital technologies to change a business model” (Bloomberg, 2018, para. 11). Finally, Bloomberg (2018) focuses on the idea that digital transformation is an organizational change that occurs while implementing digital technologies that affect the organization as a whole. From a military perspective, many digitalization projects occur, but they are not always part of a digital transformation because digitalization projects do not change how an entire organization functions.

Aligned with Bloomberg’s (2018) definition of digital transformation, Andriole (2020) determines that digital transformation is not about the software or hardware that can change business processes; rather, digital transformation in an organization depends on that organization’s leadership and its cultural readiness for how the transformation will affect the social construct of the company. Furthermore, he stresses that “conflict between the goals or processes of digital transformation and the corporate culture” will lead to problems (Andriole, 2020, p. 15). Tabrizi et al. (2019) point out that 70% of all digital transformation initiatives fail, mainly due to organizational culture issues such as the workforce not having the right change mindset and flawed practices in the organization. However, the 70% failure rate is often quoted yet not backed up by empirical evidence (Hughes, 2011). Overall, the theme gleaned from these sources is that there is not a formula for success in digital transformation, but success will come from a leadership team that looks at digital transformation in a holistic way specific to that organization.

Another theme that emerges is how organizations can successfully implement digital transformations. The literature is divided into two categories: actions that leaders can take and overall steps for the organization. I describe literature that discusses leadership actions first and then delve into the steps an organization can follow for successful implementation of a digital transformation. The leadership lesson that Tabrizi et al. (2019) discuss is that leaders



must develop a business strategy before any investment in technology occurs. One of the authors of that source describes an anecdote about how strategy at his own company helped the organization successfully navigate the digital transformation path. Although the authors use personal anecdotes, their lesson may not be able to be equally applied to all organizations. Often, leaders will start a process saying that they want to use a technology, yet there is no purpose for it. Purpose is key to defining concrete goals that can then lead to determining which technologies can best serve those goals (Tabrizi et al., 2019). Pedersen (2022) states that executives who serve in different functions need to understand two concepts known as *cultural change* and *cultural continuity*. In the sense of digital transformation, cultural change “refers to how a digital transformation may alter an organization’s culture,” while “cultural continuity refers to elements of the culture that remain stable” (Pedersen, 2022, p. 2). Pedersen (2022) explains that leaders must understand these two concepts in order to get through natural conflicts that will come up in organizations between leaders embracing change and leaders who believe the business should remain culturally stable.

Abbu et al. (2022) determined which qualities influenced leaders’ performance as digital leaders in their organizations. The researchers determined that there were 15 characteristics that were divided into character traits and competency traits. Abbu et al. (2022) concluded that leaders of an organization going through digital transformation should focus on these 15 traits. The 15 traits resulted in three main takeaways: (a) trust is essential to digital leadership, (b) employees are the core of a digital strategy, and (c) leaders must ensure that the technology they use is used responsibly (Abu et al., 2022, p. 46).

Nordgren and Schonthal (2021) describe four frictions that must be overcome for a new idea to take hold and cause change. The four frictions are inertia, effort, emotion, and reactance, which are defined as follows:

- inertia: a person or group’s desire to stay with the status quo
- effort: the amount of work (real and perceived) necessary to implement change
- emotion: the unintended negative emotions created by the change
- reactance: the impulse to resist change. (Nordgren & Schonthal, 2021)



Although Nordgren and Schonthal (2021) describe barriers that people have while encountering new ideas, I believe that these ideas can directly apply to digital transformation in the military. The focus on the human aspect is related to many definitions of digital transformation in that the people of an organization—not the technology—are responsible for the success or failure of a digital transformation.

In an article for West Point’s Modern War Institute, Blanken et al. (2022) discuss how a new structure of military innovation would benefit the DoD. Blanken et al. (2022) describe the current structure as a lighthouse focused on processes that were used during the Cold War; the lighthouse has three features: hierarchical construction, a clear and full understanding of the threat environment, and the DoD’s control over technology. According to Blinken et al. (2022), this structure is antiquated and needs to be updated into a Christmas tree model, which can be described in two parts: disaggregated parts of the organization should play a role in innovation and the connections between all the disaggregated parts could act as the “pathways that allow information and ideas to flow in multiple directions” (para. 12). This concept has not been fully adopted by the DoD and therefore cannot be fairly judged on its success, but the concept appears applicable to today’s unpredictable world in which digital technologies are key to supply chain effectiveness. Regarding digital transformation, a culture in which team members could embrace the Christmas tree structure may lead to an environment more conducive to innovations and support of digital transformation.

In regard to actual steps that organizations can take toward digital transformation, Saarikko et al. (2020) highlight five recommendations to raise the chances of successful digital transformation:

- Start small and build on firsthand benefits
 - Team up and create competitive advantage from brand recognition
 - Engage in standardization efforts
 - Take responsibility for data ownership and ethics
 - Own the change and ensure organization-wide commitment.
- (Saarikko, 2020, p. 838)

These five recommendations are focused not on technology, but on the people who will be implementing the change. Each of these recommendations are steps that



leadership in an organization could take to ensure their workforce and those they serve could experience the best benefits possible from a digital transformation.

The literature on digital transformation, both governmental and academic, provide insights on the goals of and roadmaps for a digital transformation, but going forward, I describe a strategy that NAVSUP can use to successfully implement a digital transformation.



IV. METHODOLOGY

In this study, I aim to understand the building blocks that result in successful digital transformations for organizations to inform a digital transformation strategy for NAVSUP. This effort was completed through conducting interviews with three individuals from I4.0 technology companies and four of the five LOE Leads for NAVSUP's Digital Modernization Plan. All three companies interviewed are software companies, yet each focus on different components that could benefit NAVSUP's business operations. The three companies are focused on blockchain, AI, and digital twins. These technologies are not yet being implemented by NAVSUP; however, each technology has demonstrated its utility in private industry supply chain organizations.

A. INTERVIEW PARTICIPANTS

I interviewed three individuals who currently work in the software industry and focus on I4.0 technology. The individuals were from Palantir, Coupa, and SIMBA Chain. Two of the three individuals had worked for the DoD earlier in their careers and one had conducted business with the DoD in his current capacity. Of the five NAVSUP employees I interviewed, all were GS-15's which is a senior civilian position at NAVSUP. Four of the individuals were LOE leads for the digital modernization plan and the fifth works as a process analytics manager.

B. PROCEDURE

My interviews were observational in nature and only focused on facts from the participants, not their opinions. I identified the interview participants based on their current positions in the private sector and at NAVSUP. I had contacted two individuals from industry that I previously met through my studies at the Naval Postgraduate School. I reached out to the third individual via LinkedIn. As for the NAVSUP personnel, I contacted a Navy captain who worked at NAVSUP Headquarters and asked if he could suggest members of NAVSUP who would be able to discuss digital transformation. I initiated contact with all participants via e-mail and introduced myself as well as the purpose of my study. I ensured that everyone was willing to participate in an



observational interview that was focused on fact and not opinion. I began each interview asking the participant to explain what they currently do in their position and then I asked a set of questions to the participant. I asked follow-up questions when clarification was needed, but all questions were centered around the question set that follows. My questions focused on how teams fail or succeed in digital transformation as well as on culture and policies related to innovation at the participants' respective places of work. The primary form of data collection included written notes and recorded audio. The interviews lasted between 30 to 60 minutes.

1. Determining Who to Interview

For the industry interviews, I looked for people who have experience in the emerging technology sector as well as experience in working with or in the military. One participant is a retired U.S. Navy captain in the Supply Corps that now works for Palantir. Another participant was a Senior Executive Service member at the Defense Logistics Agency (DLA) who also worked in the Office of the Secretary of Defense (OSD). He now works for SIMBA Chain. The third participant from industry (Coupa) has worked with the Marine Corps on an initiative to create a supply chain digital twin. As for the personnel at NAVSUP, I asked to talk with people who would be able to discuss digital transformation, and I was introduced to four LOE leads for NAVSUP's digital modernization plan and a fifth person from NAVSUP that works in process analytics.

a. Palantir

Palantir (n.d.) is a software company that was started in 2004 and is headquartered in Colorado. Palantir's aim is to create the "best user experience for working with data" so that people are able to solve complex problems using software and artificial intelligence without being an expert in coding and modeling (para. 5). Palantir has created software specifically for supply chain applications that is focused on a 5-step process. First, a digital twin of the supply chain is created using Palantir's software called Foundry. Second, Foundry is then able to gather the required data across an organization so that data is no longer siloed in individual business units. Third, Foundry is then able to conduct simulations using the digital twin which can inform future business decisions.



Fourth, Foundry allows an organization to use the software for making operational decisions. The final step is the implementation of AI/ML into the software, which Palantir claims can capture decisions that are made and leverage those decisions so better decisions are made in the future (Palantir, 2021, p. 3). The process just described is extremely different from how the Navy manages its supply chain, and so lessons learned from this interview provided insights on how NAVSUP can modernize, not just from an operational level, but also on a cultural level.

b. Coupa

Coupa is a software company focused on business management with expertise in procurement, finance, and supply chain. Coupa helps organizations understand how they spend their money and how to do so using Coupa's software to achieve the best outcome. Coupa does this through looking at seven components that when combined help give a true picture to that organization. The seven components are strategic sourcing, contract management, contingent workforce, treasury management, suppliers and risks, inventory management, and supply chain design and planning (Coupa, n.d.). In traditional organizations, these seven components are siloed and Coupa tries to break these silos down in order for an organization to have the data be accessible to those who need it. Coupa has over 1400 customers across a wide range of industries. (Coupa, n.d.) One component that underlies its software is the use of AI that can help prescribe insights to the organizations that use its software (Coupa, n.d.). Coupa aims to integrate all aspects of organizations that are part of the spending process and the aim to break down silos is something that the Navy could learn from.

c. SIMBA Chain

SIMBA Chain is a blockchain company that aims to provide blockchain solutions for organizations. SIMBA is short for Simple Blockchain Applications (SIMBA Chain, 2022a). Blockchain is "a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network" (IBM, n.d., para. 1). Blockchain has the potential to change how organizations track and understand data because the architecture behind blockchain only allows for the data to be in one location,



hence showing the truth about that data. For example, a network built on a blockchain can track items such as orders, payments, and production. This network is built on a ledger that shows the complete details on that transaction, end to end (IBM, n.d.). SIMBA Chain (2022b) aims to bring this technology to anyone, not just blockchain experts. Some of the organizations it has worked with include Boeing, CAT, the U.S. Navy, the U.S. Army, and SAP (SIMBA Chain, 2022b).

d. NAVSUP Personnel

NAVSUP is conducting an IT modernization plan that has five focus areas. The areas are Logistics and Supply Chain Enablement, Speed and Agility in IT Delivery, Data Architecture and Analytics, Resilient IT Supply Chain Ecosystem, and Strategic Partnerships. I interviewed four LOE leads to understand NAVSUP's current initiatives in the IT realm. The campaign plan is led by the NAVSUP 06 directorate because the plan focuses on IT, yet each of these LOEs affects the whole NAVSUP organization.

C. INTERVIEW QUESTIONS

1. Questions for NAVSUP and Industry Personnel

- What kind of teams have failed at digital transformation?
- What kind of traits did successful teams have?
- What traits did failed teams have?
- How does your organization choose which technologies to implement?
- How is culture crafted in your organization?
- In regard to digital transformation, what attributes do successful teams have?

2. Questions for Industry

- Are there industry methods for pushing innovation all the way from ideation to the workers on the floor?
- Does your organization advise other organizations on how to implement your technology?
- Do you have trainers to implement your technology?
- What methods do they use to help organizations implement the technology?
- Which methods work best?



3. Questions for NAVSUP Personnel

- What policies are in place to help NAVSUP innovate?
- What kind of policies can help NAVSUP innovate better?
- Does NAVSUP's strategy match the overall DoD strategy for digital transformation?
- What is the current culture around innovation at NAVSUP?
- How can you ensure that innovations will be beneficial for Sailors on ships?

D. THEMATIC ANALYSIS

Based on the interviews that I conducted, I based my analysis on themes that I noticed across the interviews. The common themes associated with success or failure in digital transformation revolved around People, Process/Policy, and Culture. I then applied these common themes to how NAVSUP can successfully implement digital transformation in the future as emerging technologies continue to become available. As my research is qualitative, I aim to use this research to find ideas on how NAVSUP can best implement digital transformation as the transformation will not occur in one single instance, but over a long period of time. The insights I gleaned will be able to be used continuously, not just once. My analysis appears in Chapter V.



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V. ANALYSIS

A. INTRODUCTION

The analysis is organized into three themes that I noticed across the interviews that I conducted. This approach allows me to determine best practices within industry as well as potential issues to be solved at NAVSUP. The topic portion is a description of what the topic is, while the discussion portion describes industry practices and matters at NAVSUP that have potential to be changed to allow for a successful digital transformation.

B. PEOPLE

1. Workforce Skill Sets and Authority

a. Topic

Emerging technologies are part of digital transformation. An organization that goes through digital transformation does not always have the personnel with the necessary skillsets to make the digital transformation successful. Palantir, Coupa, and SIMBA Chain, by their nature of being software companies, have the right people with the right skill sets because they are companies that work in emerging technology. This is not to say that members of NAVSUP do not have certain skillsets related to emerging technology because some members do. However, the military personnel do not have focused training related to technology such as data analytics, coding, and other technological skills that could help NAVSUP benefit from a digital transformation. In industry, a technologically savvy workforce often results in innovations and new ways of looking at things. In addition to technological skills, the Coupa respondent that had previously worked with the DoD mentioned that members of the DoD's workforce often did not have the authority to make decisions related to innovative offerings because many levels of bureaucracy exist between practitioners and decision-makers. Often times, it just takes one person to decide whether a project is turned off or not funded. Personnel who do not have proper authority to make decisions will ultimately result in no decision ever being made in relation to innovations or digital transformation.



b. Discussion

If a skillset does not exist, then there is one route an organization can take. That route is to train the workforce with the necessary skills required to make a digital transformation work. The Palantir respondent mentioned that Palantir offers three types of training to bring personnel up to speed on the products that are offered. The first method, a one-on-one approach, is customized to the learners. The next approach is having a third party that is already trained on the software work with the customer. The final approach is remote learning, which is done either virtually with a live person, or virtually with the “learning out of the box” method. The respondent from Palantir also mentioned that teams that have successfully gone through digital transformation were able to do so because the team was comfortable with the new process being introduced. They can be comfortable due to the training received and knowledge gained. Furthermore, the Palantir respondent also mentioned that this knowledge gained allows the team to have the opportunity to contribute as the digital transformation occurs. Regarding authority, the Coupa respondent mentioned that the people using whatever innovation may be implemented must be involved from the beginning of the process. Having those people involved will ensure that the process being implemented will be ready to move forward because the proper authority to make decisions will have already been thought out. Additionally, organizational leaders can empower employees who are part of a digital transformation with the knowledge and authority to make the transition a successful one. Regarding NAVSUP, leaders have the best chance to successfully implement digital transformation by properly training personnel on emerging technology and ensuring that decisions can be made at the right level so that innovation and digital transformation are not stifled.

2. The Impact of Position and Personalities

a. Topic

Across many of the interviews, the weight of a person’s position and their personality had an overwhelming effect on whether digital transformation was successful. In terms of position, many NAVSUP personnel described scenarios where decisions had to be made either by admirals or Senior Executive Service (SES) personnel for low level



actions to be taken. This is not an issue specific to NAVSUP; it is the case across the DoD. Often lower-level leaders are not in positions to make decisions because their position does not come with that ability. The second component of this topic is how personalities affect the success of digital transformation. A member from NAVSUP mentioned that senior leaders have an overwhelming impact on what technologies are used and described that if the path that is proposed is not aligned with the senior leaders' vision, then it will not be taken. One respondent mentioned that if something new is to be accomplished, then that new idea must make a big difference in leadership's eyes, or there is a limited chance for it to be adopted.

b. Discussion

Palantir, Coupa, and SIMBA Chain all have a hierarchy, but the respondents described scenarios in which the hierarchy was not involved in every decision and personnel at their companies often had autonomy from senior leaders. For instance, the respondent from Coupa described a selfless culture at the company with minimal barriers. Minimizing barriers allows for people to make decisions, experiment, fail, learn, and move on. The respondent from Palantir described his organization as having a small flat structure that was aligned by functions. Among all three respondents was the idea that leaders are responsible for creating environments in which success is most likely to thrive. Many of the respondents, from both NAVSUP and industry, also mentioned communication siloes and how both position and personality can lead to people staying in the space they are knowledgeable of and not sharing information with others. Multiple people who were interviewed mentioned that leaders must have a good understanding of their organizations and the pulse of those organizations to understand if this siloed communication exists. The Coupa respondent described how a "foundation of excellence" could be created in order to help standardize a path to be taken in regards to issues that fall under digital transformation such as AI, predictive analytics, and blockchain. Too often a person in a position with a certain personality can push to get something done. A foundation of excellence, as the Coupa respondent describes, could help create a path of what NAVSUP needs. The foundation of excellence would focus on process improvement and ways to create value for the organization.



C. PROCESS AND POLICY

1. Finding the Problem

a. Topic

Emerging technology is often used by organizations to solve problems. Some problems that NAVSUP experiences include legacy enterprise systems, auditability, sales and operations planning, and forecasting. Many emerging technologies claim to solve or mitigate these types of problems with which NAVSUP deals. There are two routes that organizations can take when dealing with emerging technologies. The first option is for an organization to choose a technology that they want to implement and then find a problem to which to apply it. The second option is for the organization to determine that a problem exists and choose a technology that can solve the problem. Often, the process of how an emerging technology is chosen, especially when the technology results in digital transformation, will determine whether the technology is a success or not. The employees I interviewed from all three companies said that successful implementation of technologies was more likely to occur when there was a clearly defined issue or problem that the technology would help solve.

b. Discussion

The military is known for using buzz words and in an era where the military is being told that it does not innovate fast enough to keep up with adversaries' innovations, there is a lot of *innovation theater* going on. Innovation theater can be described as a lot of talk about innovation, ideas, and technology, but minimal value coming from the innovation (Viki, 2020). The goal of digital transformation is to use technology to bring value to an organization. NAVSUP does not measure value the same way as a for-profit company does, but it is possible for NAVSUP to gain value in the form of warfighter readiness from digital transformation when it is correctly applied to a problem. Multiple interview respondents from NAVSUP were fully aware that problem identification should be the first step in implementing technology. However, each person that I interviewed at NAVSUP worked in a field that dealt with IT modernization and technology. Each respondent also recalled times when a leader determined that a technology should be used before having a problem to fix. The main disconnect seems to



be that some members of the NAVSUP workforce understand what a successful path for digital transformation should look like, while others do not. The lack of understanding in how to implement innovations can be directly associated with the education level and training in regard to how to successfully adopt innovations.

2. Conducting Successful Training

a. Topic

The Navy requires its personnel to conduct specific training related to their current positions. NAVSUP also has additional opportunities for its personnel to conduct training at multiple institutions such as the Naval Postgraduate School (NPS), top business schools through the 810 program (a master's degree program that allows Supply Corps officers to attend one of the top 30 business schools in the United States), as well as executive education courses. Some of the courses that are offered in these programs consist of training in emerging technology and innovation, but NAVSUP misses an opportunity for more personnel to be trained in those topics. Companies that create emerging technologies often have training programs to help implement the technology at an organization, but homegrown education within an organization can provide increased opportunities for success in digital transformation.

b. Discussion

Palantir, Coupa, and SIMBA Chain all have methods to ensure that organizations that use their technology are properly trained to use their products successfully. These organizations also hire personnel who have skillsets specifically related to the technologies that they create. NAVSUP does recruit civilian personnel in a similar fashion and many of the civilian personnel do have strong technological backgrounds. Military members though are not recruited in the same way. Some may have certain technological skills due to their own efforts, but there is not a formal training designed to educate Supply Corps officers in emerging technology or innovation. *War Transformed* by Mick Ryan (2022), states that due to Industry 4.0, the military organizations able to adapt, notice opportunity, and learn “will be in an era of opportunity, prosperity, and security (p. 12). He goes on to state that those that do not adapt will likely be encountered



by “great perils (Ryan, 2022, p. 12). Through learning and having the right training in I4.0 technologies, NAVSUP could have the chance to prosper in a world of faster change and innovation. Numerous options exist to enhance the training and education of the Supply Corps so that officers stay abreast of innovative technologies that could help strengthen the supply chain and ensure that warfighters are equipped with everything they would need in any circumstance.

3. Successful Ways to Adopt Innovation

a. Topic

Organizations aim to bring emerging technologies to the organization to fix or improve their current practices. Technology, though, is not a panacea for all the problems that organizations have. All three respondents from industry mentioned how either their organizations or organizations that they have worked with have been able to successfully adopt an innovation, and the success was not due to the technology alone. When an innovation is introduced to an organization there are bound to be barriers across the spectrum—people, processes, and culture—as previously discussed in this research. Due to these barriers, I will aim to show how industry has successfully adopted innovations, as well as describe instances where this has occurred at NAVSUP. Understanding both the failures and successes in implementing innovations is key to ensuring NAVSUP stays on the right path of innovation in the future which can lead to a successful digital transformation.

b. Discussion

Discussions with Palantir, Coupa, and SIMBA Chain led to three main ideas that were attributed to successful adoptions of innovation. The first idea deals with how an innovation is introduced to an organization. Two of the respondents mentioned that successes that they had observed at organizations started with a small team determining if the technology would fix the problem. In essence, starting small is like an experiment for an organization. According to the respondents, starting small also allows for organic growth vice forced expansion which is sometimes the case in large organizations when a technological change is forced on personnel. Starting small allows for the team to give



inputs on the innovation so it can be improved before being pushed out organization wide. The second idea relates to the adoption of innovative ideas by having leadership involved throughout the entire process. Leaders help create the environment that would allow for adoption and they can do this through a handful of methods. For example, leaders could support training and education in emerging technologies by providing time and incentives to train. They could also do listening tours with the workforce who may feel the technology would be replacing their jobs. Ultimately, if leaders are looking for digital transformation to occur through adoption of innovations, they must look into not only the technology, but also the processes in place, people who would be involved and the culture around technology and innovation. The final aspect that was brought up by both NAVSUP personnel and industry personnel was the idea that people have to be more open to taking risks. These risks are not career-ending risks, but risks associated with not being afraid to try something if it has never been done before. Many of the respondents described scenarios like this in which teams were too afraid of failure to adopt new innovations. Ultimately, fear of failure is something that leaders of an organization must change because they are the ones that create a culture where personnel look for problems and innovative ways to fix them.

D. CULTURE

1. Changing the Innovation Culture

a. Topic

Innovation has different meanings for different people. In terms of the DoD, innovation can be applied to both process and technology. Often, a successful innovation includes both technology and process. All respondents mentioned that their organizations' leadership plays a role in the culture of innovation and how members of their organization viewed the ability to be innovative in their organization. Members often viewed their organization as more innovative if leaders fostered an environment conducive to innovating. The difference between emerging technology companies that I focused on and NAVSUP is that the personnel structure, which has an effect on innovation culture, is almost opposite the military personnel structure. Military personnel structure has a large impact on innovation culture, and although the full structure of the



military will not change, its leaders' understanding of innovation culture can have an impact on innovation. Another factor of innovation experienced both in industry and at NAVSUP is when leaders have a desire to use new technology. However, a technology or innovation will not make an organization better just by using that innovation. Innovations tend to be successful when an organization first discovers what problem needs to be fixed and then, upon further problem deep-dives, what the roots causes are. Respondents from both industry and NAVSUP stated that both instances have occurred: problem discovery leading to success and direct technology adoption which normally results in failure.

b. Discussion

Changing the culture around innovation is a way to set organizations up for a successful digital transformation. Changing the innovation culture is focused on two ideas. The first idea is understanding the innovation process. The second idea is creating an organizational structure that is conducive to innovation. Understanding the innovation process, specifically as it relates to the DoD, is an important step to creating a supportive organizational culture of innovation. The best way to understand innovation is for personnel to learn how it works. In an ideal setting this would start with leaders at NAVSUP understanding innovation within the DoD. There are not many ways to learn about innovation within the DoD ecosystem. However, one such way, is through the courses that are offered at NPS to not just the Navy, but all the services. Another method of learning about the innovation ecosystem is through self-study and networking, but those methods are solely dependent on individuals who are willing to put in effort to learn more about the innovation ecosystem. This knowledge must be searched for by personnel and this knowledge is not something that is yet promoted by leadership within NAVSUP. An innovation curriculum, as part of professional military education (PME), would introduce innovation concepts to military personnel and possibly have effects on the culture of innovation. The second idea, organizational structure, also has an effect on the culture surrounding innovation. The Palantir respondent mentioned that Palantir's corporate structure is flat, while the Coupa respondent stated that his organization had limited barriers between levels of leadership. As organizational structure relates to NAVSUP, there is potential for NAVSUP to implement new organizational structures for



groups working on innovation so barriers to questions, failures, and cooperation are lowered like how the companies that took part in interviews are arranged.

2. Changing the Experimentation Culture

a. Topic

Experimentation is the act of taking a hypothesis and testing it to see what the results turn out to be. In terms of innovation, experimentation allows for the innovator to test an innovation, get feedback, and then pivot the innovation towards something that can better solve whatever problem an innovation was created for (Ries, 2011).

Experimentation is another concept that has different meanings to people who are in different positions within an organization. The respondents from Coupa, Palantir, and SIMBA Chain all mentioned different aspects regarding experimentation. For example, at Coupa, successful uses of emerging technology to help digital transformation often occurred when the people who would be using the technology were involved from the beginning. As for SIMBA Chain, the respondent said that he noticed successful technologies were implemented in the DoD when the technology had been demonstrated somewhere else prior to being implemented into the DoD. Finally, the respondent from Palantir said that teams that are successful at digital transformation often involve small groups for testing before full implementation.

b. Discussion

The respondents from industry provided three main points that can be applicable for NAVSUP. The first aspect, which is including the end user from the beginning, is an idea that could result in a higher likelihood of digital transformation being a success. Inclusion of the end-user's inputs allows for a process to be updated as necessary if some part of the transformation was not working for the end user's as it should have. The second insight, which came from the SIMBA Chain respondent, focused on how the DoD first had to see technology work in the private sector before using it in the DoD. This is not direct experimentation by the DoD, but it is an observation that can provide insight to whether the DoD could use whatever technology was being shown. For NAVSUP to be aware of observation opportunities, NAVSUP personnel would have to be knowledgeable



about emerging technologies and the types of problems NAVSUP encounters that could potentially be solved with transformational technologies and processes. The final method that was mentioned by industry focused on having small teams test the process/technology. Testing is experimentation in its truest form and it allows a small group to focus on whether an innovation can solve the problem that the innovation was created for. As digital transformation occurs, NAVSUP needs to be aware of which organizations the transformation will affect. That will affect which small teams would be able to test new innovations before they would be released enterprise-wide. One additional point is necessary to understand the current experimentation ecosystem. NPS offers a Hacking for Defense class in which students are given a real problem to experiment with and look for solutions to the problem. So far, only Air Force personnel have taken the class, and it may be beneficial in the future for all of the services to take part in the class, including Navy Supply Corps officers in both the Operations Research program and the curriculums in the Department of Defense Management.

3. Changing the Culture around Failure

a. Topic

Failure is likely to happen at different points when organizations go through a digital transformation. Often, a technology is released, it fails, and then the innovator goes back to the drawing board to fix whatever the issue was. Failing, learning, and then iterating to make the innovation better must happen to get an innovation to work. In the military, there is a stigma around failure. In the Navy, there is currently a program called Get Real, Get Better that is focused on embracing issues and problems to understand them and then make changes to fix those problems (U.S. Navy, 2022). This is a step towards the Navy changing its culture around failure, but more effort in the future can lead to cultural change around failure in the Navy. All interview respondents mentioned how military personnel are risk adverse and at times to a detriment.

b. Discussion

The Navy has a zero-defect mentality, and that is good for some things, like operating a nuclear reactor on a submarine. However, everything that the DoD is



responsible for does not have the same level of risk as nuclear energy. Industry often has to take risks to find a way to compete in the business world. Risks though are not taken just for risks sake. Industry will have a goal, aim to create an environment where that goal can be achieved, and then they act. NAVSUP has the ability to do this. NAVSUP leaders can create an environment where calculated risk is allowed, people can take chances to see if new processes can work, and failures can occur. People who take these risks, though, have to take them if they are ever to find a truly innovative way to change a process. Related to digital transformation, NAVSUP should test new processes, new technologies, fail, iterate, make things better, and then, once a product is ready, they should scale.



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VI. CONCLUSION

I aim in my thesis to determine what can make a digital transformation either a success or a failure. The goal is to provide input to NAVSUP so it can create a digital transformation strategy for now and in the future. My method to do this was through interviewing members of emerging technology companies and interpreting their best practices so NAVSUP could try to implement versions of those practices in their own operations. Hypothetically, NAVSUP could implement I4.0 technologies and the result would be a more resilient supply chain for the Navy. My summary of findings captures what I determined is most relevant to a digital transformation strategy. I also point out areas that require more research than what I was able to cover.

A. SUMMARY OF FINDINGS

I was able to compile industry practices and additional insights that I recommend NAVSUP considers in its execution of digital transformation both now and in the future.

1. Problem Discovery

Problem discovery is the first step that enables successful digital transformations. A problem must be determined before any technology is chosen. New technologies come with a lot of hype, but hype is not a reason for technologies to be implemented. Digital transformation fixes a process and includes technology, but leadership must always have an organization's personnel and mission in the front of their mind before they choose to have a technology be implemented. Problem solving is often difficult to nail down because the problem is not always evident. The military is often reactionary and at times looks towards the first items that could be a problem and then aims to fix them. At NAVSUP, leaders must be analytical in their problem discovery, and there are two ways leadership can do this. The first way is to embrace innovation education for Supply Corps officers' professional military education. Supply officers of the future will be part of an era in which technology and human interaction continues to merge. Organizations that understand this concept and are able to adapt and benefit from positive interactions with technology will come out on top. To do this, NAVSUP can make innovation education



mandatory while at NPS as well as include the NAVSUP enterprise in the Hacking for Defense program. The second aspect that NAVSUP needs to ensure happens while discovering problems that need to be fixed is to include the operational through strategic stakeholders of actions that are taken. This means that logistics specialists, culinary specialists, retail specialists, and Supply Officers at operational units should be consulted with to determine real problems that affect the operational forces of the Navy's supply chain. There are many levels of supply personnel and NAVSUP should find a way to consult with each level so that warfighters can be best supplied with the necessary equipment and processes for any situation.

2. Experiment and Iterate

Experimentation and iteration of new concepts, processes, and technology can help bring NAVSUP to the innovative edge of supply chain operations. There are three ways that NAVSUP can create an innovative environment in the NAVSUP enterprise. The first method is for leadership to create a mindset of experimentation. The next step is to create a space for experimentation where the people conducting the experiments feel safe to explore and push for innovative process improvements without fear of failing. The final step is to create incentives for people to experiment.

A mindset of experimentation is a cultural aspect of NAVSUP that must be changed. The closest thing that NAVSUP has for the logistics enterprise to experiment is an innovation portal on the MyNAVSUP homepage where there is a "Submit Idea" tab and a Logistics Innovation Cell tab. The Submit Idea submissions are limited in their suggestions in how to improve NAVSUP processes, while the Logistics Innovation Cell only has one post in the last 18 months. Part of the reason for the minimal use of these portals is most likely due to people not knowing these portals exist. Leaders need to become aware of these two items and let their people know they exist. Additionally, leaders should embrace an experimentation mindset so people are always on the lookout to do things better. A concrete way for NAVSUP leaders to show that they can embrace an experimentation mindset is to create an experimentation space.

NAVSUP has about 70 students at NPS at any one point. It should utilize these students to work on problems that the NAVSUP enterprise experiences across all



domains that NAVSUP personnel operate in. From ship to shore, there are issues that students can have the opportunity to solve. Silicon Valley is an hour away from the school and NPS has many connections with different industry partners that may help NAVSUP innovate both faster and better than it is currently doing. The space at NPS is ideal because it is in an educational environment where students can feel safe to learn, experiment, fail and iterate.

The final component that NAVSUP can embrace to strengthen innovation and increase the likelihood of a successful digital transformation is to create incentives for NAVSUP personnel to innovate. There are numerous ways to do this. First, NAVSUP could sponsor a business pitch competition focused on innovations that can solve problems that NAVSUP currently has. The teams should come from all over the NAVSUP enterprise and there should be awards for the pitches that win. For the students at NPS, Supply Corps students could participate in Hacking for Defense competitions that could help Navy detailers place students into billets in which they will continue their innovative work. All of the previously mentioned processes can help NAVSUP innovate in general, and the more knowledgeable NAVSUP personnel are about innovation, the more likely NAVSUP will be in conducting a digital transformation for the enterprise.

3. Necessary Policy

NAVSUP has an opportunity to be ready as an organization to successfully implement a digital transformation. One policy that NAVSUP should consider is a new education policy focused on innovation at different levels of the DoD. The current career progression for most Supply Corps officers in their first 10 years of service is to have one sea tour as a division officer, then a shore tour, and then a sea tour as a department head. Before each of these tours, there is usually a set of schools that the officer will attend. During the temporary duty at school, the Supply Corps should implement a program that helps teach innovation theory at the different levels that the officers will be at. As discussed earlier, there should be increased innovation education for mid-grade officers as well as senior officers so NAVSUP can adapt as emerging technologies are created.

One other recommendation is for NAVSUP to create a digital transformation policy. Currently, there is an IT modernization plan that is in development. However,



digital transformation does not only apply to the modernization of IT. Digital transformation is a holistic effort for an organization to change its process, its people, its culture, and finally, its technology so that the organization's goals are more likely to be met both now and in the future. As part of this recommendation, I suggest that NAVSUP create a position on its staff with the role of ensuring digital transformation across the different domains (technical, personnel, operations) and synthesizing with each other in order to help the NAVSUP enterprise support the warfighter.

B. FUTURE RESEARCH OPPORTUNITIES

My research included employees from three private-sector companies and five personnel at NAVSUP who were knowledgeable about digital transformation. The goal was to be focused on industry methods related to emerging technology as well as organizational change related to innovation. Although I garnered insightful themes to help develop a digital transformation strategy for NAVSUP, I believe that researching the following topics would be fruitful endeavors to help NAVSUP continue to be innovative.

1. Supply Chain Specific Problems

NAVSUP can request that students at NPS conduct research on specific issues. NAVSUP needs to determine supply chain problems and present those problems to students at NPS. NAVSUP could support this action through the creation of a logistics-focused research group that falls under the Naval Warfare Studies Institute. The problems could focus on AI in the Navy's supply chain, blockchain in the Navy's supply chain, or Navy supply chain mapping. As stated before though, technology is not the answer; finding the problem is where any instance of improvement should begin. Research could also be conducted on specific innovative programs to determine if those programs were implemented in the best way resulting in positive change.

2. Innovative Change at Different Levels of Logistics

Change can occur at all levels of the military. Further research can be conducted on digital transformation at different levels of an organization. For the military, it could be helpful to research digital transformations at the tactical, operational, and strategic



level. Different metrics could be used to determine whether digital transformation is helpful or not. A study into digital transformations at these different levels can help inform the military on continued best practices of innovating.

C. FINAL THOUGHTS

For current members of the military, logistics has been an afterthought for much of their career. The most senior members of the military joined in the 1980s. Since then, until now, logistics has occurred, for the most part, in uncontested environments. That means that it has been relatively safe to conduct logistics operations because there has not been an enemy to deny the United States freedom to maneuver in military logistics.

The geopolitical world is changing, and the world is becoming multi-polar and the United States can no longer expect that logistics will be uncontested for the foreseeable future. As it relates to the Navy and its logistics and supply chain, NAVSUP must use emerging technology and craft a culture that is ready to experiment, iterate, fail, and then succeed because our adversaries will be doing the same.

It is unlikely for NAVSUP to always have the newest supply chain technology, but it can push itself to be on the edge of creating an innovative culture that doesn't just do the day to day work that is necessary, but instead looks to the future for how processes can change, emerging technology can be used, and missions can be accomplished. Technology will not stop changing and NAVSUP must not stop innovating. NAVSUP needs to continue moving forward through constant improvement in digital transformation, which starts with innovation education.



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